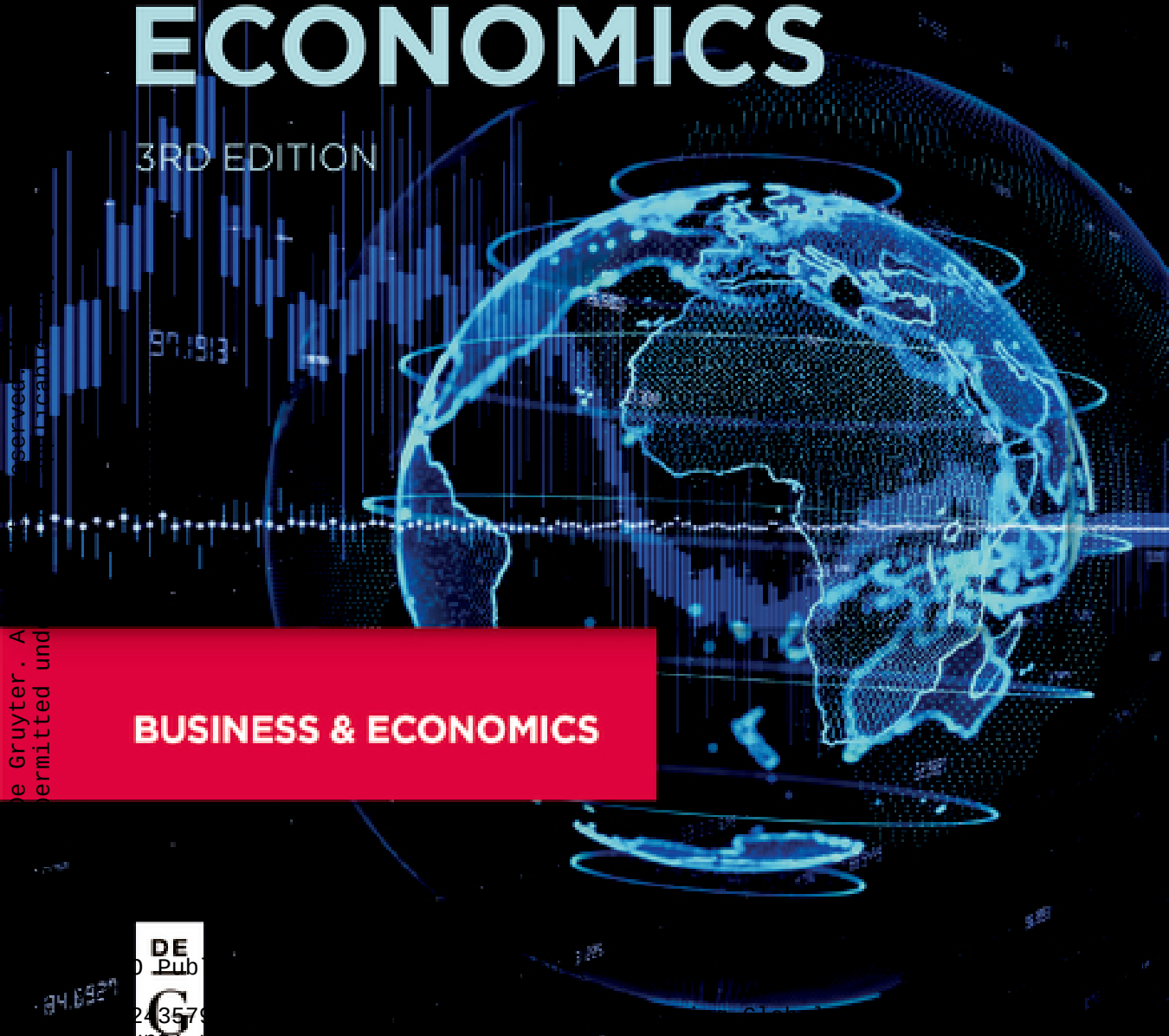
DE GRUYTER

John E. Marthinsen

DEMYSTIFYING GLOBAL MACRO-ECONOMICS

3RD EDITION



BUSINESS & ECONOMICS

John E. Marthinsen

Demystifying Global Macroeconomics

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I dedicate this book to Dr. Henri B. Meier, a friend of many years, mentor, and colleague, whose insights and support have had permanent and invaluable impacts on my life—as well as that of my family. Henri Meier is an enabler of the best kind, who has opened my eyes to important links between theory and practice.

Acknowledgments

I mentioned in the first and second editions of *DGM* and want to reinforce here that "*Writing a book is a lesson in humility*." If you don't believe me, try writing one yourself, and you will understand. So many people have contributed to the thoughts expressed here and supported their development. My first and most heartfelt thanks go to my family—Laraine, Eric, and Nils and now, also, Effie and my beloved John and Alec—for their constant and unwavering encouragement and patience. My friends continue to be an enormous source of support and strength.

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About the Author

John E. Marthinsen is Professor of Economics and International Business at Babson College in Babson Park, MA, where he holds The Distinguished Chair in Swiss Economics. His primary research interests are in the areas of international macroeconomics, corporate finance, and international financial markets. An award-winning teacher, he is also the author of many articles and books. Among his related books are *Risk Takers: Uses and Abuses of Financial Derivatives*, Third Edition (Walter de Gruyter, Inc., 2018), *International Macroeconomics for Business and Political Leaders* (Routledge, 2017), *Swiss Finance: Capital Markets, Banking, and the Swiss Value Chain* (John Wiley & Sons, 2013)—co-authored with Henri B. Meier and Pascal B. Gantenbein, *Wealth by Association: Global Prosperity through Market Unification* (Greenwood Publishing Group/Quorum Books, 2003)—coauthored with John C. Edmunds, and *Switzerland: A Guide to the Capital and Money Markets* (London, England: Euromoney Books, 1996)—coauthored with Dr. Henri B. Meier.

John Marthinsen received his B.A. in 1970 from Lycoming College. Both his M.A. (1972) and Ph.D. (1974) degrees were earned at the University of Connecticut. He has extensive consulting experience, working for both domestic and international companies and banks, as well as for the U.S. government. Dr. Marthinsen has lectured at the Universities of Bern and Basel in Switzerland and the University of Nuremberg in Germany. From 1992 to 1998, he served as Chairman of Babson College's Economics Division, and from 2000 to 2009, he was a member of the Board of Directors for Givaudan SA, a Swiss-based flavors and fragrances company.

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Preface

Demystifying Global Macroeconomics (*DGM*) bridges the gap between the theoretical and practical use and understanding of international macroeconomics. For serious business and political leaders, understanding the global interconnections in economic and financial markets is crucial for making informed and well-timed decisions. *DGM* takes the mystery out of seemingly complex economic interactions by providing a logical framework within which to analyze the effects of economic, social, and political shocks to a nation's economy.

The contents of this book are sophisticated but not "rocket science." If I wrote it correctly, each section should follow in a logical order to build an understanding of how the global economy works. My approach is to rely on common sense, with the belief that only if a concept appeals to your sensibilities and intuition will it be remembered and used as a valuable decision-making tool. With the help of supply and demand analysis, this book explains how prices, rates, and quantities per period are determined in the real credit markets, real goods and services markets, and foreign exchange markets. It then goes on to show how these three major macroeconomic markets are interconnected.

The principles in this book have a rich history, which has evolved over time. While there is still controversy in economic circles, it is fair to say that there is much more agreement than discord. Understanding global macroeconomics brings structure and organization to commercial, financial, political, and social decisions. Its logic and circuitry are useful for analyzing current, past, and possible future economic events, and this usefulness is not tied to any geographic location.

A common denominator among all the important macroeconomic variables is that they are determined by market forces and not by managers. Nevertheless, good business managers understand how to anticipate, react to, and cope with the shifting tides of economic fortune and misfortune, just as good sailors try to anticipate, react to, and cope with changing weather conditions over which they have no control.

Possessing a solid macroeconomic framework empowers managers with the ability to:

- Create, critically evaluate, and effectively use country analyses to improve financial statement projections (e.g., income statements, balance sheets, and cash flow statements)
- Integrate anticipated economic changes and government policies into business strategies that increase competitiveness and performance
- Formulate reasoned opinions about the causes of and cures for chronic economic illnesses in countries

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– Understand the economic impact and sustainability of proposed political legislation

Economic causes and effects have short-term and long-term implications. This book views the short-term as a period from one-to-five years, which is consistent with companies' budget and business plan time horizons. It is also generally consistent with the terms of office for many countries' presidents and prime ministers. The long-term is for 10-to-20-year scenario-planning analyses. The luxury of time offers greater degrees of business flexibility and maneuverability than the short term.

By tying together relevant economic principles, this book explains how to answer questions, such as:

– What effects should U.S. tariffs on Chinese imports have on economic conditions (e.g., gross domestic product, unemployment rate, inflation rate, interest rates, and exchange rates) in the United States and China?
– Presidential candidates often promise to pass large infrastructure spending bills to repair and modernize aging roads, bridges, and airports. How should infrastructure spending, and the financing needed to support it, affect a nation's economic conditions?
– Suppose investment risks in Argentina, for instance, increase relative to the United States, causing massive sales of Argentine pesos for U.S. dollars. What effect should capital flight have on Argentina's economic conditions?
– In November 2016, India launched an ambitious demonetization program with a number of goals in mind. One of them was to have India's residents embrace cashless exchange in much greater numbers. What effect should an increase in electronic payments have on India's economy?
– Suppose the U.S. government finds a way to substantially reduce the drug abuse problem, in general, and the drug overdose problem, in particular, causing an increase in the nation's employment-to-population ratio. What effect should this successful effort have on U.S. economic conditions?
– Carbon tax proponents claim that this levy would be more effective at curbing pollution and fighting climate-change than government regulations. What effect should a carbon tax have on the adopting nation's economic conditions, government budget, and money supply?
– A border-adjustment tax would prohibit companies from deducting the costs of imported inputs from gross revenues, when they report their taxable earnings. At the same time, it would remove corporate taxes on export revenues. This combination is equivalent to a tax on imports and a subsidy for exports. What effects should a border tax have on the nation's economic conditions?

- In 2018, Saudi Arabia imposed its first-ever value-added tax (VAT) of five percent on the consumption of most goods and services. What effects should a VAT have on Saudi Arabia's economic conditions?
- Bolivia relies heavily on exported commodities. What effects should falling world commodity prices (e.g., the prices of mineral fuels, ores, and precious metals) have on Bolivia's economy.

Overview of the text

Demystifying Global Macroeconomics is divided into six parts. Parts 1–5 build an integrated macroeconomic framework called the *Three-Sector Model*, which will be used to explain how economic, political, and social shocks can cause multiple and interrelated *short-term* economic changes. At each step of the way, you will be urged to ask yourself whether or not the economic concepts introduced and reasoning used meet *your* tests of common sense. Part 6 deals with *long-term* economic relationships. Let's look a bit deeper at these six parts to gain a better understanding of the topics they cover.

Part 1 (Chapters 1 to 5)

Part 1 focuses on how to measure a nation's economic health and monitor it for changes. Central to this discussion is understanding a nation's labor market conditions and the difference between real (i.e., inflation-adjusted) and nominal macroeconomic variables, such as gross domestic product (GDP), interest rates, and wages. One reason inflation is a central focus of any book on macroeconomics is because unexpected changes in inflation create economic beneficiaries and victims. Who are the victims and beneficiaries? Does inflation hurt a nation's overall standard of living or merely redistribute income and wealth among competing groups within the nation? Part 1 addresses these issues.

Part 2 (Chapters 6 to 11)

Part 2 focuses on financial markets. It begins by defining the most important monetary aggregates and then discusses the functions of money, as well as the important role of financial intermediaries and how they can create money. The ability to create money is a powerful one, so Part 2 explains central banks' monetary controls. With an understanding of the monetary aggregates and how

they change, as well as how central banks regulate domestic liquidity levels, Part 2 then focuses on the real credit market, where the cost of real credit (also called the real interest rate) and quantity of real credit per period are determined by the forces of supply and demand. Part 2 ends with a discussion of cryptocurrencies, whether they are "money," their economic benefits, and the concerns that governments and central banks have about the effect they might have on nations' tax bases, monetary policies, and criminal activities.

Part 3 (Chapters 12 to 14)

Part 3 covers the real goods and services market, using aggregate supply and aggregate demand analysis to explain what causes a nation's real GDP and GDP Price Index to change. The effects of fiscal policies (i.e., government spending and taxation), automatic stabilizers, and business cycles (i.e., periodic economic expansions and contractions) are also explained in Part 3.

Part 4 (Chapters 15 to 17)

Global macroeconomic topics are infused into this book from the beginning, but Part 4 dives more deeply into the international sector. We begin by discussing the foreign exchange market's structure, key market participants, and the effects that foreign exchange transactions have on nations' money supplies. Care is taken to explain how to read and understand currency quotations and to distinguish between bilateral and effective exchange rates, as well as nominal and real exchange rates. Part 4 goes on to address how the forces of supply and demand determine exchange rates and how changes in exchange rates affect countries' international competitiveness. Finally, Part 4 ends by focusing on how to read and interpret countries' balance of payments reports. It uses the International Monetary Fund's (IMF) approach to reporting balance of payments figures (rather than using any particular nation's approach) because IMF data can be used for cross-country comparisons. This chapter explains the most important balance of payments measures, what they reveal about a nation's economic conditions, and the ways in which managers can use them to make well-informed decisions concerning each world market in which they participate.

Part 5 (Chapters 18 to 21)

Part 5 synthesizes the information from Parts 1 to 4 into the *Three-Sector Model*. At this point, you will understand: (1) how the real interest rate and the quantity of real credit per period are determined in the real credit market, (2) how the GDP Price Index and real GDP are determined in the real goods and services market, and (3) how the nominal exchange rate and the quantity of foreign exchange per period are determined in the foreign exchange market. The goal of Part 5 is to integrate these three markets and show how changes in one of them cause predictable changes in the other two.

The beauty of the *Three-Sector Mode*l is that it empowers you to conduct an economic analysis of any country, understand those of others, critically evaluate articles and editorials in the business media, such as *The Wall Street Journal*, *Financial Times*, *and The Economist*, to better formulate financial statement projections and contribute meaningfully to business strategy and planning discussions. Part 5 analyzes the short-term effects of shocks to countries with flexible *and* fixed exchange rates. Prominent in Part 5 is the role of international capital mobility[1] and how its variations can affect economic outcomes. Part 5 ends with a case study of the Great Recession, which lasted from December 2007 to June 2009 and will be remembered by many as a low point in U.S. economic performance and financial regulation.

Part 6 (Chapters 22 and 23)

Part 6 opens our macroeconomic analyses to long-term business planning issues, which are particularly important to companies that are considering strategic maneuvers, such as mergers, acquisitions, and divestitures, as well as changes in sourcing, production, or marketing. This part begins by discussing scenario planning and the major causes of long-term development. Then, it explains comparative advantage, which demonstrates how open trade can be a win-win proposition. Part 6 goes on to explain why the economic reasoning behind good macro-level decisions at the national government level may be quite different from good company-level decisions. For instance, a nation's GDP *is not like* a company's gross sales revenues; most countries have their own currencies, but companies do not; a majority of countries consume internally most of what they produce and source

1 In general, international capital mobility is the responsiveness of global investment flows to relative international interest rate changes.

from themselves the vast bulk of their needed inputs, but companies do not. Countries have full-employment targets and use monetary and fiscal policies to reach these goals, while nothing comparable exists at the company level. For these reasons, the best treasury officials, central bankers, and top-notch public policymakers may not be the most successful chief executive officers and chief financial officers. Part 6 then discusses monetarism, the quantity theory of money, causes of long-term inflation, and the long-run Phillips Curve, which addresses whether nations face a long-term trade-off between unemployment and inflation. The natural-rate hypothesis is used in this section to facilitate the discussion.

What's new in the third edition?

The third edition has already been tested on about 150 MBA students at Babson College, to whom I owe an enormous debt of gratitude for their thoughtful feedback and suggestions. Babson College's student population is highly international, which makes teaching this material a pleasure because it is like presenting global macroeconomics to a United Nations' audience. Knowing that English, for many of my students, is their second (or third, fourth, or more) language, I have reduced the length of this book and tried to keep it free of economic jargon. What jargon remains slipped past my best efforts and is purely unintentional.

In keeping with the second edition, I have separated each chapter into "The Basics" and "The Rest of the Story." "The Basics" section contains material that is essential to build a solid foundation in global macroeconomics. "The Rest of the Story" material provides students, professors, and other interested readers with flexibility to pick and choose topics of interest that support their time constraints and interests.

The chapter sequence and some of the titles, in the third edition, are slightly different from the second edition. Table P.1 highlights the similarities and differences. Two noticeable changes, which will be discussed below are: (1) the material on business cycles has been moved from Chapter 4, "Inflation, Real GDP, and Business Cycles" (second edition) to Chapter 14, "Business Cycles" (third edition), and (2) the material in Chapter 10, "The Economics of Virtual Currencies" (second edition) has been almost completely rewritten and placed into Chapter 11, "The Economics of Cryptocurrencies" (third edition).

Chapter 2, "Taking an Economic Pulse Beat" has been reorganized in the third edition by focusing "The Basics" on gross domestic product (GDP) and leaving nuances related to differences between GDP and gross national product (GNP) for "The Rest of the Story" section of the chapter.

Table P.1: Table of Contents Comparison for DGM's Second and Third Editions.

Chapter	Third Edition Chapter Title	Chapter	Second Edition Chapter Title
FM	Preface	FM	Preface
1	Introduction	1	Introduction to International Macroeconomics
2	Taking an Economic Pulse	2	Taking an Economic Pulse: Measuring National Output and Income
3	Labor Market Conditions	3	Understanding and Monitoring Labor Market Conditions
4	Inflation and Real GDP	4	Inflation, Real GDP, and Business Cycles
5	Inflation: Who Wins, and Who Loses?	5	Inflation: Who Wins, and Who Loses?
6	Monetary Aggregates	6	Monetary Aggregates: Measuring Money
7	Financial Intermediation	7	Financial Intermediation, Markets, and Intermediaries
8	Money Creation	8	The Power of Financial Institutions to Create Money
9	Central Banks	9	Who Controls the Money Supply and How?
10	Real Credit Markets	10	The Economics of Virtual Currencies
11	The Economics of Cryptocurrencies	11	Interest Rates and Why They Change
12	Real Goods and Services Markets	12	Price and Output Fluctuations
13	Fiscal Policy	13	Fiscal Policy and Automatic Stabilizers: What Managers Need to Know
14	Business Cycles	14	Basics of Foreign Exchange Markets
15	Foreign Exchange Basics	15	Exchange Rates: Why Do They Change?
16	Foreign Exchange Markets	16	Balance of Payments Fundamentals
17	Balance of Payments	17	Putting It All Together
18	Putting It All Together	18	Economic Shocks to Nations with Flexible Exchange Rates

Table P.1 (continued)

Chapter	Third Edition Chapter Title	Chapter	Second Edition Chapter Title
19	Shocks to Nations with Flexible Exchange Rates	19	Economic Shocks to Nations with Fixed Exchange Rates
20	Economic Shocks to Nations with Fixed Exchange Rates	20	Causes, Cures, and Consequences of the Great Recession
21	Causes, Cures, and Consequences of the Great Recession	21	Causes of Long-Term Growth and Development
22	Long-Term Growth and Development	22	Long-Term Exchange Rate Movements and Comparative Advantage
23	Long-Term Inflation, Exchange Rates and Unemployment		
EM	Index	EM	Index
EM	Abbreviations	EM	Abbreviations
EM	Important Macroeconomic Relationships	EM	Important Macroeconomic Relationships

The section in Chapter 3, "Labor Market Conditions" (third edition) entitled "Outsourcing, Offshoring, and Reshoring," starts by distinguishing among outsourcing, offshoring, and reshoring and then goes on to explain the likely long-term macroeconomic effects of offshoring. In the third edition, I try to do a better job explaining the significant short-term transitional costs associated with offshoring and, therefore, the ethical choices nations may face. This chapter reminds us that economics provides answers that should be nuanced and put into a broader perspective.

Chapter 4, "Inflation and Real GDP" (third edition) differs from the second edition by eliminating the discussion of business cycles. Instead, this material has been moved to Chapter 14, "Business Cycles" (third edition). As a result, the business cycle discussion is now much closer to Chapter 12, "Real Goods and Services Market" (third edition), where the causes of real GDP movements are discussed. Also moved from Chapter 4, "Inflation, Real GDP, and Business Cycles" (second edition) is the discussion of hyperinflation and deflation, which can now be found in Chapter 12, "Real Goods and Services Markets."

Chapters 6 to 10 (third edition) focus on U.S. and global financial markets. Chapter 6, "Monetary Aggregates" and Chapter 8, "Money Creation" (third edition) are similar to their counterparts in the second edition. Chapter 7,

"Financial Intermediation," has been supplemented by a section entitled *Financial Disintermediation, Distributed Ledgers, Blockchain, and Smart Contracts*. This material is sure to pique the interests of those curious about cryptocurrencies and their effects on nations' financial systems.

In Chapter 9, "Central Banks" (third edition), I have added a short discussion of microprudential and macroprudential regulations. In "The Rest of the Story" portion of this chapter, I have also included a brief discussion of various monetary policy targets, such as inflation rates, interest rates, money supply growth rates, GDP growth rates, and exchange rates. Removed from the third edition are the second edition's appendices, entitled "Who Regulates U.S. Banks," "Structure of the Federal Reserve System," "Who Controls the Fed?" "A Brief History of the Federal Reserve System," and "U.S. Dollar Facts and Figures."

In the third edition, substantial changes (mainly in terminology) have been made to the discussion of how interest rates are determined. Chapter 10, "Real Credit Markets" (third edition) replaces Chapter 11, "Interest Rates and Why They Change" (second edition). It focuses on the real credit market and cost of real credit (also called the real interest rate). The second edition focused on the *real loanable funds market* and *real risk-free interest rate*. The third edition brings the material in this chapter and its terminology into closer alignment with what we all read in newspapers and the financial news. I also added to Chapter 10 a short discussion of the *liquidity trap*, which has become a topic of discussion since the Great Recession (2007–2009). Removed from Chapter 10 (third edition) is the second edition's coverage of "Perfectly Mobile and Perfectly Immobile International Capital Markets."

Chapter 11, "The Economics of Cryptocurrencies" (third edition) has been almost completely rewritten because so much has changed since publication of the second edition (i.e., Chapter 10, "The Economics of Virtual Currencies"). For instructors who can allocate a bit of extra time, this chapter promises to raise interesting questions for everyone in class. If the cryptocurrency markets grow to significant size, do they have the power to thwart central banks' abilities to control their nations' (or currency areas') money supplies and inflation rates? Do they undermine governments' tax bases and enable illegal financial activities, such as tax evasion and money laundering?

In the third edition, Chapters 12 to 14 focus on the real goods and services market. Chapter 12, "Real Goods and Services Markets" (third edition) replaces Chapter 12, "Price and Output Fluctuations" (second edition). Similarly, Chapter 13, "Fiscal Policy" (third edition) replaces Chapter 13, "Fiscal Policy and Automatic Stabilizers: What Managers Need to Know" (second edition). The content of Chapters 12 and 13 has been updated but, otherwise, it is very

similar to the second edition. While the content of Chapter 13 (third edition) is similar to the second edition, the order in which the material is presented has changed. First, I moved the section entitled "Active versus Passive Deficits and Surpluses" from "The Basics" to "The Rest of the Story" and changed the terminology a bit. Instead of discussing "active" and "passive" deficits, I use the terms "structural" and "cyclical" deficits, which we see more often in the new media and academic literature.

In the third edition, Chapter 14, "Business Cycles" is now a new and separate chapter, but most of the material covered in this chapter was formerly in Chapter 4, "Inflation, Real GDP, and Business Cycles" (second edition).

In the third edition, Chapters 15 to 17 focus on foreign exchange markets and the balance of payments. Chapter 15, "Foreign Exchange Basics" (third edition) replaces Chapter 14, "Basics of Foreign Exchange Markets" (second edition). Removed from Chapter 15 (third edition) is the extended discussion of forward exchange markets, which was included in the second edition.

Chapter 16, "Foreign Exchange Markets" (third edition) is similar to its second edition counterpart, Chapter 15, entitled "Exchange Rates: Why Do They Change?"), but the appendix entitled "Can the Supply of Foreign Exchange Slope Downward?" has been removed.

Chapter 17, "Balance of Payments" (third edition) has been substantially revised—and for good reason. I have tried to make this book as current, readable, and useable as possible. To this end, I have chosen to focus on the IMF's presentation of nations' balance of payments statistics. In 2013, the IMF tried to make its balance of payments statistics more transparent and user-friendly by using rules and guidelines laid out in its report entitled *Balance of Payments and International Investment Position Manual: Sixth Edition* (BPM6).[2] This new approach to measuring international transactions replaced the old version (BPM5),[3] which was released in 1993.

Chapters 18 to 20 (third edition), put together everything you have learned from the beginning of the book. The terminology in these chapters, especially with respect to the real credit market and balance of payments, has been updated. In the third edition of *DGM*, important distinctions are made between shocks that have *direct* and *indirect* impacts on the economy and also between *primary* and *secondary* economic effects.

2 IMF, *Balance of Payments and International Investment Position Manual: Sixth Edition (BPM6)*, 2013, https://www.imf.org/external/pubs/ft/bop/2007/bopman6.htm.

3 IMF, *Balance of Payments Manual*, 1993, https://www.imf.org/external/np/sta/bop/BOPman.pdf.

Chapter 19, “Shocks to Nations with Flexible Exchange Rates” and Chapter 20, “Shocks to Nations with Fixed Exchange Rates” (third edition) are similar to the second edition. To shorten the contents, I have removed from Chapter 20 the section entitled “Rise and Fall of the Asian Tigers: 1985–1997.” The new end-of-chapter review and discussion questions should help compensate for this loss of material.

Chapter 21, “Causes, Cures, and Consequences of the Great Recession” (third edition) has been updated and carries the same name as Chapter 20 in the second edition. The new version discusses what has happened since the Great Recession ended.

Chapter 22, “Long-Term Growth and Development” (third edition) and Chapter 23, “Long-Term Inflation, Exchange Rates, and Unemployment” (third edition) are similar to Chapter 21, “Causes of Long-Term Growth and Inflation” (second edition) and Chapter 22, “Long-Term Exchange Rate Movements and Comparative Advantage” (second edition), but the content has been reorganized to match the new chapter titles. Removed from Chapter 21 (second edition) and placed into Chapter 23 (third edition) are discussions of the equation of exchange, monetarism, quantity theory of money, natural rate of unemployment, and Phillips Curve. Removed from Chapter 22 (second edition) and placed into Chapter 22 (third edition) are discussions of comparative advantage and why a country is not a company.

Contents

Chapter 1
Introduction to Global Macroeconomics

Picture yourself as a newly appointed general manager, finance manager, or marketing manager working for a multinational company in an unfamiliar country. During the coming weeks and months, you will be expected to learn and understand your new business environment like no one else in the organization, becoming the "go-to person" when strategic and operational questions about this country or region arise. Succeed at your new tasks, and you will be rewarded—oftentimes financially, but equally often with more responsibilities. Failing to meet expectations can result in lateral job displacements or dismissal.

How can you systematically evaluate the health of a nation or region? Where would you begin your analysis? Answering these questions is the purpose of *country analysis*, which is the systematic investigation of the strengths, weaknesses, opportunities, and threats of a nation's, union's, or currency area's economic, political, and social systems.

This book provides the framework and tools needed to perform systematic macroeconomic analyses, which can be used to improve and reinforce any country analysis. The framework and tools described herein are valuable because their conclusions are logically defensible and can be enhanced, by experience, over time.

The Basics

Regardless of your company's location, its health and well-being are likely to be affected in substantial ways by the ebb and flow of national and international economic conditions. For develop*ed* nations, economic growth can make a noticeable difference in domestic residents' quality of life. For develop*ing* countries, growth is crucial and can make the difference between life and death.

Critical business decisions have one thing in common. They are based on the skills and insights of multiple disciplines, such as economics, accounting, entrepreneurship, ethics, finance, information systems, law, marketing, operations, organizational behavior, and strategy. Ignoring an essential discipline could render a decision misguided and its results ineffective. This is especially true for managers because companies are held accountable for their financial performance and ethical behavior, with scores kept in dollars, euros, pesos, yen, and yuan, and results tallied on scorecards called income statements, balance sheets, and cash flow statements. Table 1.1 defines these frequently used business terms.

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Table 1.1: Some Helpful Definitions.

Balance Sheet	A balance sheet shows a company's assets, liabilities, and stockholders' equity at a specific *point in time*.
Income Statement	An income statement shows a company's revenues, costs, and resulting profits or losses over a specific *period*.
Cash Flow Statement	A cash flow statement shows a company's cash inflows and outflows during a specific *period*. It is the combination of a company's income statement plus changes in its balance sheet.
Non-operational Cash Flows	Non-operational cash flows are from a company's financing and investing activities, rather than its regular business operations.
Operational Cash Flows	Operational cash flows are earned from a company's regular business operations.

To achieve their business goals and objectives, effective managers adjust their strategies to different competitive environments. For example, vitamin companies and other bulk chemical manufacturers often sell chemically identical products in very competitive international markets. Their prices are set by the global forces of supply and demand. Success in these industries depends on high efficiency, low-cost production, effective global distribution networks, and top-quality customer service. By contrast, pharmaceutical businesses, in general, and biotechnology companies, in particular, operate in riskier competitive environments, where research and development, patents, copyrights, trade secrets, strategic marketing, speed-to-market, and control of vital inputs are keys to success. One problem is, over time and in the absence of government protection, these advantages are eroded by imitation and competition as this industry gradually becomes more competitive.

This book focuses on macroeconomics, not microeconomics, and it is useful to keep the distinction in mind. Figure 1.1 shows how microeconomics focuses on understanding the relationship between a *company* and the *industry* in which it competes. Sustainable profits require efficiency and a thorough grasp of shifting industry trends, but focusing exclusively on these two levels of management ignores important broader issues. Firms and industries also operate in *national* and *global markets*. The macroeconomic variables determined in these markets and the cultural norms that arise from their general socioeconomic settings are crucial factors influencing company and industry performance. An old aphorism says "a rising tide lifts all boats," and this is true for company performance. It is much easier to hide the sins of managerial ineptitude when national and global markets are surging than when they are stagnating or falling.

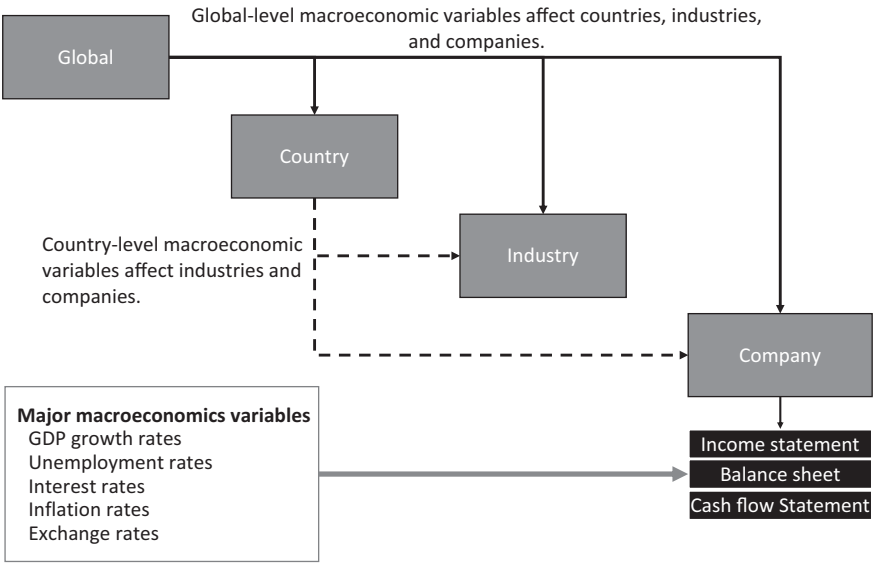

Figure 1.1: Companies and Industries within a Country and Global Setting.

Three Major Macroeconomic Markets

International macroeconomics focuses on the interaction of three key markets: the credit market, the goods and services market, and the foreign exchange market (see Figure 1.2).

- The *credit market* is where a country's interest rates and the quantity of credit per period are determined by borrowers' demands and lenders' supplies.
- The *goods and services market* is where a nation's average price level (i.e., price index) and output rates (i.e., gross domestic product) are determined by businesses that supply products and the consumers, businesses, governments, and foreigners that demand them.
- The *foreign exchange market* is where global forces of supply and demand determine exchange rates and the quantities of traded currencies per period.

Understanding how each of these three macroeconomic markets functions in isolation is important, but the most valuable rewards are harvested by understanding how all three interact simultaneously—which means understanding how shocks to one or more of these markets affect the others. It is only then that sound business judgments, reasoned political decisions, and insightful conclusions about past, present, and expected future events can be made.

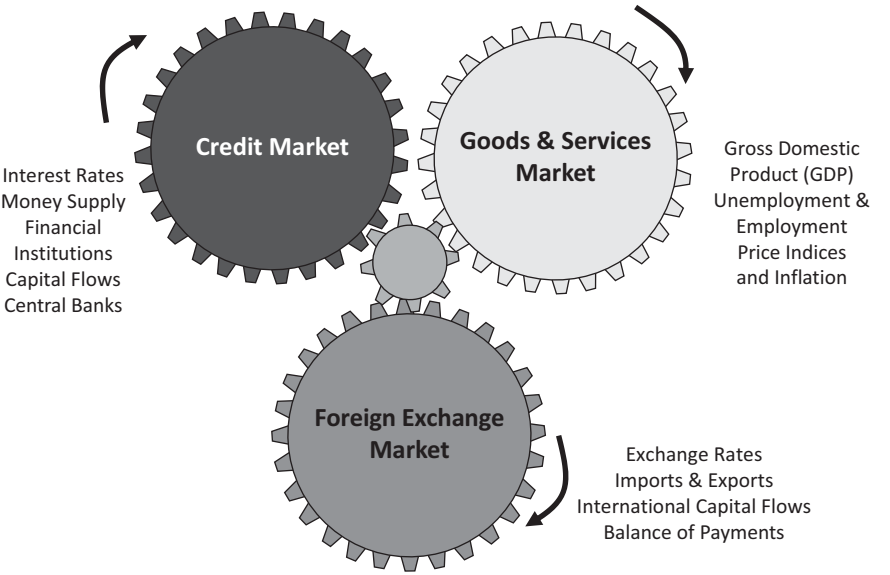

Figure 1.2: Three Major Macroeconomic Markets.

Flow Versus Stock Variables

Figure 1.2 portrays the three key macroeconomic markets as interconnected, spinning gears. The purpose of this visual is twofold. First, it reinforces the idea that macroeconomic analyses are concerned mostly with flow variables rather than stock variables. A *stock variable* is measured at a point in time. Examples of stock variables are a nation's money supply and capital infrastructure, as well as company assets and liabilities. By contrast, a *flow variable* is measured over a period because only by knowing the length of time does the measure make sense.

The following example will show why. Suppose a friend said she earned $2,000. Without knowing whether she earned the amount per hour, day, week, month, quarter, or year, her salary information is meaningless. Besides income, other examples of macroeconomic flow variables are consumption, investment, government spending, imports, exports, taxes, deficits, and all the components of a nation's balance of payments.

Macroeconomic equilibrium is a dynamic, harmonious state, where opposing forces of supply and demand meet and balance each period. Using the visual in Figure 1.2, macroeconomic equilibrium can be viewed as a state in which all three

gears move at expected speeds and in expected directions. It is *not* a state where the gears are at rest.[1]

Most macroeconomic analyses begin by assuming a nation's markets are in a state of dynamic equilibrium and remain that way until some external shock changes supply or demand conditions in one (or more) market(s). Then they explain the likely impacts of this shock. Assuming a nation's markets are initially in equilibrium is mainly for convenience and ease of analysis, but it is not a necessity. Under normal conditions, results of economic analyses would be the same, even if the nation did not start exactly at equilibrium, because macro markets should be continually moving an economy toward equilibrium. When an external shock occurs, it merely changes the equilibrium endpoint to which markets move.

Think of equilibrium as the point where the amount supplied equals the amount demanded. If the nation's price level were initially in equilibrium, any increase in demand would drive up the price level. Now consider a nation whose price level was slightly below (but approaching) equilibrium. With no change in supply or demand, market forces should drive it upward toward equilibrium. If demand increased, then market forces would drive the nation's price level to a new and higher equilibrium price. In short, there should be no *qualitative* difference between a nation starting in equilibrium and one starting slightly out of equilibrium.

Logical Interdependence

This brings us to the second reason for visualizing a macroeconomic system as three, interdependent, turning gears. Changes in the speed and direction of any gear cause predictable movements in the speed and direction of the other gears. In short, no gear can move without causing logical and predictable changes in the others.

Business Uses of Macroeconomic Analyses

Well-founded macroeconomic analyses can act as beacons of light when significant business decisions must be made. The structure and rigor they bring to the

1 It is also helpful to think of macroeconomic equilibrium as the water level in a bathtub, where the water flowing in through the faucet equals the water rushing out through the drain. Despite the inflows, the water level stays the same. Equilibrium should not be viewed as the water level in a bathtub with no running water, faucet, or drain.

decision-making process are as important as the projections and conclusions they generate.

Meaningful projections and scenario analyses of cash flows, income statements, balance sheets, and risk measures need reasonable and internally consistent assumptions about the interrelationships among economic variables, such as prices, output growth, interest rates, and exchange rates. Those individuals responsible for developing these analyses often find themselves in front of seasoned, highly informed audiences, among whom may be the company's chief executive officer (CEO), chief operating officer (COO), chief financial officer (CFO), treasurer, directors, division heads, and department chiefs. Carefully examining the assumptions and conclusions of such analyses is important because mergers, acquisitions, capital budgeting projects, and marketing plans can involve expenditures worth millions (in some cases, billions) of dollars and can have significant effects on a company's strategy and profitability. We might go even further and say that, unless some overriding strategic goal takes precedence, profitability projections are usually the primary basis on which business decisions are made—even though other goals, such as long-term sustainability, as well as environmental, social, and governance (ESG) criteria are expanding many companies' short-term horizons.

Macroeconomic Analysis Is Not a Crystal Ball

Even if country analyses and financial projections are based on the most current, realistic, and internally consistent macroeconomic assumptions, they are not crystal balls into the future. The value of macroeconomic analysis is measured by the extent to which it reduces the odds of making bad decisions, which means increasing the odds of making good ones. The future is not predictable, so anyone conducting a macroeconomic analysis should expect inaccuracies in his or her assumptions and predictions. At the same time, the future is imaginable, and using reasoned macroeconomic analysis with reasonable assumptions can increase the chances of making the right choices.

In the context of a firm, there are meaningful differences between short-term and long-term macroeconomic analyses. In this text, *short term* refers to a time horizon that is consistent with a company's budget or business plan, which is approximately one to five years. Technically, the *long term* is any period longer than five years, but many businesses perform long-term "scenario" analyses for 10- to 20-year periods. With the rapid changes in technology, the time horizon for companies' scenario analyses may need to be reconsidered.

Macroeconomic Analysis for Economists and Policymakers

Economists and policymakers are also interested in macroeconomic analyses for the insights they provide on how to keep nations on sustainable expansionary paths. To do so, they must keep in mind the short-term and long-term implications of their policies.

Short-Term Macroeconomic Analyses

Short-run macroeconomic analyses tend to focus on ensuring a nation's demand for goods and services is sufficient to meet its production and employment potentials and goals. Because output capacity tends to change slowly over time, adjustments in production capabilities are often relegated to long-term analyses. This is not to minimize the importance of supply in short-term economic analyses. On the contrary, many factors, other than production capacity, affect the supply of a nation's goods and services, such as exchange rates, input (e.g., oil) prices, and expectations. During the short-run, absolute and relative prices vary,[2] but they are significantly less flexible than in the long run.

The particular components of demand that are at the center of policymakers' attention are personal consumption expenditures, business investments,[3] government spending, and net exports. The extent to which government and central bank policymakers' actions are capable of improving economic conditions is an ongoing debate in the economics profession.

Long-Term Macroeconomic Analyses

In contrast to their short-run counterparts, long-run macroeconomic analyses allow much more time for absolute and relative prices to adjust. For this reason, long-run investigations tend to emphasize factors that improve a country's production potential, rather than focusing on achieving current capabilities. The reason is clear. If growth and prosperity could be secured by merely implementing

2 The absolute price of a product is its nominal currency value, such as \$1 per Pepsi and \$1 per Coke. A relative price is the cost of one good in terms of another. With the Pepsi-Coke example, because their absolute prices are the same, one Pepsi is worth one Coke. If the absolute prices of Pepsi and Coke rose to \$3.00 and \$1.50, respectively, then the relative price of Pepsi would rise to two Cokes (i.e., Pepsi is twice as expensive as Coke).

3 In the context of a nation's demand and output, "business investments" (i.e., gross private domestic investments) include new machinery, tools, equipment, factories, other construction projects, and changes in inventories. They do not include financial investments, such as stocks and bonds.

expansionary fiscal policies (i.e., increasing government spending or lowering taxes) or monetary policies (i.e., increasing the money supply), then all countries would be prosperous and their residents wealthy. This is not the case. To consume more, nations need to produce more, and increased production requires well-educated workforces, incentives to invent and invest, access to technological improvements, constructive labor-management relations, well-grounded corporate governance practices, fair and reasonable governments and tax rates, as well as the freedom to invest, trade, and pursue economic opportunities.

Let's Begin!

With these preliminaries in mind, let's begin our study of global macroeconomics. How are the economic conditions in your nation? Are people working hard or hardly working? Is the economy functioning or malfunctioning? What countries in the world interest you the most? Is any country of particular interest for your job? This text constructs an integrated economic framework that will be helpful regardless of when and where it is used. It is intended to be both a means to better understand the world around us and a way to add breadth and depth to significant business decisions.

The Rest of the Story

Four Major Business Planning Documents

Companies create planning documents, such as budgets, business plans, capital budgeting plans, and scenario analyses, to foster their business decisions. Because they contain proprietary (confidential) information, these documents are meant for internal audiences only. Strategic plans are presented formally to upper-level management and boards of directors. Planning documents that have little strategic value and focus mainly on operations are used primarily for short-term goal setting.

A common thread among all of these planning documents is the role macroeconomic assumptions play, such as those for expected inflation, interest, and exchange rates. Quantitative financial analyses often place these assumptions prominently at the top of their spreadsheets, which enables scenario analyses, such as "realistic," "optimistic," and "pessimistic" cases. Credibility requires studies with assumptions having realistic bounds and logical interrelationships.

Let's look more closely at the similarities and differences among budgets, business plans, capital budgets, and scenario plans.

Budget

Budgets are very short-term planning documents that itemize a company's estimated revenues and expenses for periods of one to three years. Their short time horizons allow for limited operational flexibility. Therefore, they are rarely used as strategic planning documents and often reported only to division and department heads, as well as executive committee members, rather than a company's board of directors.

Business Plan

Business plans are short-term planning documents that lay out a company's operational and financial goals for three- to five-year periods. These plans typically focus on projected cash flows and operational profits. Therefore, they provide helpful feedback to CFOs and treasurers, whose job is to finance anticipated cash deficiencies and invest cash surpluses.

For most (nonfinancial) companies, business plans tend to concentrate on projected cash flows from operations, but there is no compelling reason why they could not include non-operating cash flows, as well. Because of their relatively long-term time horizons, as compared with budgets, business plans are strategic documents that are presented formally to boards of directors.

Business plans focus on strategic initiatives, anticipated competitor actions and reactions, customer trends, pricing and marketing initiatives, new product development, old product retirement, changes in factory utilization, input sourcing, outsourcing, and potential mergers and acquisitions. They are intended to be forward-looking documents. Due to changing conditions, business plans rarely turn out as expected and, therefore, are seldom used retrospectively to evaluate actual company performance. At the same time, they are valuable learning exercises that can give direction to the company and uncover attractive opportunities and synergies.

Capital Budgeting Plan

Capital budgeting plans forecast the anticipated revenues and expenditures for particular projects, such as building a new factory or acquiring a new machine. Based on capital budgets, companies can compare their costs of capital with forecasted returns, such as internal rates of return, to decide whether the investments make economic and strategic sense. Because they focus on specific

projects, rather than the company's broader goals, capital budgets are generally not strategic documents.

Suppose you were employed in Boston, Massachusetts and given a week to prepare a financial analysis on the expected revenues, costs, and returns from expanding your company's production facility in England. Would you include in your analysis assumptions about England's future interest and inflation rates? Would the exchange rate between the U.S. dollar and English pound be an essential ingredient? Suppose one of your scenarios assumed England's inflation and growth rates would increase relative to the United States during the coming year, and concluded that the pound's dollar value would fall. How would you respond if someone in the meeting asked you to explain how it was possible for all three of these changes to occur at the same time? Is this interrelationship logical and defensible? If you are unsure how you would (or should) respond, then read on because answering such questions is the focus of this book.

Scenario Plan

Scenario plans have time horizons that can range from 10 to 20 years. Because they are the most extended business-planning documents and have the broadest panoramic view of the future, scenario plans are frequently delivered in the form of thought-provoking presentations, made in front of executive committees and boards of directors. Typically, these plans do not forecast cash flows or profits. Instead, they focus on structural issues, such as possible long-term changes in a company's product portfolio and shifts in business interests, as well as industry and global trends and growth strategies. Therefore, scenario plans tend to concentrate on broad-based demographic changes, as well as technological, business, government, and other macro-environmental trends.

Conclusion

Having a solid understanding of global macroeconomics opens a new world of intellectual discovery to anyone who can master its basic logic—and virtually anyone can. Macroeconomics provides insights into political and economic debates, offers a solid base for making many business decisions, and opens the daily news to a higher level of understanding and critical review.

A company's operating revenues and costs, borrowing rates, credit availability, and asset returns are all influenced by expansive national and international

arenas. Individual firms have little or no influence over these variables. Nevertheless, good decisions must identify, measure, and address them. Once the firm and industry are put into the context of the national and international marketplaces, decision-making becomes more interesting and complex, requiring nuanced strategies.

Key Points

- Country analysis is the systematic investigation of a nation's economic, political, and social strengths, weaknesses, opportunities, and threats.
- Important business decisions are multidisciplinary.
- Different competitive environments require different competitive behaviors.
- Companies can gain competitive advantages via product differentiation, patents, copyrights, strategic marketing, and control of vital inputs, but these advantages are eroded, over time, by imitation and competition.
- Global macroeconomics focuses on variables over which firms have no control, but the risks associated with changes in these variables can be managed.
- Macroeconomic analyses provide insight and structure to business decisions.
- International macroeconomics considers simultaneous changes in variables determined within the credit, goods and services, and foreign exchange markets.
- Macroeconomic equilibrium can be viewed as three interdependent, spinning gears that are moving simultaneously at harmonious rates.
- The future is not predictable, but it is imaginable. International macroeconomics helps clear the vision and interpret the implications of alternative scenarios.
- Short-term macroeconomic analyses tend to focus on factors that enable countries to produce up to their potential—a potential that changes slowly over time.
- Long-term macroeconomic analyses focus on factors that increase countries' output potential.
- Stock variables are measured at a point in time, and flow variables are measured over time.
- Understanding macroeconomic can improve short-term budget planning, medium-term planning for capital budgeting projects and business plans, and long-term scenario analyses.

Review Questions

1. What three financial statements form the basis for most company decisions? What major macroeconomic variables influence these financial statements?
2. What are the three major macroeconomic markets considered by the Three-Sector Model? Briefly explain each market and what macroeconomic variables are determined in them.
3. What is the difference between stock and flow variables?
4. Which of the following economic variables are stock variables, and which are flow variables?

a. GDP, saving, savings, wealth, investment, capital, money supply, exports, imports, government spending, consumption, income, earnings, assets, and liabilities

5. Explain the differences among budgets, business plans, capital budgets, and scenario plans. For what purposes is one more important than the others?

Discussion Questions

6. "Even though companies cannot control macroeconomic variables, anticipating the effects of changes in these variables and understanding macroeconomic interrelationships can be very useful to businesses." Explain whether this statement is true or false.
7. What business decisions can be improved with the help of short-term macroeconomic analysis? What business decisions can be improved with the help of long-term macroeconomic analysis?
8. How important are monetary and fiscal policies to long-term economic growth? What are the most important economic variables determining a nation's long-term economic growth?

Chapter 2
Taking an Economic Pulse

Starting or growing a business in a healthy economy is easier than in a weak or struggling one, but how do you tell if a nation is economically sick, well, recovering, or deteriorating? One of the most widely used measures of economic health is *gross domestic product* (GDP)—not only because it measures a nation's output but also because it has close connections to other key macroeconomic measures of well-being, such as unemployment rate and employment-to-population ratio, business profitability, wage rates, and stock prices. This chapter explains the strengths and weaknesses of GDP as an economic thermometer. It goes on to link GDP to gross domestic income (GDI), and then the circular flow diagram, which will lead us to the important concept of macroeconomic equilibrium.

The Basics

Nominal Gross Domestic Product

Nominal gross domestic product (GDP) measures the market value of all final goods and services produced for the market by resources (i.e., land, labor, capital, and entrepreneurship) within a nation's geographic borders during a given period. There is much to keep in mind with this definition; so, let's review the essential parts.

Market Value

GDP combines a broad and diverse assortment of goods and services. Without market values, a nation would have no way to sum these products into a single aggregate number. Instead, it would need to report output in terms of units, such as tons of steel, liters of milk, miles of transportation services, number of cars, and hours of consulting services. By contrast, multiplying the quantities of goods and services produced by their prices allows different products to be combined. Currencies, such as dollars, euros, pesos, yen, and yuan, serve as units of account for combining unlike goods and services into one aggregate figure, and exchange rates (i.e., the price of one currency in terms of another currency) allow us to compare the GDPs of different nations and currency areas.

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Final Goods and Services

Many goods are produced in stages. For instance, bread requires grain to be harvested, milled into flour, combined with other ingredients, baked, transported, and, finally, distributed to consumers through retail outlets. When a consumer buys bread in the grocery store, the final price includes all of these intermediate steps. Therefore, if GDP included the value of each production stage *and* the final price, it would be double counting. Focusing attention only on final goods and services avoids this problem and correctly measures GDP.[1]

Produced

GDP includes all goods and services produced, regardless of whether they are sold. Goods that are produced but not purchased go into business inventories and are included as part of a nation's *gross private domestic investment*, which is discussed later in this chapter.

For the Market

GDP measures market values. Therefore, products that are not traded and priced in open markets are excluded. These activities are part of the "underground economy," which is also known as the black market, shadow market, hidden economy, gray economy, cashless economy, and informal economy. They include activities that are: (1) legal, but unreported, (2) illegal, and (3) related to non-publicly traded (i.e., common) goods.

Legal, But Unreported, Activities

In many cases, underground activities are legal, but the incomes earned are off-the-books and not reported; for example, to avoid paying taxes.[2] Jobs that lend themselves to such activities include farm work, house cleaning, construction, painting, and plumbing because they allow workers to be paid in cash, goods, or services (e.g., "I'll fix your car if you'll install my kitchen cabinets"). Also excluded from GDP are the services of homemakers, such as childcare,

1 Another way to solve the double-counting problem is to sum only the value added at each stage of the production and distribution process and, therefore, to exclude the final price. The sum of these added values equals the final purchase price.

2 Even if these jobs are legal, falsifying income taxes is illegal.

cooking, chauffeuring, and cleaning, and the numerous jobs many of us do around the house, like painting, performing home and auto repairs, landscaping, and calculating tax returns. These activities would be included in GDP if households hired someone to do them. As a result, reported GDP can suffer some bizarre and outlandish distortions. For example, a nation's GDP falls whenever a resident marries his or her fitness trainer, golf instructor, accountant, or therapist.

Illegal Activities

Individuals who practice unlawful activities also populate the underground economy. Drug trafficking, prostitution, pimping, robbery, extortion, money laundering, and forgery are just a few examples. Companies participating in the underground economy can gain unfair cost advantages over those that do not participate by paying lower-than-minimum wages and avoiding expenses connected to required health insurance, retirement contributions, and safety standards embedded in labor laws. As a result, legal, open-economy jobs may be lost to the underground economy, causing the nation's reported unemployment rate to rise and GDP to fall.

Common Goods

The value of common goods, such as clean air and clean water, are also excluded from GDP when companies and individuals utilize them without charge.

By Resources Within a Nation's Borders

GDP measures production *within a nation's geographic borders*, regardless of whether domestic or foreign residents or companies produce the goods and services. For example, products made by Japanese citizens who work and reside in the United States are included in U.S. GDP.

During a Given Period

GDP is a flow measure, which means it has significance only if discussed over a period. For example, a statement such as "this nation's GDP equaled $1 trillion" is meaningless until you know whether the measured period was a week, month, quarter, year, or decade.

Shortcomings of GDP as a Measure of Economic Health

GDP has shortcomings that limit its use as an accurate measure of economic health. Among the most problematic are the following.

Excludes Nonmarket Transactions

Meaningful statistics on output and income are difficult to collect when significant portions of a nation's population operate in the underground economy. As previously mentioned, the underground economy is made up of individuals who are employed but appear not to be because they report only part or none of their incomes, giving the illusion that macroeconomic problems exist. As a result, governments or central banks might intervene to fix a nonexistent problem.

The volume of black market activity is considerable. In 2018, an International Monetary Fund report found that the shadow economy comprised, on average, almost 32% of the GDP for 158 countries during the 1991 to 2015 period.[3] The larger a nation's underground economy, the more distorted its reported GDP is from reality. For example, it is estimated that opium production accounted for approximately 400,000 jobs in Afghanistan during 2017.[4]

Does not Properly Account for Quality Improvements

The quality of goods and services changes as time passes—hopefully for the better. In some industries, such as electronics, communications, and pharmaceuticals, the changes have been so dramatic and price reductions so persistent that many consumers intentionally postpone purchases to get better deals. For goods, such as computers, and services, such as surgical vision correction, a year can make a significant difference in terms of quality and cost. Unfortunately, quality improvements that neither raise a product's price nor increase the quantity sold are unmeasured, unless adjustments are made to account for them.

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3 Leandro Medina and Friedrich Schneider, "Shadow Economies Around the World: What Did We Learn Over the Last 20 Years?" Working Paper No. 18/17, IMF Working Papers (January 2018).

4 Jon Greenberg, "Does Afghanistan Grow More Opium Poppies Than before 2001?" Politifact, April 4, 2017. https://www.politifact.com/global-news/statements/2017/apr/04/ted-yoho/yoho-afghanistan-poppy-growth-way/ (accessed May 23, 2019).

Does Not Account for All Factors That Improve the Quality of Life

GDP measures output. It does not measure human well-being. To do so, it would need to account for the value of intangibles, such as greater safety and increased leisure time, which most individuals have enjoyed over the past century. What is the value of improved workplace safety, cleaner air, better sanitation, and lower noise levels? What would you pay to work in an environment where physical injury was not a worry, and capricious, undisciplined behavior by managers was not a threat? How do you put a price tag on having extra hours to read, exercise, meet with friends, practice a musical instrument, ski, or sleep?

Counts Harmful and Dangerous Output the Same as Useful Output

Any final good or service that has a price tag and is traded in an open market is included in GDP. This means that the costs associated with the care and repairs needed after traffic accidents, natural disasters, terrorist attacks, wars, and environmental catastrophes increase GDP as much as the discovery and production of lifesaving medicines, safer automobiles, more efficient airplanes, and better health care services.

Circular Flow Diagram

The circular flow diagram separates the economy into the business sector (also called the *producer* sector) and the household sector (also called the *consumer* sector). Its major takeaway is: *For the economy* as a whole, *every dollar spent must be a dollar earned*. Figure 2.1 shows how income earned by the household sector comes from the resources it sells to the business sector, and revenues earned by the business sector come from spending by the household sector. In

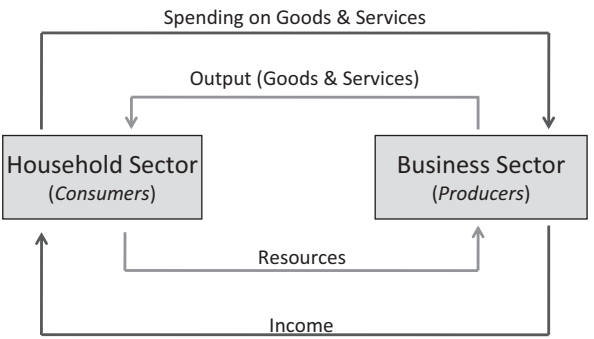


Figure 2.1: Circular Flow Diagram.

short, the value of a nation's spending on output per period and the income earned from producing it are two sides of the same coin. Let's dig a bit deeper by investigating the *income approach* (bottom portion of the circular flow diagram) and *spending approach* (top part of the circular flow diagram) to visualizing a nation's GDP.

Income Approach: Bottom Portion of the Circular Flow Diagram

The bottom portion of the circular flow diagram (see Figure 2.2) shows how the business and household sectors interact through the *resource market*. The resource market is where the household sector supplies resources (also called *factors of production*) and the business sector demands them. From this interaction, the prices of these resources and the quantities hired per period are determined.

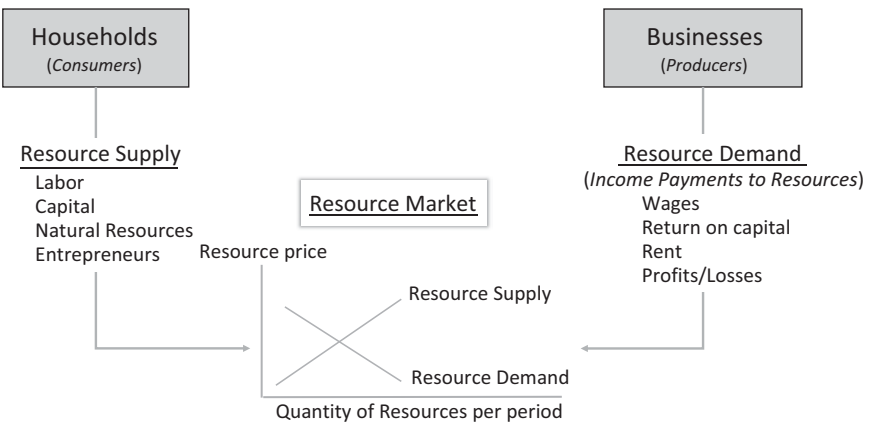


Figure 2.2: Resource Market.

The resources owned by the household sector and sold to the business sector can be separated into four different categories: labor, capital, natural resources, and entrepreneurship. *Labor* includes both the physical and mental capabilities of individuals. The return on labor is called the *wage*. *Capital* includes all human-made aids to production, and the return on capital is called the *return on capital*.

The return on *natural resources* is called *rent*. Many of us recognize the word "*rent*" as the monthly payment made for an apartment or a house—an amount that is usually associated in some way with land—but in economics, rent is the return on *any* natural resource (e.g., the return on coal, forestry, or land).

The last resource is *entrepreneurship*, whose return is called *profit or loss*. Entrepreneurs are different from laborers because they are founders of companies and initiators of new lines of business within existing companies. They willingly take on risks that are not associated with normal employment. A particular type of compensation, called *profit*, is earned by entrepreneurs for their risk-taking activities, which distinguishes their contributions to economic activity from those of labor.

A major takeaway point from this discussion of the circular flow's bottom portion is that the income earned from producing a nation's GDP is equal to the sum of wages plus rent plus return on capital plus profits. In short, Income ≡ Wages + Rent + Return on Capital + Profits. This sum is called *gross domestic income (GDI)*.

A Helpful Way to View the Resource Market

A helpful way to conceptualize the interconnections between the amount of resources supplied by the household sector and the amount demanded by the business sector is to picture a mountain of goods and services produced and made available for sale each period (see Figure 2.3). A significant focus of macroeconomic analysis is making sure the mountain of goods and services produced each period (e.g., each year) is purchased. Macroeconomic analysis also seeks to ensure that the amount produced is sufficiently large so that everyone who wants a job has one and living standards are high. In the next section, we will discuss what sectors of the economy purchase this mountain of goods and

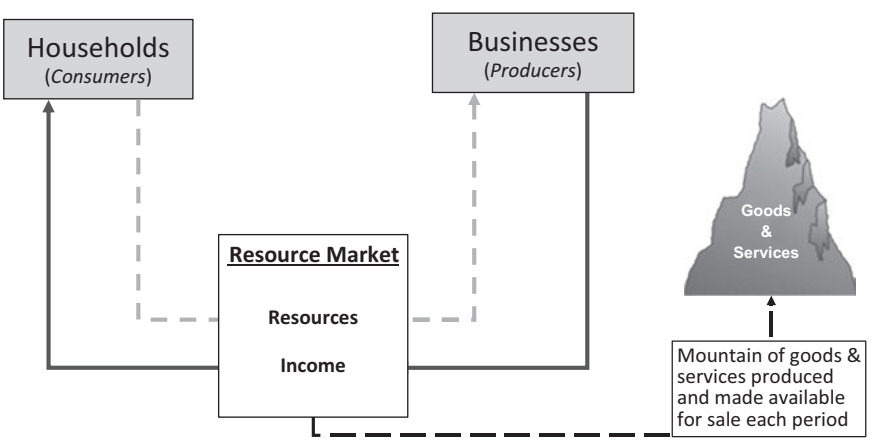


Figure 2.3: A Helpful Way to Conceptualize the Resource Market.

services and how much they buy. Then we will turn our attention to what happens when too much or too little is purchased.

Expenditures Approach: Top Portion of the Circular Flow Diagram

Until now, our focus has been on the bottom portion of the circular flow diagram, so let's turn our attention to the top part. In the last section, we visualized the resource market (the bottom portion of the circular flow) as one that produces a mountain of goods and services and makes it available for sale each period (see Figure 2.3).

The top portion of the circular flow diagram shows the linkages between the household sector and the business sector in the *goods and services market*. As Figure 2.4 shows, the goods and services market connects the amount of goods and services supplied by the business sector with the amount demanded by the household sector. From the interaction between supply and demand forces, output prices and quantity per period are determined.

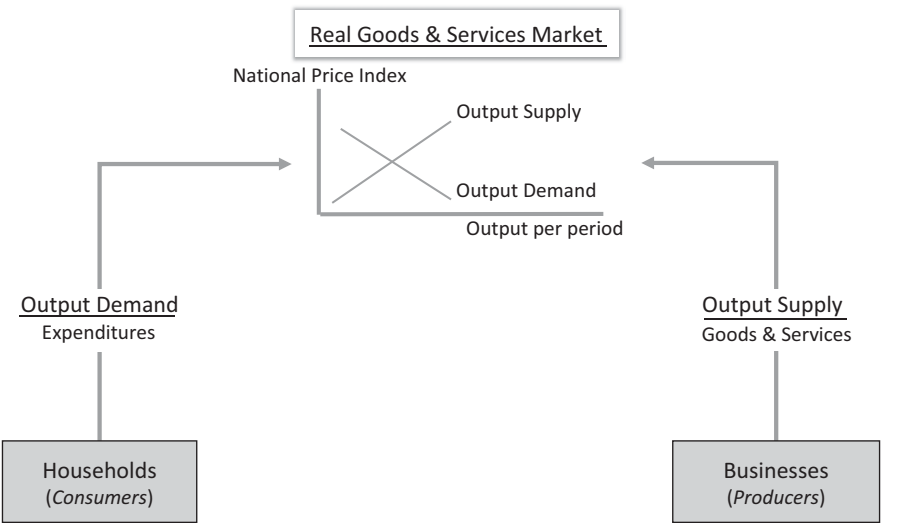


Figure 2.4: Goods and Services Market.

Macroeconomic Expenditures

A nation's principal sources of demand include personal consumption expenditures (C), gross private domestic investment (I), government spending on final

goods and services (G), and net exports (NX). Therefore, Demand ≡ C + I + G + NX,[5] which means total expenditures on final goods and services equals the sum of C + I + G + NX.

Personal Consumption Expenditures (C)

Personal consumption expenditures (C) measure the amount spent *per period* by the household sector on consumer goods and services. It includes purchases of durable goods, which have lifespans of three years or more (e.g., cars, washing machines, and refrigerators), nondurable goods (e.g., food, beverages, and clothing), and services (e.g., banking, plumbing, entertainment, and dry cleaning). Notice in Figure 2.5 how consumption accounts for only a portion of the mountain of goods and services produced each period. In equilibrium, the rest would be purchased by investment, government, and net-export spending.

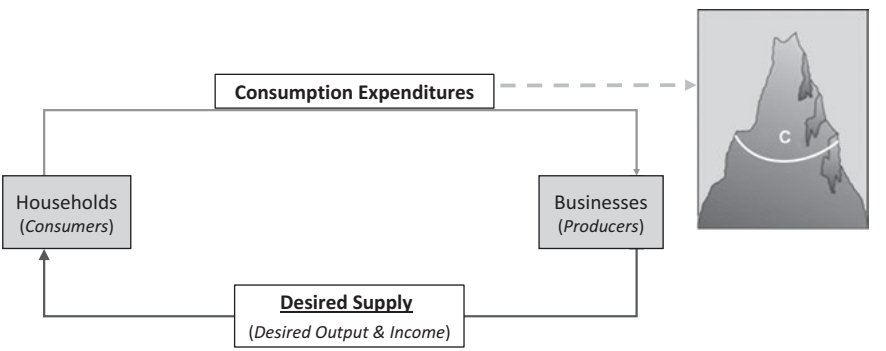


Figure 2.5: Personal Consumption Expenditures: One Component of a Nation's Demand.

Gross Private Domestic Investment (I)

Gross private domestic investment, or simply, "*investment*" (I), includes expenditures on human-made aids to production. It is called "gross" because these investments are for both new investments and the replacement of depreciated capital.[6] It is called "private" because they are not part of government

5 The three-bar equality sign, used in this equation and others, means the relationship is true "by definition."

6 "New" investment is also called "net" investment, and net investment equals gross investment minus depreciation.

spending. Finally, it is called "domestic" because these expenditures are invested in the domestic economy, rather than abroad. Included in gross private domestic investment are purchases of newly produced machines, tools, equipment, construction (both residential and business), and changes in business inventories.

Most of the spending components included in gross private domestic investment are straightforward, uncomplicated, and, generally consistent with our common sense. Nevertheless, one expenditure that deserves special attention is *changes in business inventories,* and another is *residential construction*.

Business inventories can rise or fall for planned and unplanned reasons. If producers expect consumer demand to increase in the future, they often invest in larger inventories to meet the surge in anticipated sales. If they expect demand to fall, they do the opposite. Inventories can also decrease or increase due to unforeseen reasons, such as unexpected changes in domestic or foreign demand. When demand falls unexpectedly, inventories rise, leaving businesses holding unwanted stores of goods. They often react to such increases by lowering prices, laying off workers, and reducing workday hours. When demand rises unexpectedly, just the opposite happens. Inventories fall, and businesses have incentives to raise prices and hire new workers. Regardless of whether the changes in inventories are planned or unplanned, any increase is included as part of gross private domestic investment. What makes these inventory changes even more important is they are among the most volatile and closely watched components of gross private domestic investment.

If any component of gross private domestic investment seems to defy common sense, it is *residential construction*. Many people ask, "Why is the construction of residential homes counted as 'investments,' when it appears so disconnected from business productivity and profitability?" The reason for counting it this way is individuals *could have* rented their homes and, thereby, derived business income from doing so. Most individuals choose not to rent their houses, but they could if they desired. As a result, residential construction represents a sort of shadow market for commercial construction or the opportunity cost for living in your own home.

Stocks and Bonds Are Not Part of Gross Private Domestic Investment: In discussions of GDP, it is important to remember that investment expenditures are for tangible, newly produced assets. They do not include issues of new financial instruments, such as stocks, bonds, notes, and bills. Financial instruments are excluded from GDP because they do not reflect newly produced goods or services

with equivalent values.[7] In short, a new $1 billion bond issue does not imply the creation of products worth a billion dollars.

A second reason financial instruments are excluded from GDP is made more evident by remembering that someone must own a company's assets. If the ownership claims are by the company's stockholders, they are called *stockholders' equity*. If they are by individuals who do not own shares, such as lenders, they are called *liabilities*. Therefore, a company's assets must equal the sum of its liabilities and stockholders' equity. An example might help to explain. Suppose XYZ Corporation purchased a new machine costing $10 million and financed it by issuing bonds and shares worth $10 million. Including both the new machine (an asset) and its financing (liabilities and stockholders' equity) in gross private domestic investment would overstate the actual level of real investment by one hundred percent. In effect, it would be double counting by including the asset and ownership claims on the asset.

A third reason financial instruments are excluded from GDP is new debt and equity are claims on *all* company assets and not just the newly produced ones. Therefore, these claims are on current and past investments, but GDP includes only freshly produced goods and services.

Government Spending (G)

Government spending on newly produced goods and services, or simply "*government spending*" (G) is a significant component of most nations' demand. It is larger than many people first expect because this spending includes all levels of government—national, state, provincial, cantonal, and local. At the same time, government spending is smaller than many people expect because it excludes transfer payments, such as unemployment compensation and social welfare programs, which are not payments for newly produced goods and services.

In this book, we will focus primarily on government spending at the national level because, usually, discretionary fiscal policies that are enacted to battle unemployment and inflation are done by national governments. Nevertheless, in some countries (e.g., Switzerland and Brazil), spending at lower levels of government (e.g., cantons and states) can be a significant portion of overall public expenditures and, therefore, exert a meaningful influence on overall economic activity.

7 The financial services needed to create, market, and resell financial investments are included in GDP, but the value of the financial instruments themselves are excluded.

Net Exports (NX)

The final component of total expenditures is *net exports (NX)*, which include a nation's exports of goods and services to foreign countries *minus* its imports of goods and services from foreign nations. Imports are subtracted from exports because they are expenditures on foreign-produced goods and services, not on domestic products. Because the value of imports can be higher than exports, net exports can be (and often is) a negative number. Nevertheless, these expenditures are still called "net exports."

Two examples might help to clarify why imports need to be subtracted from exports. First, consider a country that imports components, increases their value by processing and assembling them, and then exports the finished or semi-finished products. It would be a gross exaggeration to count the entire value of these exported goods as the demand for this nation's domestically produced goods and services because only the value added was produced domestically. For example, suppose a country imported $100 million worth of ingredients, processed them, and then exported $120 million of finished goods. The net demand for that country's goods and services would be only $20 million (i.e., $120 million worth of exports minus $100 million worth of imported inputs), and the country's net earnings from this activity would only be $20 million. Counting the entire $120 million as part of this nation's demand would inaccurately reflect the extent to which domestically produced goods and services were being purchased.

A second way to understand why *net* exports are part of demand (and not just exports) is because personal consumption expenditure, gross private domestic investment, and government spending include expenditures on goods and services that are imported in addition to those domestically produced. Therefore, subtracting imports from total demand serves to remove a component (i.e., imports) that should not be included in GDP. If consumption, investment, and government spending included only expenditures on domestically produced goods, there would be no need to subtract imports.

Linking the Top and Bottom Portions of the Circular Flow Diagram

Stepping back, we can see that there are financial flows and real flows in both the top and bottom portions of the circular flow diagram (Figure 2.6), which are either supply-related or demand-related. In the top part, financial expenditures by the household sector (i.e., the demand for final goods and services) meet the flow of products from the business sector (i.e., the supply). In the lower portion, the supplier and demander roles are reversed; the business sector demands

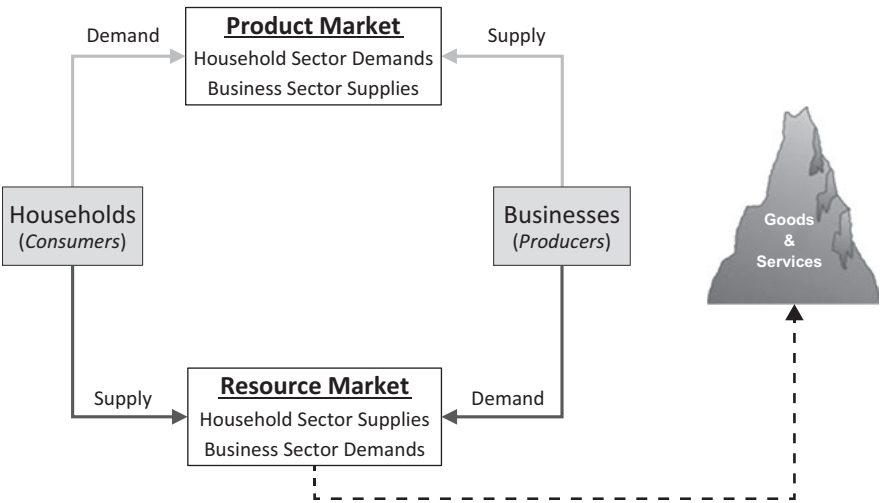


Figure 2.6: Product and Resource Market Supply and Demand.

resources with financial compensation, and the household sector supplies resources to the market.

Keeping in mind the interrelationships between supply and demand in the product and resource markets, let's turn our attention to the meaning and importance of macroeconomic equilibrium.

Macroeconomic Equilibrium

Macroeconomic equilibrium occurs when the *desired amount supplied* by a nation equals the *desired amount demanded* (see Figure 2.7).[8] Recalling the mountain of goods and services analogy, which was introduced earlier in this chapter, equilibrium means the mountain of goods and services produced each period by the business sector is completely and willingly purchased by domestic and foreign consumers, businesses, and governments, with no undesired surplus or shortage remaining at the end.[9]

8 The word "desired" has the same meaning as "anticipated," "expected," "planned," and "intended." These adjectives are synonymous and significant in macroeconomics because they refer to what people intend to do and not what they end up doing.

9 In *The Rest of the Story* portion of this chapter, the section entitled "A Second Way to View Macroeconomic Equilibrium," uses a leakages-and-injections approach to explain equilibrium.

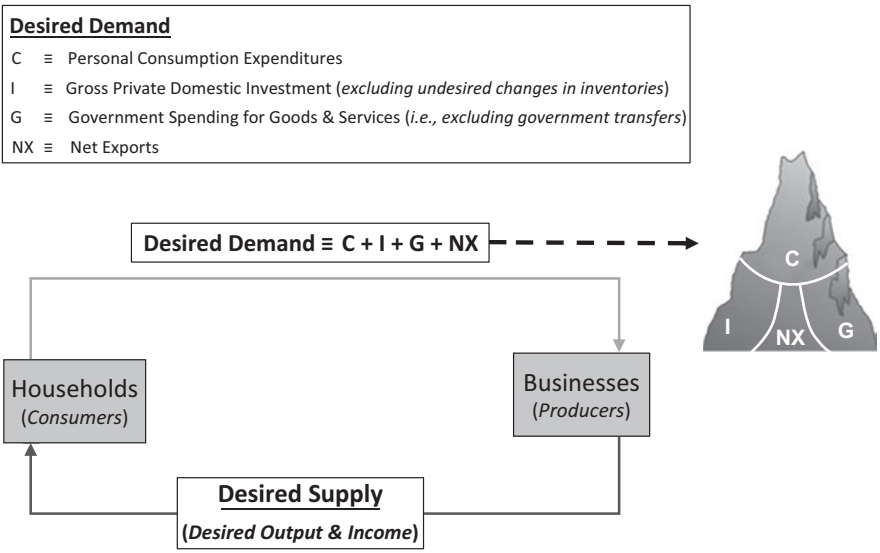


Figure 2.7: Macroeconomic Equilibrium: Intersection of Desired Demand and Desired Supply.

Disequilibrium occurs when the desired amount demanded is different from the desired amount supplied. For example, if the desired amount demanded is insufficient to purchase all the newly produced products, business inventories rise, unintendedly. As a result, companies have incentives to lay off workers, reduce hours, and cut prices. By contrast, if the desired amount demanded exceeds the desired amount supplied, planned business inventories fall, incentivizing companies to hire, increase workers' hours, and raise prices.

Is Equilibrium Good or Bad for a Nation?

Before answering this question, remember that macroeconomic equilibrium occurs when the goods and services that domestic businesses desire to produce are equal to the amounts that domestic and foreign buyers wish to purchase. Using this definition, it may be clear that macroeconomic equilibrium is neither good nor bad. It depends. The amount produced could be far below a nation's capacity, thereby causing severe unemployment, or it could be far above it, triggering inflation and strains on domestic resources. Macroeconomic equilibrium means that there is no short-term tendency for businesses to change the amount of resources they demand, alter the quantity of goods and services they

supply, or vary their prices. When the products that businesses desire to produce are purchased in full, inventories remain steady, and there is no need to increase or decrease production.

The Rest of the Story

A Second Way to View Macroeconomic Equilibrium

A second way to understand macroeconomic equilibrium is by using the *leakages-and-injections approach*. Any income that is not spent on domestically produced goods and services is called a *leakage* from the circular flow. As Figure 2.8 shows, these leakages are categorized into three parts: saving (S), taxes (T), and imports (IM). Macroeconomic leakages reduce demand for the mountain of domestically produced goods and services each period, but that does not pose a significant problem as long as there are spending injections that redirect these leakages back into the economy. The three primary sources of macroeconomic injections are gross private domestic investment (I), government spending (G), and exports (EX).

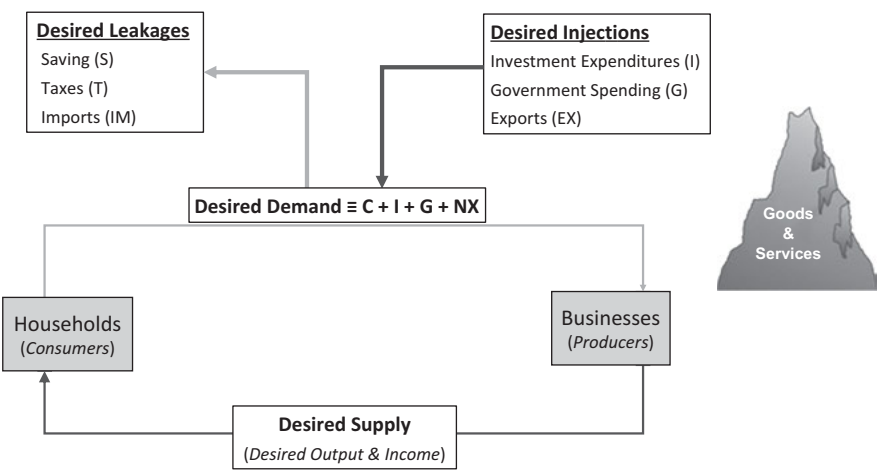


Figure 2.8: Desired Leakages and Injections from the Circular Flow.

Using this approach, macroeconomic equilibrium occurs when *desired* leakages equal *desired* injections, which means desired (S + T + IM) equals desired

(I + G + EX).[10] Notice how equilibrium does not require desired: (1) saving to equal investment, (2) taxes to equal government spending, or (3) imports to equal exports. It requires only that the sum of the three desired leakages equal the sum of the three desired injections (see Figure 2.8).

An easy way to understand the leakages-and-injections approach is to visualize a nation's circular flow as a giant inner tube with air circulating from top to bottom and bottom to top. This is no ordinary inner tube because the air in it represents the income earned by the household sector when it sells resources to the business sector (bottom flow) and revenues earned by the business sector when it sells products to the household sector (top flow). The more air, the higher the inner tube's pressure, just as the more production and expenditures in a nation's circular flow, the higher its GDP.

A macroeconomic leakage is like air escaping through a valve on the inner tube, and an injection is like air being pumped right back into the tube through a separate tap. If total leakages of air exceed injections, the pressure falls and the inner tube deflates, causing production, income, and prices to fall. If total desired injections exceed desired leakages, the reverse happens.

Leakages

In "The Basics" portion of this chapter, we thoroughly discussed the three desired injections (i.e., gross private domestic investment, government spending, and exports); so, let's take a closer look at the leakages.

Saving (S)

Saving (S) is the residual after consumption expenditures and taxes are deducted from a nation's income.[11] Because most countries have positive saving rates, they cannot rely on consumers alone to purchase all the goods and services produced each period, which is why desired injections are so important.

Taxes (T)

Taxes (T) are leakages from the circular flow of expenditures because they are also a portion of household income that is not spent on domestically produced

10 Remember that "desired" is synonymous with "anticipated," "expected," "planned," and "intended."

11 S ≡ GDP − C − T. Beware: "Saving," which is a word with no "s" at the end, is an economic *flow* concept because it *occurs over a period*. Savings, a word with "s" at the end, is a *stock* concept because it is the value of net accumulated saving measured at *a given point in time*. An easy way to remember the difference is the "s" at the end of savings stands for "stock."

goods and services. These funds go to the government, and the government decides whether to spend more or less than the amount received. For most national governments, there is no requirement to spend exactly what they earn in tax revenues. Usually, when governments spend more than they collect in taxes, they finance the resulting deficits by borrowing—just as businesses and individuals do. By contrast, when tax revenues exceed spending, the surplus can be used to retire outstanding debts or increase the government's financial liquidity.

Imports (IM)

Imports (IM) are a leakage from the circular flow of expenditures because this spending is on foreign-produced goods and services, rather than domestically produced products. In terms of our analogy using the mountain of goods and services, imports purchase goods and services from foreign mountains, such for Canada, China, Mexico, and Japan, produced each period, rather than from the domestic mountain.

Using the Circular Flow to Explain Recessions

Let's use the circular flow diagram to explain the economic implications of a recession and focus first on the top portion of Figure 2.9. Suppose the business sector produced more than the economy demanded. Business inventories would rise, unexpectedly, providing businesses with incentives to lay off workers, reduce hours of employment, and cut prices.

If fewer resources are hired, the household sector's income falls, which further erodes the demand for goods and services. Reductions in consumption expenditures diminish business incentives to invest. The declining demand for goods and services and added costs of carrying large inventories begin to hurt business profitability, causing stock prices to fall. If stock holdings are a significant part of the household sector's wealth, declining share prices provide consumers with yet another reason to reduce their demands for goods and services.

The downward spiral in economic activity would not stop at the nation's borders. Falling domestic income reduces the demand for foreign goods and services, which reduces foreign nations' exports and, therefore, lowers their incomes. In this way, the domestic recession is transmitted to foreign lands.

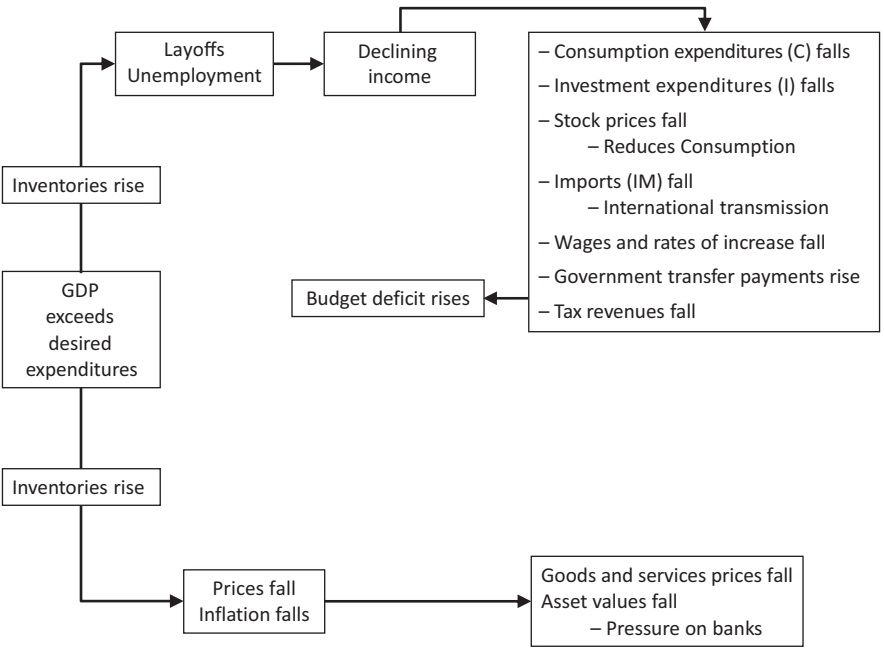


Figure 2.9: Using the Circular Flow to Explain a Recession.

As workers lose their jobs, downward pressure is put on wages. Even though absolute wage rates may not fall, their frequency and pace of increase would slow. When wages rise by less than the rate of inflation, then workers' real (i.e., inflation-adjusted) salaries fall, thereby cutting product demand even more.

At this point, it might seem that, when an economy turns sour, all the follow-on effects reinforce the downturn, but government transfers and tax revenues act as automatic stabilizers. They are called "automatic" because there is no need for the government to pass special legislation for them to take effect. They are called "stabilizers" because changes in government transfers and tax revenues help to cushion economies from excessive contractions or expansions.

Automatic stabilizers function in much the same manner as shock absorbers in cars, in the sense that they cushion drivers from otherwise-bumpy rides. For example, when a nation dives into a recession, GDP falls and unemployment rates rise, causing automatic increases in government transfer payments for unemployment compensation and social welfare programs. Similarly, when economic activity declines, tax revenues collected by governments, at all levels,

fall.[12] Because transfer payments rise and tax receipts fall automatically during recessions, governments usually experience rising budget deficits. These deficits do not push the economy forward. Instead, they prevent it from falling deeper into a recession. When automatic stabilizers cause government deficits, they are called *passive deficits*.[13]

The bottom portion of Figure 2.9 shows other significant economic interactions during recessions. When the amount produced exceeds desired expenditures, causing inventories to rise, businesses often try to reduce their brim-filled warehouses by lowering prices or, at a minimum, by lowering their periodic markups. As a result, downward pressure is put on a nation's inflation rate. Not only are the prices of newly produced goods and services reduced, but the prices of important assets, such as real estate (e.g., homes and apartment buildings), artworks, antiques, and precious metals, also fall. As a result, household wealth declines, causing consumer spending to fall and the recession to worsen.

If the recession causes individuals to default on their loans—either because they cannot afford to make payments or because they strategically walk away from mortgage obligations when they exceed property values—banks are forced to take possession of these properties. Selling them at substantially reduced prices can stress banks' profitability and liquidity. Because their equity is often small in relation to total assets (e.g., 8% or less) banks often react to massive defaults by restricting credit to businesses at precisely the time when economic activity is souring and in need of financial support.

How Do Governments Actually Calculate GDP and GDI?

Have you ever wondered exactly how governments collect all the data that goes into calculating their gross domestic products? We know that GDP is supposed to measure the prices of all final goods and services produced during a period multiplied by their quantities, and GDI is supposed to measure all the incomes earned from producing GDP, but from where do these figures come? The answer is easy to understand, even though piecing together all the needed ingredients is quite

12 Imagine how harsh the world would be if wage earners were required to pay the same amount of taxes, regardless of how low their incomes fell, and consider how inequitable it would be if taxes remained the same irrespective of how high incomes rose.

13 Chapter 12, "Fiscal Policy," explains passive deficits and automatic stabilizers in greater detail.

complicated. Governments use calculation and data-collection methodologies that try to estimate how many new goods and services have been produced per period and their average prices, based on "sales or receipts, wages and salaries, unit sales, housing stock, insurance, premiums, expenses, interest rates, mortgage debt, and tax collections."[14] They also use a considerable amount of estimation.

Let's use the United States as an example. Two publications provide excellent coverage of the considerable care and effort the Bureau of Economic Analysis (BEA) puts into calculating U.S. GDP. For those interested, every November, the "Survey of Current Business" runs an article explaining the U.S. BEA's updated methodologies for calculating the National Income and Products Accounts (NIPA).[15] For breadth and depth, most interested readers need nothing more, but the brave of heart can draw even more information from a publication entitled *NIPA Handbook: Concepts and Methods of the U.S. National Income and Product Accounts*.[16]

Gross Domestic Product

The BEA starts by identifying GDP's major expenditure categories, which are personal consumption expenditures, gross private domestic investment, government expenditures, and net exports. Under each of these categories, it arranges the main expenditure components.

Personal Consumption Expenditures

Under personal consumption expenditures, there are three major categories: durable goods, non-durable goods, and services (for households):

- *Durable goods'* major components are motor vehicles and parts, furnishings and durable household equipment, recreational goods and vehicles, and other durable goods
- *Nondurable goods'* major components are food and beverages purchased for off-premises consumption, clothing and footwear, gasoline and other energy goods, and other non-durable goods

14 See Bureau of Economic Analysis, Updated Summary of NIPA Methodologies, Survey of Current Business, 98:11, 2018, and p. 1. https://apps.bea.gov/scb/2018/11-november/1118-nipa-methodologies.htm (accessed July 14, 2019).

15 Ibid.

16 Bureau of Economic Analysis, *NIPA Handbook: Concepts and Methods of the U.S. National Income and Product Accounts*. https://www.bea.gov/resources/methodologies/nipa-handbook (accessed July 14, 2019).

- *Services' (for households)* major categories are utilities, health care, transportation, recreation, food and accommodations, financial services, insurance, non-profit institutions, and other services

Gross Private Domestic Investment

Gross private domestic investment is separated into four major categories: fixed investment, non-residential intellectual property, residential investment, and changes in private inventories.

- Fixed investments include: (1) nonresidential structures, such as commercial healthcare, manufacturing, power and communication, mining exploration, shafts, and wells, and (2) nonresidential equipment, such as new automobiles, new light trucks, and net purchases of used autos and trucks, and well as other fixed investments.
- Nonresidential intellectual property includes software, research and development, entertainment, literary and other artistic originals, as well as other nonresidential intellectual property.
- Residential investment includes newly built, permanent-site, single- and multi-family homes, manufactured homes, improvements, brokers' commissions, transfer costs, and other residential investments.
- Changes in private inventories include farm, manufacturing, trade, mining, construction, and other nonfarm industries.

Government Spending

Government spending includes both consumption and investment demand for goods and services at the national, state, and local levels. Among the major items are national defense and nondefense expenditures, such as compensation for government employees' services, structures, intellectual property, and other government expenditures.

Net Exports

Finally, net exports include U.S. exports minus imports of goods and services, net income receipts, and rest-of-the world corporate profits. This information comes from the BEA's broader international transactions accounts.

Combining these Sources of Information

The backbone of the U.S. GDP calculation is the five-year (i.e., quinquennial) census taken by the U.S. Census Department, where price and quantity sold per period are specifically uncovered, for example, from manufacturers' shipment

information. Added to this data, the BEA uses yearly information from industry trade sources, industry retail sales reports, the Census Bureau's annual retail trade survey (ARTS), energy consumption figures from the Energy Information Administration, consumer spending surveys and price information from the Bureau of Labor Statistics, spending reports from state and local government administrations, federal government information from the U.S. Office of Management and Budget's (OMB's) *Budget of the U.S. Government*, financial service information from the Federal Deposit Insurance Corporation and Federal Reserve, and tobacco sales from the Department of the Treasury's Alcohol, and Tobacco, Tax and Trade Bureau. Data from these sources are combined into one number, which we call GDP. If precise figures are not available for any particular production/expenditure category or sub-category, a "judgmental trend" is applied to past data.

Gross Domestic Income

The value of final goods and services produced each period should have a close correlation to the income earned from producing it. To estimate wages, interest, rent, and profits, the BEA relies heavily on data from the A.M. Best corporation (e.g., insurance premiums), Agency for Healthcare Research and Quality (e.g., employer health and retirement contributions), Bureau of Labor Statistics (e.g., compensation, pensions, and health insurance for federal, state, local government and private employees), Census Bureau's quinquennial census (e.g., taxes on production and imports), Department of Labor (e.g., pensions), Internal Revenue Service (e.g., taxes, royalties, profits, inventory valuations, and depreciation), OMB's *Budget of the U.S. Government* (e.g., federal government wages, salaries, health insurance, less subsidies), Social Security Administration (e.g., contributions), Treasury Department (e.g., employer contributions to Medicare and taxes), as well as spending reports from state and local government administrations and information from industry trade sources.

Gross National Product

Gross national product (GNP) is another well-known measure of economic health. Both GNP and GDP measure the market values of all final goods and services produced in open markets over a given period. The single major difference is that GDP includes production by resources living within a nation's borders, while GNP includes production anywhere in the world, as long as the resources used in the production process are domestically owned.

For most countries, GDP and GNP are so close in value that it makes little difference which one is used to measure a nation's pulse. Nevertheless, GDP usually receives relatively more attention than GNP because it measures the value of output on *domestic* soil, which influences *domestic* unemployment rates and *domestic* standards of living.[17]

Figure 2.10 shows how GDP can be differentiated from GNP, by focusing on the income earned from newly produced goods and services. Box W represents income earned by Swiss-owned resources living in Switzerland. Box X represents income earned by foreign-owned resources residing in Switzerland. Together, Box W plus Box X equal Switzerland's *GDP*. Similarly, Box Y represents income

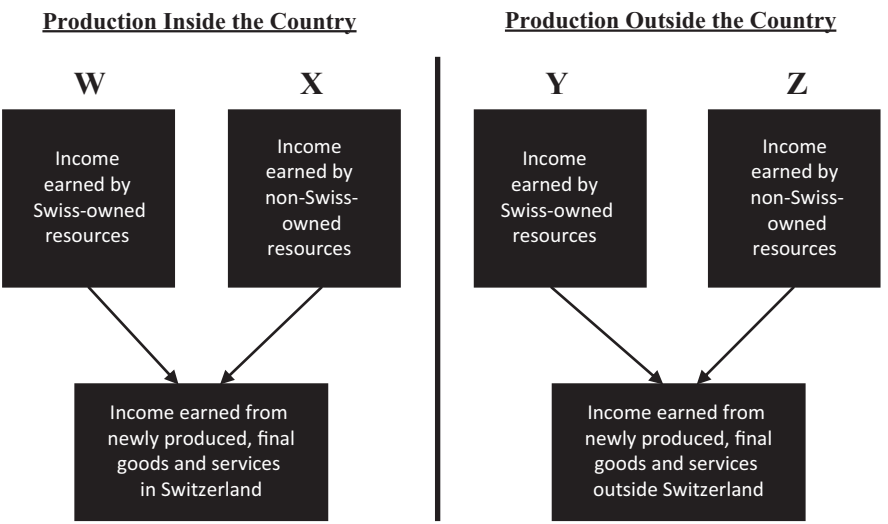


Figure 2.10: Gross Domestic Product versus Gross National Product.

17 See Robert Reich, "Who Is Us?" Harvard Business Review 11, product number 90111 (January 1, 1990).

earned by Swiss-owned resources living abroad, and Box Z represents income earned by foreign-owned resources living abroad. Adding Box W and Box Y equals Switzerland's *GNP*.

For Switzerland, net foreign income (NFI) equals the earnings of Swiss-owned resources living abroad (i.e., Box Y) minus the earnings paid to foreign-owned resources living in Switzerland (i.e., Box X). Therefore, GNP must equal GDP plus net foreign income. We know this because GDP $\equiv$ W + X, GNP $\equiv$ W + Y, and NFI $\equiv$ Y − X. By adding and subtracting X from GNP, we get GNP $\equiv$ (W + Y) + (X − X), and rearranging terms yields GNP $\equiv$ (W + X) + (Y − X), which means GNP $\equiv$ GDP + NFI.

Underground Economies

Underground occupations vary from country to country, which is why caution is advised when making cross comparisons. For instance, in September 2006, Greece changed its national income accounting to better measure the nation's rapidly growing service sector. As a result, segments of the underground economy, such as prostitution and money laundering, were suddenly included in Greece's GDP. In part, the change in national accounting practices was because Greece wanted to avoid violating the European Union's (EU) Stability and Growth Pact, which limited the budget deficits of member nations to 3% of GDP. Due to these changes, Greece's GDP increased by about 25%, enabling the country to meet the EU deficit requirement (and avoid fines) without cutting government spending or raising taxes.[18]

As might be expected, estimates of the underground economy are varied. After all, these transactions are not reported so uncovering them is problematic. By one estimate, the shadow economy's average size (not including criminal or illegal activities) for 158 nations between 1991 and 2015 was nearly 40% of *official* GDP.[19] The three countries with the smallest (average) underground economies were Switzerland (7.2%), the United States (8.3%), and Austria (8.9%). The three with largest shadow economies were Zimbabwe (60.6%), Bolivia (62.3%), and Georgia (64.9%).

18 See Kerin Hope and George Parker, "Oldest Profession Helps Boost Greek National Output by 25%," *The Financial Times*, September 29, 2006, p. 1.

19 Friedrich Schneider, "The Shadow Economy and Work in the Shadow: What Do We (Not) Know?" Institute for the Discussion of Labor, Discussion Paper No. 6423, March 2012, http://ftp.iza.org/dp6423.pdf (accessed May 23, 2019).

In general, the more efficient a nation is at identifying individuals who earn incomes and collecting taxes from them, the smaller its underground economy. Underground transactions most often occur when cash is used and the risk of detection is low. Therefore, one way to reduce this market's size and growth is to make transactions easier to trace by encouraging electronic (non-cash) payments. Mexico, Poland, and South Korea have subsidized the use of electronic payment terminals, which significantly increased their use.

In November 2016, India demonetized more than 86% of its money supply by taking away *legal tender* status from its 500-rupee and 1,000-rupee (i.e., ₹500 and ₹1,000) currency notes—money that accounted for more than 90% of the nation's transactions. Due to demonetization, these notes could no longer be used as mediums of exchange for meeting financial obligations or settling debts. India's sizeable underground economy was estimated to be 25% to 40% of the nation's GDP. Fewer than 4% (and perhaps as low as 1%) of India's population paid taxes. Therefore, part of the government's intent was to promote social fairness by exposing both the legal and illegal layers of its informal economy. By promoting the use of checks, credit cards, and other forms of electronic payments, there was hope that demonetization might make underground transactions more difficult to hide, thereby broadening India's tax base, increasing government revenues, lowering interest rates, reducing tax rates, increasing domestic investments, and promoting growth and development.[20]

Other measures to inhibit underground transactions are also available, such as conducting tax audits and on-site inspections to verify workers' employment status, requiring identification cards for specific occupations, and imposing penalties on companies violating employment laws. Some countries, such as Italy, Poland, Portugal, and Spain, have enacted laws that heavily penalize companies engaged in underground activities. These penalties range from outright fines to the loss of government subsidies, forced repayment of past subsidies, and business closures (permanent or temporary).

Perhaps the best approach to solving the underground economy problem is to provide incentives that move these activities out of the darkness and into the sunlight. This might be done by simplifying and strategically lowering taxes (e.g., value added and income taxes) so that total tax receipts rise, providing benefits and cutting red tape for small businesses, and providing incentives to shadow market participants to report their proper tax obligations. If successful,

20 John Marthinsen, "India's Demonetization: What Were They Thinking?" *Babson Insight*, April 2017.

these measures would broaden the tax bases of nations and improve the accuracy of their unemployment statistics.

Conclusion

Gross domestic product (GDP), gross domestic income (GDI), and gross national product (GNP) are important measures of a nation's economic health. GDP and GNP differ in one significant way, which is GDP measures production within a nation's borders, and GNP measures the output of a nation's resources, regardless of where they are in the world.

The circular flow diagram is a valuable tool for conceptualizing real and financial flows in an economy. It separates the economy into two parts: the business sector, which supplies goods and services and demands resources, and the household sector, which demands goods and services and supplies resources. Macroeconomic equilibrium requires that the desired quantity supplied equals the desired quantity demanded or, equivalently, that desired leakages from the circular flow of expenditures equal the desired injections.

Key Points

- GDP
  - GDP measures the market value of final goods and services produced for the market *within a nation's geographic borders* during a period.
  - GDP is not a perfect measure of economic health because it excludes nonmarket transactions, black market and underground transactions, and improvements in product quality and the quality of life that do not result in price or quantity increases.
- Circular Flow
  - The circular flow diagram separates the economy into the business and household sectors and shows that, for the economy *as a whole*, every dollar spent must be a dollar earned.
  - The business sector supplies products and demands resources used in the production process. The household sector demands products and supplies resources used in the production process.
  - The bottom portion of the circular flow diagram shows the relationship between the household supply and business sector demand in the resource markets. The top part of the circular flow diagram shows the relationship between the household sector's demand and business sector's supply in the product markets.
  - The returns on labor, capital, natural resources, and entrepreneurship are called: wages, return on capital, rent, and profit, respectively.

- Macroeconomic Expenditures
  - Total desired macroeconomic expenditures (i.e., demand) equal C + I + G + NX.
  - Personal consumption expenditures (C) include the purchase of durable goods, nondurable goods, and services.
  - Gross private domestic investment (I) includes expenditures for newly produced machines, tools, equipment, construction, and changes in business inventories.
  - Government spending (G) includes expenditures for goods and services at all levels of government. Government transfer payments are not included in GDP.
  - Net exports (NX) include a nation's exports of goods and services minus its imports of goods and services.
- Equilibrium
  - Macroeconomic equilibrium occurs when the desired amount supplied equals the desired amount demanded.
- Underground economy
  - The underground economy can be separated into legal, but unreported, activities; illegal activities; and non-market transactions.
  - The underground economy obscures meaningful labor and production statistics.
  - Efficient income identification and tax collection can reduce the underground economy.
- GNP
  - GNP measures the market value of final goods and services produced for the market by a nation's resources, *regardless of location*, during a period.
  - Government transfer payments are not included in GNP.
  - For the same reasons as GDP, GNP is not a perfect measure of economic health.
- Equilibrium
  - Macroeconomic equilibrium also occurs when desired leakages equal desired injections. Therefore, equilibrium is achieved when desired S + T + IM = desired I + G + EX.

Review Questions

1. After each of the following items, indicate whether it is included in U.S. GDP as personal consumption expenditures (C), gross private domestic investment (I), government spending (G), net exports (NX), or not included (X). After each entry, give a brief explanation why you chose your answer.
   a. Foreign aid
   b. Government welfare payments
   c. Razors produced this year but unsold
   d. The construction of a new home
   e. IBM shares issued this year
   f. Colgate shares issued last year and bought this year
   g. Stealth bomber research by the government
   h. Apples used in Mrs. Smith's® Apple Pies

i. Vitamins sold this year but produced last year
j. General Motors trucks sold to Mexico
k. Purchases of bonds
l. Apartment rent payments
m. Purchases of new homes
n. Purchases of existing homes
o. Unemployment benefits paid by the government

2. Klaus Trafobia just bought a 10-year-old Porsche Boxster for $10,000. What was the impact on the nation's GDP if he spent $5,000 refurbishing it, and sold the car for $21,000?
3. Is it accurate to say that, if there are more stages of production (i.e., more steps between the production of raw materials and the production of a final product), then GDP will be higher?
4. How do improvements in product quality affect GDP? Explain.
5. What are the problems with GDP as a measure of economic health?
6. What does the circular flow diagram tell us about the relationship among aggregate income, spending, and output in an economy?
7. If GDP is the market value of all final goods and services, then why are wages included in GDP? Isn't it double counting to include both wages and product prices?
8. Is it true that a nation's principal sources of demand/expenditures must be closely related to the components of income, or can they diverge substantially? Explain.
9. Is macroeconomic equilibrium a stock concept or a flow concept? Explain.
10. Is macroeconomic equilibrium good or bad for a nation, or does it depend?
11. Suppose foreign direct investments in China were greater than the direct investments that China made in other countries. Explain whether these flows caused China's GDP to be greater than, less than, or equal to its GNP.
12. Suppose gross private domestic investment equals $100 billion, government spending equals $250 billion, net exports equal –$60 billion, saving equals $70 billion, and government taxes equal $230 billion. Is it true that there is macroeconomic disequilibrium, and the forces of supply and demand are causing business inventories to fall, inflation to rise, the government's budget deficit to fall, and net exports to rise?
13. Explain whether you agree or disagree with the following statement: *If South Africa's gross private domestic investment plus government spending plus net exports is less than saving plus government taxes, then GDP must be rising and planned business inventories must be falling*.
14. Distinguish between GNP and GDP.
15. Many Turkish citizens work in the EU and send a portion of their paychecks back home each month. Assuming that Turkey is a net exporter of such labor, should Turkey's GNP be less than, equal to, or greater than its GDP?
16. Explain two ways to define macroeconomic equilibrium.

Discussion Questions

17. When a country has a net export surplus, what is it gaining, and what is it giving up? Explain.
18. "Macroeconomics tells us that, if the government does not balance its budget, and simultaneously the nation does not balance its exports and imports, then that nation cannot be in short-term macroeconomic equilibrium." Comment on the validity of this statement.

Chapter 3
Labor Market Conditions

Labor market conditions are important to a broad cross-section of every nation. Measures of labor market health provide critical feedback to government policymakers and central bankers on the successes or failures of fiscal and monetary policies. To businesses, they offer valuable insights on labor cost projections, how difficult it will be to fill vacant positions, the chances that valued employees will leave in search of better opportunities elsewhere, and prospects that fiscal and monetary policies will be changed, thereby impacting key macroeconomic variables, such as interest, inflation, and exchange rates.

As important as labor market conditions are to governments and businesses, they are even more important to individuals. Governments, businesses, and those with jobs can afford to treat unemployment rates as mere statistics, reflecting averages over large populations, but the unemployed cannot be so cavalier. Either they have jobs, or they do not, but even the employed may be dissatisfied if their jobs are part-time, poorly paid, or unchallenging. News that the nation's unemployment rate is improving may offer some peace of mind that better employment prospects are just around the corner, but it is cold solace to those experiencing depression-like circumstances at home because they are without jobs or opportunities to earn adequate compensation.

A well-functioning labor market is also important on an emotional level because jobs are so intimately tied to many individuals' senses of identity and perceptions of belonging. Job losses result in sacrificed income, but they can also reduce self-esteem, lower self-confidence, and cause considerable mental distress. For these reasons, numerous studies have shown high positive correlations between a nation's unemployment rate and incidences of suicides, criminal offenses (e.g., homicides and robberies), alcoholism, drug addiction, heart attacks, and admissions to psychiatric hospitals.[1] This collateral damage reduces a nation's productivity and diminishes overall economic well-being to the same extent as the loss of output caused by fewer people working.

1 To appreciate the breadth, depth, and number of these studies, interested readers are invited to do a quick internet search using phrases such as "relationship between unemployment and suicides" or "relationship between unemployment . . ." and any of the following topics: criminal offenses, alcoholism, drug addiction, heart attacks, or admissions to psychiatric hospitals. The list will be impressive, even if the search is restricted to studies published during the past two years.

https://doi.org/10.1515/9781547401437-003

The state of a nation's labor market is reflected in a variety of closely monitored economic statistics. Among the most visible are the unemployment rate and employment-to-population ratio, but also closely watched are labor force participation rates, wages, benefits, and worker mobility. More granular measures add body and meaning to overall labor market statistics, such as the average duration of unemployment, number of discouraged workers, and the age, gender, and ethnic composition of the unemployed population. Significant differences in unemployment, based on gender or race, are signals for concern, just as much as increases in the overall unemployment rate, but the policy solutions to these demographic problems can be quite different.

This chapter focuses on how to interpret a nation's labor market conditions through monthly economic statistics. Deciphering these indicators to make informed decisions requires an appreciation of how they are calculated, what they reveal, and what they mask. For instance, we will find that there are four different types of unemployment that are caused by and respond to different stimuli. Trying to cure them all with the same economic medicine might be a mistaken use of time and scarce resources.

The Basics

Who Uses Labor Market Information?

Let's explore more deeply the business, government, and central bank uses of labor market statistics.

Business Uses

Unemployment rates have direct and significant effects on companies' profits and cash flows. On the cost side, falling unemployment rates put upward pressures on wages due to the reduced availability of skilled and unskilled workers. On the revenue side, falling unemployment rates usually go hand-in-hand with rising gross domestic product (GDP), increased demand, and higher sales growth.

For many companies, wages and salaries are among the most important (if not *the* most important) costs of production, and the compensation needed to attract and retain good talent is moored firmly to the state of a nation's labor market. Financial projections, such as capital budgeting projects, annual budgets, business plans, new product initiatives, and product line expansions, require thoughtful and realistic estimates of how rapidly labor costs will change over

planning horizons. Credible unemployment forecasts can help to establish a basis for these business projections.

If the current unemployment rate is high and expected to rise, then companies might assume, for planning, that there will be rather gentle and diffused upward pressures on wages or none at all. By contrast, if the current unemployment rate is low and expected to fall, then companies would be prudent to assume that labor costs will rise. Under these circumstances, not only will it cost more to hire new talent, but also the expense to retain existing employees will increase. In tight markets, businesses that require distinctive skills often find it especially difficult to match the availability of competent employees with salaries that can attract them.

Expected changes in labor market conditions also have significant implications for companies' human resources policies. They influence decisions about whether and when to terminate or temporarily lay off employees, as well as recruitment choices concerning whether to hire permanent (with full benefits) or temporary help. To lose a key worker (especially to a competitor) can be like losing a patent, trade secret, or other valuable asset. Human resources directors must be especially cognizant of labor market fluctuations that affect employee turnover, productivity, and loyalty. Accurate labor market information provides human resources directors with a clearer view of the pay scales and fringe benefits required to remain competitive.[2] Chief financial officers and treasurers also use labor market measures to make informed decisions about the current and expected financial needs of their companies.

Government and Central Bank Uses

Changing labor market conditions also influence government and central bank policies, as well as public perceptions about future changes in them. For instance, as a nation's unemployment rate rises, governments and central banks often respond with expansionary fiscal policies (i.e., increasing government spending or reducing taxes) and expansionary monetary policies (i.e., increasing the money supply). These actions have direct and indirect impacts on key macroeconomic

2 Many companies pay more for recruits than they are willing to pay for current talent. This is most visible when workers leave their jobs, requiring their former companies to hire new employees. Being forced into the recruiting market presents these firms with workplace realities. In effect, employee skills that companies pay to develop are lost when these employees exercise their right to find jobs with better pay, wider options, greater mobility, and more attractive benefits.

variables, such as inflation, interest rates, and exchange rates, which can affect a nation's GDP growth rate, living standards, and overall well-being. Each of these macroeconomic variables enters directly into investment planning decisions because of its effect on business income and cash flows.

Do changing unemployment rates affect state, local, and national elections? A common belief is that low and falling unemployment levels improve the odds that incumbents (both individuals and parties) will remain in office. As a result, providing an economic climate for job creation and employment is normally high on candidates' lists of reelection priorities.

The unemployment rate and employment-to-population ratio are among a nation's key labor market measures. They are used frequently by the media and play essential roles in economic, political, and social discussions. To react to these monthly statistics and their trends in constructive ways that meet the employment challenges of current and expected economic situations, politicians, central bankers, and businesses need to understand both the strengths and weaknesses of these economic indicators. It is also necessary for this information to be accurate and timely because acting too quickly or slowly on faulty signals could be costly and destabilizing to a nation.

Measuring Employment and Unemployment

To calculate a nation's *unemployment rate* and *employment-to-population* ratio, let's start by explaining who belongs to the *civilian*, *noninstitutional* population 16 years of age and older (see Figure 3.1). *Civilian* means individuals who are not part of the armed forces, and *noninstitutional* means they are outside institutions, such as hospitals, asylums, and prisons. The second step is to separate the civilian, noninstitutional population into three parts, namely individuals who are (1) employed, (2) unemployed, and (3) Not in the Labor Force.

Who Are the Employed?

What does it mean to be officially categorized as *employed*? Is someone employed if she works only 20 hours a week, but would like to work full-time? Could she work as little as an hour each week and still be considered employed? How does someone who works 80 hours each week figure into labor market statistics? Is he counted as having one or two jobs? How about those with multiple jobs? Do they count more than once? A useful guide to answering these questions is asking, "Do the individuals under consideration have *any*

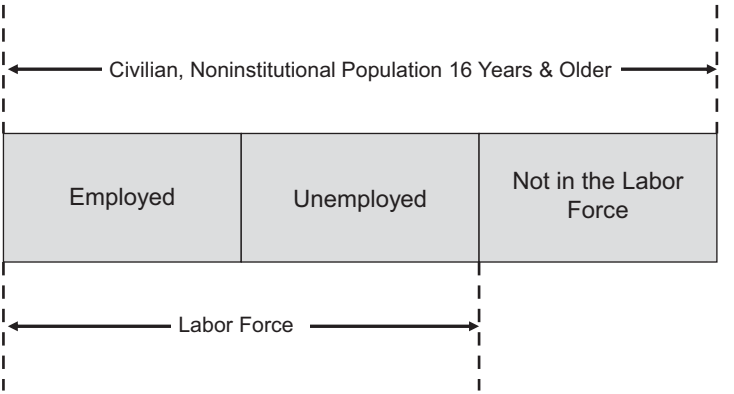


Figure 3.1: Components of the Civilian, Noninstitutional Population 16 Years and Older.

visible source of employment income?" If the answer is yes, then they are considered to be employed.

A surveyed individual is classified as employed if he or she worked for *any number* of hours during the relevant survey period.[3] It makes no difference whether the work was for 1 hour or 80 hours or if the individual had one job or two, and no provision is made for those who work part-time but want full-time employment. Classifying individuals in this way could create the false impression that whoever works for at least one hour is no longer an economic problem, but keep in mind that policymakers have other labor-market statistics that attempt to unveil the degree of national *underemployment*. For example, statistics are collected on workers who are *marginally attached to the labor force*. Included in this category are *involuntary part-time workers* and *discouraged workers* (i.e., those who tried but have given up looking for jobs)—more about this later.

Who Are the Unemployed?

What does it mean to be unemployed? If the answer seems easy and trivial, then consider this: Does it make a difference to the unemployment statistics whether someone quits his job, is fired, or is laid off? How about when someone is out of

3 In the United States, individuals are also counted as *employed* if they were on paid leave, worked in their own businesses, professions, or farms, or worked without pay at least 15 hours in family businesses or farms.

work due to a strike, vacation, or when she is forced to remain home due to bad weather? To answer these questions, a helpful guide is asking, "In which circumstance is there a nationwide labor market problem?" In other words, what type of joblessness is a reflection of some broad-based economic malfunction or insufficient demand? Identifying the unemployment type helps in designing effective policies to correct it.

Most countries have adopted the International Labor Organization's (ILO) recommendations for reporting unemployment statistics, or they have created internal rules that closely parallel the ILO standards. Accordingly, individuals are unemployed if they are (1) without a job, (2) available to work (e.g., not in a hospital, asylum, or prison), *and* (3) actively seeking employment. Therefore, if someone loses her job and stops looking (or fails to look) for a new one, she is not counted in the official statistics as unemployed. Instead, she is considered *Not in the Labor Force*.

How about people who are taking vacations or are out of work due to strikes or labor-management disputes? Vacationers are treated as employed because they are not considered to be a fundamental macroeconomic problem that policymakers can or should address. The same is true for individuals who are absent from work due to illness, bad weather, or personal reasons. They all are classified as employed. As for strikers, they must be out of work for a considerable amount of time to be classified as unemployed. In the United States, this interval could be as short as a week and as long as a month.

How about people who involuntarily lose their jobs as opposed to those who quit? Individuals become unemployed for a variety of reasons. Some are laid off due to falling demand, and many of them expect to be rehired as soon as conditions improve. Others have no such expectations. There are also workers who are dismissed for cause, usually with no expectation of being rehired by the same company, and still others who voluntarily terminate their employment by resigning or retiring. Finally, many unemployed individuals are new to the labor force or are reentrants. In all of these cases, individuals are classified as unemployed only if they are without jobs, available, and actively seeking work.

The Labor Force

A nation's labor force is made up of two groups: individuals who are classified as employed and those who are classified as unemployed, available to work, and actively seeking employment. Anyone who is not in these two categories is classified as Not in the Labor Force. Students, homemakers, retirees, and discouraged workers are not in the labor force unless they are seeking employment.

Calculating Unemployment Rate and Employment-to-Population Ratio

Monthly labor market surveys separate respondents in the civilian noninstitutional population into three major categories: (1) employed, (2) unemployed, available, and actively seeking work, or (3) Not in the Labor Force.[4] Suppose the number of people in these three categories is equal to 95 million, 5 million, and 50 million, respectively, which means the civilian, noninstitutional population 16 years of age and older is equal to 150 million (see Figure 3.2).

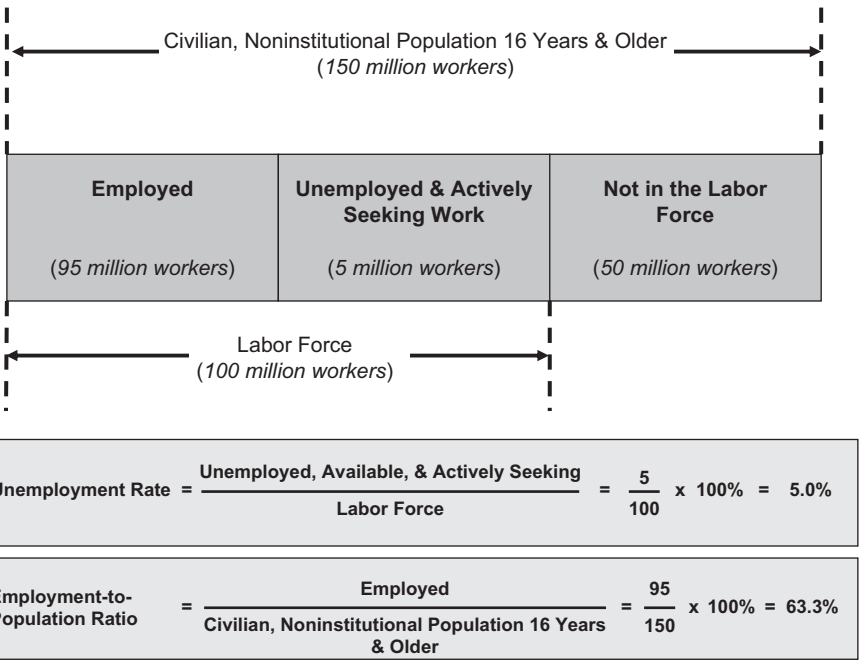


Figure 3.2: Calculating the Unemployment Rate and Employment-to-Population Ratio.

Calculating the Unemployment Rate

The unemployment rate is calculated by dividing the number of individuals who are unemployed, available, and actively seeking work by the total labor force.

4 Notice that U.S. unemployment statistics are estimated from monthly survey results and *not* extracted from lists of individuals who qualify for unemployment compensation.

$$\text{Unemployment rate} \equiv \frac{\text{Unemployed, Available, and Actively Seeking Work}}{\text{Labor Force}}$$

If 5 million people meet these three criteria and the labor force equals 100 million, then the unemployment rate equals 5% (see Figure 3.2).

Calculating the Employment-to-Population Ratio (Employment Rate)

The *employment-to-population ratio*, also called the *employment rate*, is calculated to broaden economic perspectives and avoid some of the problems (discussed later in this chapter) with the unemployment rate measure. It would be a redundant, unneeded exercise if the employment-to-population ratio were simply the complement of the unemployment rate (i.e., if an unemployment rate of 5% meant an employment-to-population ratio of 95%). Fortunately, this is not the case.

The employment-to-population ratio measures the number of people *employed* relative to the entire civilian noninstitutional population 16 years of age and older.

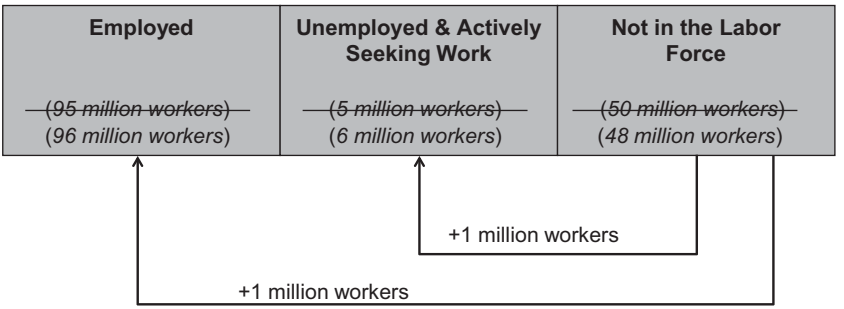
$$\text{Employment–to–population ratio} \equiv \frac{\text{Employed}}{\text{Civilian, Noninstitutional Population 16 Years and Older}}$$

Using the data from Figure 3.2, the number of individuals employed is 95 million, and the civilian, noninstitutional population 16 years of age and older is 150 million. Therefore, the employment-to-population rate equals 63.3%.

Unemployment Rate and Employment-to-Population Ratio Can Rise and Fall Together

More frequently than you might expect, the unemployment rate and the employment-to-population ratio move in the same direction, thereby giving conflicting signals. A rising unemployment rate indicates declining economic activity, but an increasing employment-to-population ratio suggests just the opposite. How is it possible for these two measures to move in the same direction? The answer is easier to understand if we use the information from Figure 3.2, which is replicated in Figure 3.3 to illustrate this outcome. Notice that the initial unemployment rate and employment-to-population ratio are 5% and 63.3%, respectively.

In this example, suppose two million people left the Not in the Labor Force category and entered the labor force. Suppose further that one million of them found jobs, and one million were now unemployed, available, and actively seeking work. As Figure 3.3 shows, these composition shifts would raise the



$$\text{Unemployment Rate} = \frac{\text{Unemployed, Available \& Actively Seeking}}{\text{Labor Force}} = \frac{6}{102} \times 100\% = 5.9\%$$

$$\text{Employment-to-Population Ratio} = \frac{\text{Employed}}{\text{Civilian, Noninstitutional Population 16 Years and Older}} = \frac{96}{150} \times 100\% = 64.0\%$$

Figure 3.3: Unemployment Rate and Employment-to-Population Ratio Can Rise at the Same Time.

unemployment rate from 5% to 5.9% *and* increase the employment-to-population ratio from 63.3% to 64%.

Four Types of Unemployment

"If we can put a person on the moon, land a spaceship on Mars, and drive robotic vehicles over its surface, then why can't the government create 100% full employment?" Let's use this question as the basis for identifying four commonly cited types of unemployment: frictional, structural, seasonal, and cyclical unemployment. They will be useful for understanding why a 0% unemployment rate is not a national goal and why there is no single solution to a country's unemployment problem.

Frictional Unemployment

In every nation, jobs are continuously being created and destroyed. As a result, people are constantly moving to and from positions, seeking their first employment opportunities, and waiting for the best offer. While in transit and during their job searches, these individuals are classified as unemployed. This type of joblessness is called *frictional unemployment*.

Frictional unemployment is usually short term, and it is a natural byproduct of any dynamic economy, where opportunities are persistently opening and closing. The wholesome churning of economic activity is a sort of silver lining to this type of joblessness. On the negative side, frictional unemployment is partly the consequence of imperfect information flows between job demanders (the unemployed) and job suppliers (businesses). Even if enough jobs were available and they matched exactly with the skills of the unemployed, it would take time for the companies to discover and interview potential job applicants and for unemployed workers to search and decide which offer they wished to take. Therefore, the size and duration of frictional unemployment are mainly functions of the frequency of labor turnover and the speed of finding the best matches.

Frictional unemployment rates vary over time and from country to country because they depend on different economic incentives, such as the level of unemployment compensation, as well as dissimilar demographic and legal factors, such as labor market mobility, male and female participation rates, labor market entry and exit rates, labor union strength, real wage flexibility, the minimum wage, and lawful barriers to hiring and firing. For this reason, when nations estimate their *normal* levels of frictional unemployment or when international comparisons are made, calculations and comparisons should consider these differences (e.g., economic incentives, demographics, and legal factors).

Unemployment compensation is a good example of a financial incentive that affects frictional unemployment. When an unemployed person is supported financially by unemployment compensation, the sacrifice (opportunity cost) associated with joblessness is blunted. Does generous unemployment compensation exert a powerful influence on the length of time it takes such individuals to find new jobs? Does the intensity with which individuals seek new posts change directly with both the financial and emotional costs of being jobless?

Because frictional unemployment is usually short term and its effects are beneficial, policymakers do not target a 0% unemployment rate. No economy, especially a growing one, would want the government to set a goal of having 100% of its labor force employed because such a policy might inhibit healthy job creation and destruction, as well as reduce worker mobility. Nevertheless, public policies, such as reforming unemployment insurance compensation, changing maternity leave policies, and reducing search costs by establishing job clearinghouses, can affect frictionally unemployed people—especially in the long run. For these reasons, the normal frictional unemployment rate should be viewed as changing and changeable.

Structural Unemployment

Structural unemployment is caused by a mismatch between the skills demanded by businesses and the talents supplied by unemployed workers. This mismatch could be due to numerous factors, such as technological advancements that leave workers with skills that are no longer demanded, significant changes in resource prices, swings in the composition of domestic demand, the shifting sands of international competition, lack of experience, educational mismatches, and geographic imbalances (e.g., high-growth versus low-growth regions). For instance, unemployed schoolteachers, who have been laid off because of local budget cuts or individuals who have lost their jobs due to low-cost foreign labor, may need months or years to acquire new skills (e.g., computer programming) and move to areas with growing opportunities.

In late 2018, General Motors announced its intention to close plants in Michigan, Ohio, Maryland, and Ontario, Canada, which could have resulted in the loss of 15,000 jobs in North America. At the same time, Foxconn, a Taiwanese electronics manufacturer, broke ground on a new plant in Wisconsin that was promising to hire 13,000 workers. One way to reduce structural unemployment would have been to incentivize unemployed workers to move to Wisconsin and develop the skills needed for these new jobs.

Possible solutions to the structural unemployment problem should not be overestimated or underestimated. Significant increases in aggregate demand would sweep many structurally unemployed individuals into growing job markets, as companies were forced to reach further into the applicant pools by funding internships and training programs. In the absence of such demand, the solution to structural unemployment lies in concerted efforts to reduce barriers to labor mobility through better educational opportunities, training, innovative ways of matching individuals' skills to jobs, informational job clearinghouses, and employment guidance.

Frequently, the possibility of finding a new job with equally attractive compensation, benefits, and advancement opportunities is almost nonexistent. Quite naturally, people are reluctant to accept reductions in their living standards. This reluctance reduces a nation's labor mobility, thereby raising its level of structural unemployment. For example, an unemployed nuclear engineer might not be interested in working at a fast-food restaurant. Not only would the wage be out of line with her skills, but also the opportunity for advancement and personal job gratification would be missing. The issue here is not whether an alternative job exists, but whether the unemployed person's pay and job satisfaction criteria are met. One way in which governments have tried to address the structural unemployment problem is by creating job corps programs that teach new skills and by

providing relocation expenses to unemployed workers who are willing to move from depressed areas.

In many nations, teenage unemployment tends to be much higher than the labor force's overall average. This type of unemployment is structural in a demographic sense because many teens are just beginning to develop the skills and work habits that will make them more valued and desired employees in the future.

Seasonal Unemployment

Seasonal unemployment is caused by predictable, yearly changes in labor supply and demand, due to factors such as weather, holidays, and school schedules. For instance, during the winter, construction workers lose their jobs because of inclement weather, and each spring and summer the unemployment rate rises as college, university, and high school students leave school and seek summer jobs. Predictably, in spring, construction workers are reemployed, and during the fall, the mismatch between the supply and demand for school-age labor changes, as students return to their classrooms. Seasonal unemployment is not a serious macroeconomic problem, but it can account for significant portions of month-to-month changes in the unemployment rate. For this reason, unemployment rates are often *seasonally adjusted* to take out the impact of these predictable changes and allow policymakers to identify and focus on the fundamental sources of unemployment.

Cyclical Unemployment

Recessions or slow economic growth cause cyclical unemployment. It is called *cyclical* because of the strong relationship this type of unemployment has to changes in a nation's business cycle. Robust economic growth reduces cyclical unemployment; recessions increase it. Even weak growth can raise the cyclical unemployment rate if the number of individuals entering the labor force exceeds the number of newly created jobs.

Cyclical unemployment is related directly to a deficiency in national demand. Therefore, it is the type of joblessness that is of fundamental concern to macroeconomic policymakers, such as central bankers, elected representatives and senators, as well as treasury ministers and secretaries. Governments and central banks can try to influence aggregate spending by changing fiscal and monetary policies. When cyclical unemployment is zero, a nation is said to be at *full employment*.

It may seem as if full employment is a somewhat elusive goal that no country ever achieves, but that is a misconception. If we use 5% as a standard, there

have been many times, in the relatively recent past, when the U.S. unemployment rate was below 5%.[5] Between 2010 and 2019, Austria, the Czech Republic, Germany, Hungary, Iceland, Israel, Japan, Korea, Luxembourg, Mexico, the Netherlands, Norway, Poland, Switzerland, and the United Kingdom had unemployment rates which, in certain years, were lower than 5%.[6]

Table 3.1 summarizes the four types of unemployment discussed in this chapter.

Table 3.1: Summary of Unemployment Types.

Type of Unemployment	Source
Cyclical	Caused by slow or negative economic growth. Cyclical unemployment is the focus of macroeconomic policies.
Frictional	Caused by natural adjustments that occur in an economy as jobs are created and destroyed and as the labor force expands and contracts.
Structural	Caused by a mismatch between job skills needed and those possessed by the unemployed.
Seasonal	Caused by predictable changes in yearly unemployment conditions, such as weather conditions, harvest cycles, vacations, and holidays.

Strengths and Weaknesses of Labor Market Measures

Measures of employment and unemployment have strengths and weaknesses, which is why careful analyses usually consider both of them when determining a nation's economic health. In short, the unemployment rate and employment-to-population ratio complement each other. This section reviews the major advantages, disadvantages, and common misperceptions about the unemployment rate and employment-to-population ratio.

5 The yearly U.S. unemployment rate was below 5% from 1997 to 2001, 2006 to 2007, and 2016 to 2019.

6 OECD, *OECD Employment Outlook 2019*, OECD Publishing, Paris (2019), https://doi.org/10.1787/empl_outlook-2018-en (accessed May 23, 2019).

Common Misperceptions About the Unemployment Rate

The unemployment rate is useful for interpreting economic performance, but it can be a deceiving statistic if misunderstood.

The Unemployment Rate Can Overstate Economic Hardship

Consider two households, the Wolfs and the Conaways, both of which have three family members. The Wolf household has only one income earner, and the Conaway household has three, including both spouses and a 20-year-old son, who lives at home. If the Conaways' son was fired, the unemployment rate would rise by the same amount as if the sole income earner in the Wolf family lost his job. Though the level of economic hardship would be greater for the Wolfs than for the Conaways, the unemployment figures would not reflect this difference.

Understanding the contrasting economic situations of the Wolfs and the Conaways helps to explain one of the reasons caution should be taken when making direct comparisons between unemployment rates over time. For example, a majority of U.S. households today have multiple income earners, but the same could not be said for the 1950s when relatively few U.S. households had more than one income earner.

A nation's unemployment rate could also be a poor measure of labor market conditions if a significant number of surveyed individuals falsely report that they were unemployed and actively seeking work, which would result in unemployment rates higher than they ought to be.[7] Overstating the actual level of economic hardship could lead economic policymakers to conclude that expansionary policies were needed, when, in truth, the economy was not in any danger from recession.

The Unemployment Rate Can Understate Economic Hardship

The unemployment rate does not include a category of individuals called "marginally attached workers," which includes individuals who would like to work, actively sought employment but were unsuccessful, and have given up their searches in frustration.[8] These individuals are not included in a nation's labor force and, therefore, are not counted as unemployed.

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7 Some unemployed individuals may incorrectly indicate that they are actively seeking employment to qualify for unemployment benefits or because they are embarrassed to admit that they are neither working nor looking.

8 In the United States, *discouraged workers* are unemployed, available for work, and have searched for a job during the past 12 months but have given up looking because they believe no posts exist or available jobs do not match their skills. See U.S. Department of Labor, Bureau of Labor Statistics, *BLS Glossary*, https://www.bls.gov/bls/glossary.htm (accessed May 23, 2019).

Anyone estimating future labor market trends should consider discouraged workers as a potential source of labor market supply. When an economy recovers or the possibility of securing employment improves, discouraged workers often reenter the workforce, thereby putting downward pressure on labor costs or moderating their rate of increase. To the extent that the group of discouraged individuals is a significant portion of the jobless population, the unemployment rate may *underestimate* a nation's actual level of macroeconomic hardship.

The Unemployment Rate Lags Economic Activity

The unemployment rate tends to lag significant turning points in economic activity. When a nation slides into a recession, company managers often cut employees' hours before they release, lay off, or fire them. Therefore, the unemployment rate does not rise immediately after a recession begins. Managers are reluctant to let employees go because recessions can last for very short periods. Firing workers could mean losing, forever, significant investments a company has made increasing employees' productivity—not to mention the disruption it causes to these individuals' personal lives. When demand recovers, hiring and training inexperienced workers can cause costs per unit to rise and productivity to fall. On the plus side, downturns provide opportunities for managers to prune low-productivity workers from their workforces and not rehire them when the economy recovers.

At the onset of an expansion, businesses often increase the hours of their existing workforces before hiring new employees. As a result, the unemployment rate does not fall immediately after an economic recovery begins. By avoiding additional expenses, such as health care and other benefits for new workers, managers can keep down their costs, thereby increasing productivity as output rises.

What Does It Take to Be "Actively Seeking Work?"

The unemployment may be challenging to measure accurately because it is based on whether someone is actively seeking work. Due to the relatively broad definition of actively seeking work, the unemployment rate can be affected by shifts in the status of individuals between unemployed and actively seeking work and Not in the Labor Force.

What exactly does *actively seeking work* mean? In the United States, to be actively seeking work, an individual must fulfill any one of the following criteria: (1) placing or answering employment advertisements, having job interviews, or contacting prospective employers; (2) checking union or professional registers;

(3) contacting employment agencies (private or public); (4) asking friends or relatives about job opportunities; (5) inquiring with school or university job centers; or (6) writing letters of application.[9] One wonders how reliable a statistic can be if all you have to do to qualify as actively seeking work is check occasionally with friends and relatives. At the same time, strong and weak social networking linkages can have powerful positive results.

Common Misperceptions About the Employment-to-Population Ratio

Like the unemployment rate, the employment-to-population ratio is often misinterpreted.

It Includes Underemployed Workers

The employment-to-population ratio overstates the health of a nation because it counts underemployed workers as *fully employed*, regardless of whether they are seeking full-time jobs, more hours, or are working below their physical and mental capabilities. For instance, waiters with PhDs, doctors who drive taxicabs for a living, and those who work part-time, for as little as one hour a week, are considered employed. Consequently, nations that seem to be benefiting from robust employment statistics could be suffering considerable losses due to *underemployment*. As a nation's underemployment rate rises, economic growth slows and living standards fall progressively behind where they should be.

For businesses interested in using labor market measures to forecast future costs, underemployment masks a potential source of supply. Because they earn less than their skills are worth (or less than these workers *feel* their skills are worth), underemployed workers continue to search for more suitable jobs. If they are willing to change employment quickly when opportunities arise, underemployed workers could put downward pressure on wages.

Strengths of the Employment-to-Population Ratio

Despite its problems, the employment-to-population ratio is considered one of the best indicators of a nation's current macroeconomic state. Not only does it provide direct, contemporaneous information on overall labor conditions, but this ratio is one of the most timely, significant, reliable, and consistent macro-

9 Bureau of Labor Statistics, *Frequently Asked Questions*, https://www.bls.gov/bls/faqs.htm (accessed May 23, 2019).

economic variables available. In the United States, it is one of the four main indicators used to date the beginning and ending of business cycles.[10]

For purposes of taking the pulse of a nation's labor market, the employment-to-population ratio has some significant advantages over the unemployment rate. For instance, the number of people employed is more stable and easier to determine than the number of people unemployed, available, and actively seeking work. This is especially true in nations where their income tax returns can cross-check individuals' employment status. Therefore, the employment-to-population ratio tends to have fewer sampling errors, which improves its quality relative to the unemployment rate.

Final Comments on Interpreting Unemployment Rate and Employment-to-Population Ratio

It is relatively easy to find flaws in any macroeconomic measure. All the criticisms mentioned in this chapter are well known to labor economists around the world, but they often seem to get lost in translation. The challenge is not to find fault but rather to fully understand the limitations of our economic indicators and develop better measures that reveal critical labor market information at a reasonable cost. Voters, politicians, and business managers all make decisions based on their perceptions, and unless they understand the nuances of labor market measures, such as the employment and unemployment rates, they could easily make poorly considered choices. Supplemental measures of labor market health are also available for anyone interested in expanding their knowledge, such as the number of discouraged and part-time workers, families with multiple income earners, as well as unemployment rates differentiated by age, gender, geographic location, and duration.

10 U.S. business cycles are dated by the National Bureau of Economic Research (NBER). Besides the employment-to-population ratio, the NBER uses three other monthly indicators: real (i.e., inflation-adjusted) personal income less transfer payments, the volume of real sales of the manufacturing and trade sectors, and industrial production. Of the four measures, the employment-to-population ratio is considered the broadest and best.

The Rest of the Story

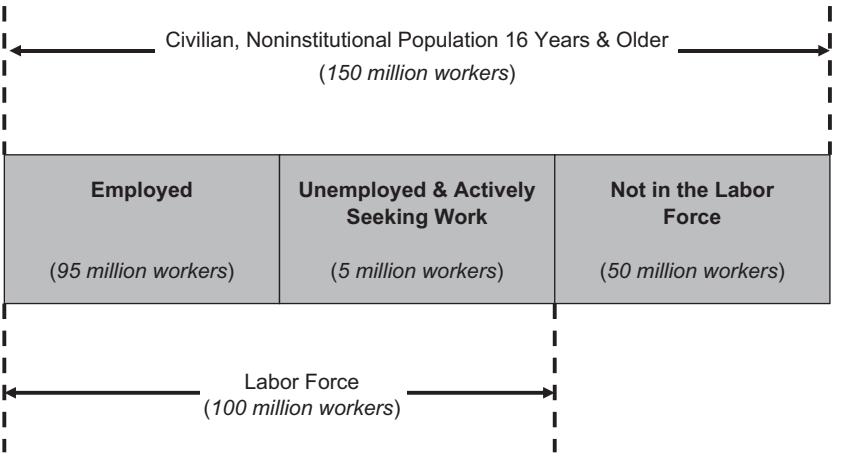
Other Labor Market Measures

Even though the unemployment rate and the employment-to-population ratio are the most popular labor market measures, they are not the only ones used by policymakers and businesses. Other key gauges are the level of labor market participation, length of time it takes unemployed workers to find new jobs, and unemployment composition.

Labor Force Participation Rate

The labor force participation rate is equal to a nation's labor force as a percent of its civilian, noninstitutional population 16 years of age and older. This indicator provides information on the portion of a nation's working-age population that is willing, available, and able to work.

In Figure 3.4, the labor force equals 100 million individuals, and the civilian noninstitutional population 16 year and older equals 150 million individuals. Therefore, the labor force participation rate equals 66.7%.



$$\text{Labor Force Participation Rate} = \frac{\text{Labor Force}}{\text{Civilian, Noninstitutional Population} \geq 16} = \frac{100}{150} \times 100\% = 66.7\%$$

Figure 3.4: Labor Force Participation Rate.

The labor force participation rate in the United States experienced dramatic increases between 1960 and 2000, rising from about 59% to 67% (see Figure 3.5). After 2000 and until 2019, it fell to about 63%. Primary reasons for the significant increase were demographic changes, such as increases in female participation rates, the proliferation of families with multiple income earners, and strong economic growth. Between the early 1960s and 2000, female participation rates rose from about 38% to 60%, while participation rates among men declined from 83% in 1960 to about 75% in 2000. After 2007, the fall in labor force participation was heavily influenced by the Great Recession (December 2007 to June 2009) and its after-effects, as well as the demographics of a retiring baby boomer generation, which started in earnest during 2011.[11]

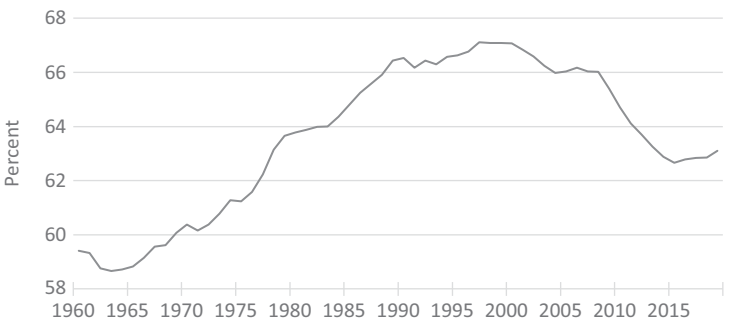


Figure 3.5: U.S. Labor Force Participation Rates: 1960 to 2019.
Source: U.S. Bureau of Labor Statistics, Civilian Labor Force Participation Rate [CIVPART], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/CIVPART (accessed May 22, 2019).

Unemployment Duration

A lengthening lag between when individuals lose their jobs and find new ones is a prominent signal that the labor market is deteriorating.[12] Figure 3.6 shows that, between 1970 and 2019, the average unemployment duration for the United States varied between about 8 weeks and 41 weeks, which is a sizeable

11 The baby boomer generation includes individuals born between 1946 and 1964. In 2017, it accounted for about 23% of the U.S. population.
12 This point was addressed in our discussion of frictional unemployment.

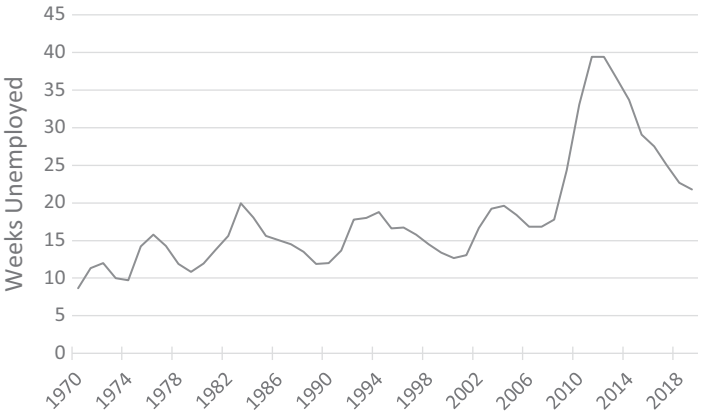


Figure 3.6: Mean Duration Rate of U.S. Unemployment: 1970 to 2019.
Source: U.S. Bureau of Labor Statistics, Average (Mean) Duration of Unemployment [UEMPMEAN], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/UEMPMEAN (accessed May 22, 2019).

difference. Clearly, the longer it takes to find a job, the more precarious and weaker the labor market.

Unemployment Composition

Focusing on average unemployment rates is useful for anyone interested in monitoring a nation's macroeconomic problems, but this statistic hides essential differences in the composition of the unemployed. For example, Table 3.2 shows how widely the U.S. unemployment rate varied among different demographic groups during the first quarter of 2019. The unemployment rate among white men, 20 years of age and older (3.6%), was 4.1 percentage points lower than the rate for comparably aged black or African American men (7.7%). Similarly, white women, 20 years of age and older (3.1%), had an unemployment rate 2.4% lower than the rate for black or African American women of a similar age (5.5%). Finally, the unemployment rate for white teenagers (11.8%)[13] was 8.4% higher than the rate for white men and women 20 years of age and older (3.4%) but 11.3% lower than the rate for black or African American teens (23.1%).

13 In this, context "teenagers" are 16 to 19 years old.

Table 3.2: U.S. Unemployment by Demographic Characteristic: First Quarter 2019.

Category	Rate
White	
Overall	3.7%
Men and women 20 and older	3.4%
Men 20 and older	3.6%
Women 20 and older	3.1%
Teenagers (16 to 19)	11.8%
Black or African American	
Overall	7.1%
Men 20 and older	7.7%
Women 20 and older	5.5%
Teenagers (16 to 19)	23.1%

Source: Bureau of Labor Statistics, https://www.bls.gov/web/empsit/cpsee_e16.htm (accessed May 22, 2019).

If Only I Could Be a Fly on the Wall

At 8:30 a.m. on the first Friday of every month, the U.S. Bureau of Labor Statistics (BLS) reports the nation's unemployment rate—along with a rich assortment of other labor market information. Of all the economic statistics published by the U.S. government each month, the information contained in this report is arguably the most influential. Investors anticipate it and, if the reported statistics are different from those expected, they act immediately.

If you could be a fly on the wall at the BLS meeting, able to learn the news before it hit the market, your money worries would be solved for life because you could profitably trade stocks, bonds, commodities, and currencies and earn massive profits. Your wealth would materialize like a submarine surfacing next to a rowboat. Any car, house, vacation, or adventure your heart desired would be affordable, and not just that, you would have the time to enjoy them all because you would never again have to work—ever. Sound good? If it does, you're not alone, which is why the BLS makes every effort to protect its sensitive labor market information.

The Lock-Up

The BLS solves its confidentiality problem by (literally) locking-up those who have prior access to this information and forcing them to release it simultaneously. The only exceptions are the president of the United States, the chairman of the Council of Economic Advisors, and the Federal Reserve chairman, who get the labor market report a day before its official public release. Who are the others who get prior knowledge of these sensitive figures but are temporarily locked up?[14]

About two dozen news reporters are allowed to inspect the labor-market data before their official release. They arrive at the BLS's offices on 3rd Avenue and C Street in Washington D.C. well before 8:00 a.m. Upon entering the building, they are given ID badges and ushered, by armed guard, to the BLS's windowless secure pressroom, called the "lock-up room." When news reporters enter BLS's secure pressroom, they are required to sign an Embargo Agreement, which spells out sanctions for individuals and news organizations that violate the confidentiality terms of the agreement. Temporary suspension or permanent expulsion is possible.

At 7:55 a.m., a BLS official places a call to the U.S. Naval Observatory to confirm and adjust, if needed, the time so that it exactly matches the observatory's super-accurate atomic clock. At 8:00 a.m., the press room door is closed and locked. Armed guards make sure that no one leaves or enters for the next 30 minutes, and everyone inside is asked to turn off all communication devices. The lock-up has begun. Those under "house arrest" have just 30 minutes to read the report, distill the information, and compose their stories.

At 8:28 a.m., television reporters are allowed to leave so they have time to make their daily 8:30 a.m. broadcasts. At 8:30 a.m., the news hits the market, and within seconds, this information is communicated worldwide with blazing speed. Newspapers, business media, and online services publish the story, interpret the figures, and spread the information through highly efficient global information networks.

European markets, which have been open for hours, react immediately, as do electronically traded derivative markets that operate continuously throughout the 24-hour trading day. Those who have accurately predicted the statistics can sit back as their profits soar. Those who guessed incorrectly scramble to hedge or otherwise unwind their positions. The stakes are high, and the lingering question is how, if at all, the central bank and government will react to the news.

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14 Bernard Baumohl, *The Secrets of Economic Indicators: Hidden Clues to Future Economic Trends and Investment Opportunities*, Wharton School Publishing, Pearson Education Inc. (2012).

Expectations and the prices of stocks, bonds, commodities, and currencies all snap to attention as the news filters through the international community.

Suppose you were able to get prior access to confidential unemployment data and knew the reported figures would be dramatically different from prevailing expectations. What would you do? What trades would you make? For instance, suppose you knew the unemployment rate would be much lower than the market anticipated. Would you buy or sell stocks? How about bonds, commodities, and currencies? Which ones would you buy or sell? Would it make a difference? These questions will be answered as you learn more about financial markets and macroeconomics. A clear understanding of how these markets act and interact is a primary goal of this book.

Natural Rate of Unemployment

You may be surprised to learn that countries around the world define *full employment* differently, but these differences are usually reasonable and logical. Each country has its own socioeconomic and institutional idiosyncrasies, and these differences influence its unemployment rate. As a result, reaching a 5% unemployment rate may be far easier (i.e., done with far less sacrifice) for one nation than it is for another.

What is sacrificed when a nation strives for full employment? Often, the cost of lower unemployment is higher inflation. Therefore, the *natural rate of unemployment* is defined as the unemployment rate that allows a nation to sustain its current level of inflation. In other words, at this rate of unemployment, inflation has no inherent tendency to rise or fall. For this reason, the natural rate of unemployment is often called the *nonaccelerating inflation rate of unemployment* (NAIRU). Perhaps, more accurately, it should be called the *nonincreasing inflation rate of unemployment* (NIIRU) because the rate of acceleration is not the point. These names buttress the strong link that exists among the unemployment rate, stable inflation, and a nation's full-employment goals.

In general, the natural rate of unemployment tends to be lower in countries that have higher degrees of labor mobility and worker participation rates, lower minimum wages, weaker unions, less generous social welfare payments, and more flexible real wage rates. Because these factors vary from country to country, each nation can have a different natural rate of unemployment. Similarly, because these factors change over time, natural rates of unemployment change with them. Therefore, the full employment goals of nations can fluctuate over time.

Outsourcing, Offshoring, and Reshoring

It seems as if we all know someone who has lost his or her job to technology or because it was exported to a foreign nation with lower wages. The problem is the pace seems to be accelerating and increasingly threatening broader segments of our workforce. Whose job is really safe these days? Are job losses caused by technological advancement and foreign competition the source of serious national problems, such as income inequality, salary compression, sectoral decay, and rising crime rates traced to unemployment and abandoned houses?

Offshoring provides a convenient framework for addressing these issues and understanding better where *you* stand on them. What is offshoring, and how is it different from outsourcing? Does offshoring cause a nation's unemployment rate to rise? Does it reduce real GDP? Even if there were clear macroeconomic advantages from offshoring, would you support it, knowing the massive disruption it causes to thousands of families' lives? To what extent should ethical considerations be a part of any evaluation of offshoring's net benefits? At the same time, knowing the suffering that offshoring causes to those who lose their jobs, how should we weight their losses relative to the benefits that it brings to consumers who pay lower prices and shareholders who earn higher returns? If all we need is a way to slow the pace of job losses, then how can we be sure that protectionist policies or subsidies will be short-term and not interfere with our long-term growth and development?

Outsourcing Versus Offshoring

Outsourcing is a generic term, which refers to the act of delegating company responsibilities to external vendors. These responsibilities might be operational (e.g., component production and procurement) or non-operational (e.g., back-office administration, programming, call centers, and portfolio management). External vendors can be domestic-owned or foreign-owned companies.

When companies located in foreign nations handle these responsibilities, the activity is called *offshoring*, which is the focus of this section. The foreign companies hired to do outsourced work may be domestically owned or foreign-owned. For instance, a U.S. pharmaceutical company could purchase ingredients from an affiliate or subsidiary located abroad or from an independent, foreign-based company. Both are examples of offshoring. Therefore, offshoring is not necessarily transacted with "external" firms. The common denominator is that companies doing offshored work are located in foreign countries.

Economic Forces Driving Outsourcing and Offshoring

Let's focus on this issue from a purely economic point of view and ignore, for now, the impact on those whose jobs are lost. We will come back to the ethical issues thereafter. Outsourcing and offshoring provide distinct benefits to consumers when they can purchase higher-quality or similar quality products at lower prices. Businesses also benefit when they can buy quality inputs at lower costs and increase profits. These returns can then flow to shareholders and possibly employees who are left, via more attractive dividends, capital gains, and compensation packages.

Companies that engage in outsourcing and offshoring activities do so for a variety of profit-minded reasons. Not only can they increase operating and pricing flexibility by transforming fixed costs into variable costs, but outsourcing and offshoring can also help businesses improve quality, speed process cycles, and permit access to broader and deeper pools of resources, talents, and skills.

Offshoring has been encouraged by global deregulation, reductions in international trade barriers, greater global competition, and risk mitigation strategies based on diversification. During the 1980s and 1990s, reductions in transportation costs and international trade barriers led to the growth of offshoring in manufacturing, which caused the loss or displacement of many blue-collar jobs. The more recent wave of offshoring has been prompted by advances in information and communication technologies (e.g., fiber optics, computers, and the internet) and has caused the loss or displacement of many white-collar jobs, as well. This trend is sure to continue.

The improvements mentioned above in transportation and communication technologies have enabled companies to fragment, mechanize, outsource, and offshore their production processes and activities. They have allowed businesses to focus on areas of core competence and offload the rest. Jobs that previously could not have been done conveniently or profitably abroad, such as call centers and diagnostic labs, have found their way to foreign shores.

Offshoring Is a Revolving Door

The same forces that have spawned offshoring have also made it a revolving door, as companies in develop*ing* nations now find it increasingly advantageous to locate certain activities, such as corporate headquarters, in develop*ed* nations with better infrastructures. More generally, countries that complain about offshoring's negative effect on domestic employment often forget that they are also the recipients of the offshoring activities of foreign nations. For instance, many Japanese companies have constructed automobile and electronics manufacturing sites across the United States.

Does Offshoring Reduce a Nation's Standard of Living?

Is offshoring bad for a nation? Let's take a closer look at the net effect it has on a nation's GDP, unemployment rate, and income distribution. We will find that the answers are not as evident as they might first appear. An example will help to show why.

Suppose that offshoring resulted in the loss of 100,000 U.S. jobs to China, and suppose further the losses were traced to a significant wage differential. More specifically, assume the displaced U.S. workers were earning annual salaries equal to $60,000, and the employed Chinese workers earned only $5,000 per year.

By losing 100,000 jobs, U.S. GDP would fall by $6 billion.[15] Some of the unemployed (relatively few) would soon find new jobs at higher salaries. Others (again, relatively few) would never find new jobs. The most likely scenario is the vast majority would find new jobs but at substantially lower salaries. Let's trace the consequences.

If the national unemployment rate were 7%, then we might expect 93% of the unemployed workers to find new jobs, but it is often difficult to quickly find new employment–especially if the area is broadly affected by the same economic shock, workers are relatively old, and the jobs available require special skills. To make our example more conservative, let's err on the negative side and assume that only 90% of them find new jobs, and they earn only half their previous wages (i.e., $30,000). Firing 100,000 workers earning $60,000 per year would reduce U.S. GDP by $6 billion, but rehiring 90% of them at annual wages equal to $30,000 would partially offset the loss by $2.7 billion, resulting in a net decrease in U.S. GDP by $3.3 billion.

At this point, it may seem as if the case against offshoring is clear, but we must also consider the effects offshoring has on business profits. Offshoring reduces U.S. business costs substantially. Instead of paying 100,000 workers $60,000 per year, businesses can import these goods or services, paying foreign workers only $5,000 per year, which amounts to $0.5 million for the 100,000 foreign workers. As a result, business costs fall from $6 billion to $0.5 million—a net saving of $5.5 billion. Combining offshoring's effects on workers and businesses produces an interesting result. U.S. wages fall by $3.3 billion, but profits rise by $5.5 billion, resulting in a net increase in GDP by $2.2 billion.

The conclusions from this exercise rest on the assumptions made. Could offshoring have caused GDP to fall? What would it have taken to turn the

15 100,000 jobs × $60,000/job = $6 billion. Remember that the income approach to calculating GDP sums wages, return on capital, rent, and profits.

tables? If we concentrate only on the percent of unemployed workers who found jobs paying (on average) $30,000 a year, then approximately 83% of those who lost their jobs would have to remain unemployed to offset the gains to businesses. This result is highly unlikely on two grounds. First, while there is every reason to believe that offshore-displaced workers should have a higher unemployment rate higher than the national average, it is much less reasonable to believe it will be almost twelve times the national average and remain that way in the long run. Second, if offshoring caused unemployment to become a national (as opposed to regional) problem, central banks and governments would use their expansionary monetary and fiscal powers to reduce swelling unemployment rates.

Does Offshoring Redistribute National Income?

Even if offshoring does not reduce a nation's GDP, it has the potential to significantly redistribute incomes from labor to business. Income inequality has become a broad-based economic issue in many countries–one which has many causes, not just offshoring. Remedies may be found in nations' tax and social benefit systems, but this problem is clearly a ticking time bomb that could lead to considerable social unrest.

Transition Costs of Offshoring—Ethical Issues

It's easy to be analytical and objective when discussing the loss of someone else's job and reduction in someone else's quality of life. While offshoring may provide significant long-term benefits to the nation, as a whole, it is disruptive in the short run and can negatively affect the lives of many families, which is why short-term transition costs should also be considered. The hopes of families with decent earnings and visions of sending their children to college and retiring comfortably can be shattered by sudden job losses and the prospect of living from paycheck to paycheck. Along with the loss of wages and benefits, such as health insurance and pensions, there can also be an erosion of skills and, for many, a loss of self-esteem. For those young enough to change careers, there are retraining and relocation costs. For governments, there are additional transfer payments to finance social welfare programs, such as food stamps and unemployment compensation. For communities, tax bases erode, thereby limiting the services they can provide, such as the teachers they can hire and community services they can support.

Reshoring

If outsourcing is an inevitable result of the cost-reduction process, then offshoring is an inevitable result of globalization. Outsourcing and offshoring can enable companies to produce cheaper and better products and to penetrate and exploit their market potential, which is why they do it—most of them with the blessings of their shareholders. Offshoring is not an irrevocable decision. If foreign suppliers fail to deliver on their sides of the bargain, such as producing at lower costs or higher quality, then companies can and will respond by changing course. This could involve moving production and services to new foreign locations or bringing them back home, which is called *reshoring*.

Indeed, many U.S. companies have decided to reshore their production and service activities. Culture clashes are often cited as major causes, but perhaps more important are the ways companies have reacted to communication and coordination problems, apprehensions about reduced flexibility, the loss of cost controls and predictability, quality concerns, weak contract enforceability, and perceived disrespect for basic property rights, especially intellectual property rights, such as patents, copyrights, and trade secrets. Some companies have noticed and regretted the erosion of in-house knowledge, and others have felt the heat of negative backlashes from domestic governments, shareholders, and unions for the effects that offshoring has had (or was believed to have had) on domestic employment, community services, and worker conditions.

The Future of Offshoring

In the future, offshoring will be transformed by economic and political forces in developed and developing nations. As it grows, relative international incomes, prices, and exchange rates will adjust to choke off some or all of the incentives to offshore. This has been happening for some years now in countries such as China and India, where wage increases have far outpaced those in the United States and Western Europe.

Futurist Buckminster Fuller once said: "You never change things by fighting the existing reality. To change something, build a new model that makes the old reality obsolete." The advancement of 3D printing has the power to transform "manufacturing," which usually takes place in large factories located thousands of miles from the consumer, to localized and smaller-scale production facilities. It could be a paradigm changer in the offshoring debate, substituting access to software for access to low-cost labor.

Social issues must also be considered. As nations develop, residents will expect better living standards, including those that extend beyond their salaries. They will want reasonable social lives, with time to spend with friends and family. Time zone differences (e.g., between New York and Mumbai) force many offshore workers (especially in customer service centers and call centers) to work late-evening shifts. Such hours can put considerable stress on their family lives. As a result, companies providing outsourced services often suffer from high attrition rates, low morale, and disappointing productivity. Increasing demand and healthy competition are also reducing the margins of companies that offer offshore services.

One alternative to offshoring is protectionism (e.g., tariffs, quotas, and exchange controls), but protectionism is contrary to more than 200 years of economic logic and experience. Protectionism can definitely postpone job losses in the short run, but it is unlikely to prevent them indefinitely. Only by producing affordable, quality products can a country ensure that jobs will remain at home.

In the outsourcing/offshoring debate, it is essential to remember that international trade is *not* a zero-sum game. There does not have to be a loser for every winner. It is equally important to remember that outsourcing/offshoring can be disruptive, which means winners *and* losers are inevitable. While consumers and some businesses are clear winners, there will be businesses and families that lose. As a result, decisions should be based on *net* gains or losses and not on the existence or possibility of *any* losses. At the same time, these net gains and losses should be weighed against the ethical standards each nation sets for itself.

Conclusion

Measures of labor market conditions, such as the unemployment rate, employment rate, labor force participation rate, and unemployment duration, are neither arcane concepts nor mere academic statistics. Instead, they are practical barometers that gauge a nation's level of economic hardship or prosperity. For businesses and individuals, it is important to understand a nation's vital labor statistics to make prudent decisions. For policymakers, it is also essential to understand these measures so that proper diagnoses can be made of existing or impending economic problems and credible solutions can be enacted.

Unemployment rates vary over time and internationally due to differences in economic, social, and demographic factors. For this reason, care should be taken when drawing conclusions from comparative data. Because there are

different types of unemployment (e.g., frictional, structural, seasonal, and cyclical), there is no single solution to reducing it—but increased demand certainly helps. Moreover, because measures of labor market conditions might overstate or understate the actual level of economic hardship in a nation, government policies and business decisions should be based on a broad selection of key labor market measures.

Key Points

- Labor market conditions
  - Joblessness can reduce self-esteem, lower self-confidence, and cause mental distress.
  - Labor market measures help predict costs of production and top-line sales growth.
  - Labor market fluctuations affect employee turnover, productivity, and loyalty.
  - The changing state of labor markets has direct and indirect impacts on economic activity via their influences on government decisions, central bank policies, and business expectations.
- Unemployment and employment-to-population measures
  - The *employed* are those individuals who have worked for any number of hours during the relevant survey period.
  - The *unemployed* are those individuals without jobs, available to work, and actively seeking employment.
  - The *labor force* includes individuals who are employed and unemployed. All others are Not in the Labor Force.
  - The *unemployment rate* equals the number of unemployed divided by the labor force.
  - The *employment-to-population ratio* equals the number of people employed divided by the civilian noninstitutional population 16 years of age and older.
  - The unemployment rate and the employment-to-population ratio can (and occasionally do) move in the same direction.
- Frictional, structural, seasonal, and cyclical unemployment
  - Frictional unemployment is due to the normal creation and destruction of jobs in a healthy economy. It is not considered a serious macroeconomic problem.
  - Structural unemployment is due to the mismatch between job skills and job opportunities.
  - Seasonal unemployment is due to predictable, periodic (e.g., yearly) changes in the supply and demand for labor.
  - Cyclical unemployment is due to insufficient demand, and it is considered to be a macroeconomic problem.
- Problems with labor market measures
  - When there are multiple family income earners, the unemployment rate may overstate a nation's actual level of economic hardship.

- Individuals who falsely report that they are actively seeking work cause the unemployment rate to overstate the actual level of economic hardship.
- Discouraged workers are considered to be Not in the Labor Force, causing the unemployment rate to underestimate the level of economic hardship.
- Counting part-time workers as employed causes the unemployment rate to understate the actual level of economic hardship.
- The employment-to-population ratio masks underemployment and, therefore, the underutilization of a nation's labor resources.

- Other labor market measures
  - The *labor force participation rate* is equal to a nation's labor force relative to its civilian, noninstitutional population 16 years of age and older.
  - Unemployment duration (i.e., the length of time needed to find a new job) is another prominent labor market measure.
  - Race, ethnicity, and gender can explain many of the composition differences in a nation's unemployment rate.
  - International unemployment rates differ because of demographic and structural dissimilarities and because of varying macroeconomic factors.
- Natural rate of unemployment
  - The natural rate of unemployment allows a nation to sustain its current level of inflation.
  - Another name for the natural rate of unemployment is the nonaccelerating inflation rate of unemployment (NAIRU) or nonincreasing inflation rate of unemployment (NIIRU).
  - The natural rate of unemployment varies among nations and over time because of social, economic, and institutional differences and changes.
- Outsourcing, offshoring, and reshoring
  - Outsourcing means delegating company responsibilities to external vendors.
  - Outsourcing means delegating company responsibilities to external vendors.
  - Outsourcing to foreign nations is called *offshoring*.
  - Outsourcing and offshoring are popular because they can lower the prices of consumer goods, improve quality, and increase business profits.
  - Global deregulation, lower trade barriers, greater competition, and better diversification are forces behind offshoring.
  - Offshoring seems to have its most significant effect on income redistribution.
  - Offshoring can have high transactions costs.
  - The benefits from offshoring should be tempered with its transition costs, the economic hardship it brings to many families, and broader issues of social distress, which are ethical issues.
  - *Reshoring* means bringing offshored jobs back home.

Review Questions

1. In the following cases, what happens, if anything, to the nation's unemployment rate?
   a. Individuals have their weekly hours cut from 40 to 30 hours.
   b. Massive layoffs occur due to a decline in economic activity.
   c. A sharp reduction in college and university applications occurs because high school students decide to work rather than get advanced degrees. It takes six months for them to find employment.
   d. Due to a sluggish economy, many of the high school graduates in Question 1c get jobs that are substantially below their abilities.
   e. There is a significant increase in the number of homemakers looking for work to pay for their children's university educations.
   f. Due to a rapidly growing economy, executives with well-paying jobs send their résumés and letters of application to potential employers offering more interesting positions.
2. Suppose the civilian, noninstitutional population over 16 remains the same. Explain how it is possible for a nation's unemployment rate to fall at the same time its employment-to-population ratio falls.
3. Explain what happens to a nation's unemployment rate and employment-to-population ratio if unemployed individuals become so discouraged that they stop looking for jobs.
4. Explain how the unemployment rate both understates and simultaneously overstates the true level of economic hardship in a nation.
5. Why don't governments try to achieve 0% unemployment?
6. Explain the four different types of unemployment. Briefly provide ways in which each type of unemployment might be reduced.
7. Is it accurate to say that as a nation's economy falls into recession, its structural and frictional unemployment rates should rise?
8. Explain the natural rate of unemployment and why this economic measure is important to economists, businesses, and policymakers. What is the relationship, if any, between the natural rate of unemployment and a nation's potential output?
9. What is outsourcing? How, if at all, is it different from offshoring? Why is offshoring so controversial? What are the advantages and disadvantages of outsourcing and offshoring?

Discussion Questions

10. Is the unemployment rate or employment-to-population ratio a better measure of economic health? Take a position, and be able to defend it against someone else in class with a different opinion.
11. Explain how a forecasted increase in unemployment and reduction in GDP might affect a company's cash flow projections over a capital budgeting period (e.g., five years).

12. There are many measures of labor market conditions besides the unemployment rate and employment-to-population ratio. List the measures that you feel are most important, and of these measures, explain which of them you feel best reflects economic conditions.
13. Explain how factors such as ethnicity, age, education, gender, and financial background affect a nation's labor force participation rate.
14. Explain whether *you* believe the net effects of offshoring are positive or negative.

Chapter 4
Inflation and Real GDP

"Where's the beef?"[1] This is the question business managers should be asking themselves as they prepare their short-term budgets and business plans. The "beef" for any business comes from increasing the quantity of goods and services sold to customers, reducing *real* (inflation-adjusted) costs of production, and earning *real* profits from sound and timely investment decisions.

Like the distorted reflections, we see of ourselves in carnival mirrors, inflation twists the image of both business performance and the economic world around us. For this reason, managers should understand what inflation is and how to remove its contorting effects from their analyses. Only in this way can they get a clear view of economic reality.

This chapter explains inflation, how it is measured, what it measures, and, equally important, what it does not measure. The chapter goes on to explain how the illusionary effects of inflation can be removed from national income statistics, such as gross domestic product (GDP) so that a nation's past, current, and expected future economic growth rates come into clearer view.

The Basics

What Is Inflation?

In 1917, before the hazards of smoking were so well known, Vice President Thomas R. Marshall said on the floor of the U.S. Senate, "What this country needs is a good five-cent cigar." About a decade and a half later, Marshall's quip was revised by New York journalist Franklin P. Adams, who said, "There are plenty of good five-cent cigars in the country. The trouble is they cost a quarter. What this country needs is a good five-cent nickel."

Inflation is like an acid that erodes the purchasing power of a nation's currency. The higher the inflation, the greater the erosion. Consider the U.S. dollar's loss of purchasing power between 1913 and 2019. What do you think it cost in 2019 for a basket of goods and services worth $100 in 1913? You might be

1 "Where's the beef?" has become a motto in the United States and Canada, since it was first introduced in 1984, in a Wendy's restaurant commercial. Since then, it has been used by politicians and others when questioning the value or substance of an idea or product.

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surprised to learn that, due to inflation, a basket of products costing $100 in 1913 cost more than $2,600 in 2019![2]

Inflation is defined as a *sustained* increase in the average price level. When the average price level falls for a sustained period, it is called *deflation*, and when prices get out of hand and rise very quickly, it is called *hyperinflation*. One of the most common, but unofficial, definitions is *hyperinflation occurs when a nation's prices increase above 50% per month for a sustained period*.[3]

If the price of every good and service in a nation rose by the same percentage—say, 3%—then the inflation rate would be easy to calculate, but such homogeneous changes in prices never occur. Prices change at different rates. Some rise rapidly, others slowly, some stay the same, and others even fall. Much of the relative difference depends on market factors, such as the level of demand, costs, and competitive structure of an industry. It is for this reason that the inflation rate is calculated as a weighted average of percentage price changes, with the weights reflecting the relative importance of each product being considered.

To understand better how the inflation rate is calculated, consider the following example. Suppose the residents of a country spent, on average, 20% of their incomes on food, 50% on housing, and 30% on clothing and other expenditures (see Table 4.1, Columns 1 and 2). If food prices increased by 4%, housing

Table 4.1: Inflation Rate: Weighted Average of Percentage Changes.

	Column 1	*Column 2*	*Column 3*	*Column 4*
	Product Group	**Weight of Each Product Group (Sum = 100%)**	**Inflation Rate of Each Group**	**Weighted Average (Col. 2 × Col. 3)**
Row 1	Food	20%	4%	+0.8%
Row 2	Housing	50%	10%	+5.0%
Row 3	Clothing & other	30%	−6%	−1.8*
Row 4	**Average inflation rate**	*(Sum of rows 1, 2, and 3)*		**+4.0%**

2 The Bureau of Labor Statistics has an easy-to-use inflation calculator. See https://data.bls.gov/cgi-bin/cpicalc.pl (accessed September 1, 2019).

3 Phillip Cagan, "The Monetary Dynamics of Hyperinflation," in *Studies in the Quantity Theory of Money*, ed. Milton Friedman, Chicago: University of Chicago Press (1956).

prices rose by 10%, and clothing/other prices fell by 6%, the average rate of inflation would be 4.0%. This result can be calculated in just two steps.

First, multiply the inflation rate for each product group (Rows 1 to 3 in Column 3) by its relative importance (Column 2). The result (which is shown in Column 4) is the contribution that each expenditure group makes to the inflation rate. Second, determine the average inflation rate for the nation by summing the weighted inflation rates of the three expenditure groups (Rows 1 to 3 in Column 4).

Inflation Measures

Inflation is the *percentage change* in a country's price index, but there are a few of them from which to choose. Those most frequently mentioned and used are the *GDP Price Index*, *Producer Price Index, Personal Consumption Expenditures Index, Consumer Price Index, and Core Price Index*. Which of these is used depends on what questions need answering.

GDP Price Index

The *GDP Price Index* (also called the *GDP Price Deflator* or *Implicit Price Index*) is the broadest price index because it includes the prices of all final goods and services included in GDP (see Figure 4.1). Therefore, the GDP Price Index includes only *domestic* prices and excludes imports. For economists, policymakers, and many managers interested in country analyses or comparative economic studies, percentage changes in the GDP Price Index are the best measures of a nation's inflation rate.

Producer Price Index (PPI)

The *Producer Price Index* (PPI) measures prices at the wholesale level (i.e., before retail markups, sales taxes, excise taxes, and distribution costs).[4] It includes the prices of inputs that go into the production process and capital investments. Like the GDP Price index, the PPI excludes import prices.

4 Each commodity is assigned to one specific part of the overall production process (i.e., crude materials, intermediate products, or final products) so that the same product is not counted twice.

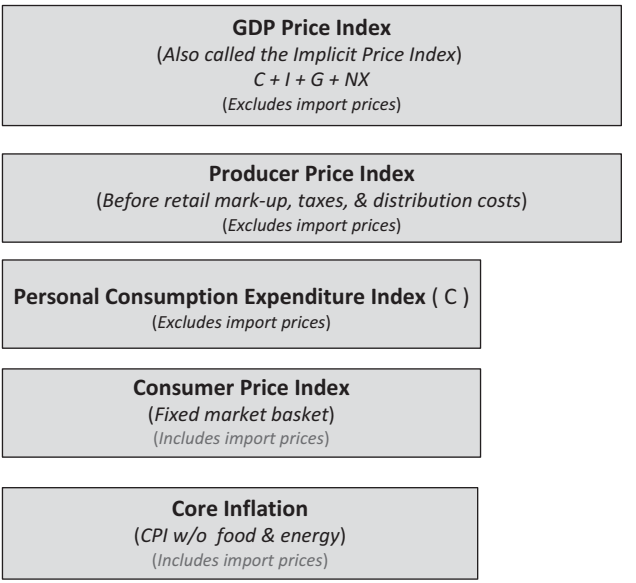

Figure 4.1: Major Price Indexes.

Often, changes in the PPI precede changes in consumer prices. This is especially true when rising input costs cause inflation. Producers try to pass these increased costs onto retailers, who try to raise retail prices to consumers. Business managers, who use current changes in the PPI to predict future movements in consumer prices, should be careful because this causal link is rather weak. Even though the PPI and consumer prices often move in the same direction, they do not always change by the same degree, at the same time, or in logical sequence. One reason for this weak relationship is the goods and services consumed by households are only a fraction of the products included in the PPI. Similarly, the PPI excludes items that play significant roles in consumer spending, such as housing. Finally, even if input costs increase, the producers' ability to pass them on to retailers, as well as retailers' ability to pass them to consumers, depends on the industry's competitive condition.

Personal Consumption Expenditure Index (PCE)

The Personal Consumption Price Index (PCE) measures prices of consumer goods and services purchased by the household sector. In short, it measures

prices for the "C" component of macroeconomic demand, which equals C + I + G + NX.[5]

Unlike the Consumer Price Index, the PCE does not use a fixed market basket to determine consumer prices. Many analysts prefer this feature because prices are measured after the household sector has adjusted its consumption patterns to changing relative prices.

Consumer Price Index (CPI)

The *Consumer Price Index* (CPI) is a weighted-average of prices in a typical *market basket* of goods and services purchased by the *average* domestic consumer. Because it reflects only consumer-related products, the CPI is a much narrower measure of inflation than the GDP Price Index, which includes prices for consumers, businesses, governments, and exporters (see Figure 4.1).[6]

The CPI tries to capture consumers' actual out-of-pocket expenses. Therefore, it includes retail markups, taxes on goods and services (e.g., sales and excise taxes), distribution costs, and the prices of imported consumer goods.

Government surveys, which are conducted and periodically updated, determine domestic consumers' spending patterns, and from them, the CPI's "typical" market basket of goods and services is defined. Once defined, the government calculates, each month, how much it would cost to repurchase the CPI's market basket. The percentage change in this price index is the nation's inflation rate.

Core Price Index

Core inflation measures the percentage change in prices of consumer goods and services but without the influence of food or energy, which are relatively volatile sectors. Short-term changes in food and energy prices often are uncontrollable and can become unhinged from a nation's long-run inflation trend. For this reason, many analysts feel that the government and central bank should focus their attention on controlling the core inflation rate, rather than percentage changes in the CPI or PCE.

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5 Remember that "C" stands for personal consumption expenditures, "I" for gross private domestic investment, "G" for government spending on final goods and services, and "NX" for net exports.

6 The CPI focuses almost exclusively on price changes of consumer products, but there are some minor exceptions, such as residential housing, which is included in gross private domestic investment.

What Is Price Stability?

Price stability means low, nonvolatile rates of inflation. For the clear majority of developed nations during the twentieth and twenty-first centuries, this goal has been a low-variance, average inflation rate of around 2%. Many people wonder, "If price stability is the goal, then why don't governments and central bankers try to achieve 0% inflation? Shouldn't a 0% inflation rate be the ideal?"

One primary reason for the more modest 2% goal is price indexes may misrepresent the actual inflation rate. For instance, they may not account appropriately for quality changes, new-product introductions, and the ability of consumers to substitute lower-priced products for relatively higher-priced ones.[7] If these three factors cause the reported CPI to overstate the actual, underlying inflation rate by 1%, then targeting 0% annual inflation, when adjusted for these factors, would be a goal of 1% deflation. Another reason for concern is the possibility that tying the inflation rate too tightly to zero risks having a sudden negative economic shock to supply or demand cause deflation, which is an economic condition that may have substantially worse consequences than mild inflation.

There are other reasons why greater-than-zero inflation targets may be desired. For one, they may speed the economic adjustments needed for recovery. Consider a nation with a high unemployment rate and nominal wages that are sticky downward, because wage movements trend up more often than down. If nominal wages do not fall in the face of growing unemployment but prices rise, real wages fall, thereby incentivizing businesses to hire more and reduce the unemployment rate. At low levels of inflation, such adjustments may not be as easily accomplished.

Others favor a higher inflation target because they feel it can stimulate economic growth. They argue that rising prices promote business profitability and, therefore, increase employment by boosting production and investments in plant and equipment. According to this line of reasoning, business profitability increases with inflation because business costs, such as wages and other resource prices, are less flexible than the prices of final goods and services. As a result, inflation allows producers to pass along price increases to consumers faster than their resource costs rise, resulting in increased profits.

The problem with the reasoning behind this argument is that it ignores the likelihood that current increases in resource costs are based on past expectations

7 See *Shortcomings of the CPI* in *The Rest of the Story* section of this chapter for a brief explanation of these factors.

of inflation. Therefore, even if it worked to increase production and reduce unemployment, these benefits should be short term. We will look more deeply at this issue in Chapter 5, "Inflation: Who Wins, and Who Loses?" where we will find that it is only when inflation rises above what was expected that business profitability should benefit from rising inflation.

Real Versus Nominal GDP

How do rising prices affect GDP? How can we remove the effects of rising prices from GDP figures so that the real production behind these statistics can be revealed? To answer these questions, we must distinguish between *real* GDP and *nominal* GDP.

Nominal GDP is calculated by multiplying the prices of all final goods and services produced in each period, such as a year, by the quantities produced in that same period. For example, Table 4.2 shows that nominal GDP in 2000 equaled the sum of prices in 2000 times the quantities of final goods and services produced in 2000 (i.e., the sum of $\text{Prices}_{2000} \times \text{Quantities}_{2000}$). Notice that nominal GDP can increase if either prices or outputs rise, but for a nation's standard of living to improve, greater output, and not prices, are required. Rising prices increase nominal GDP, giving a false impression that the economy is doing better than it is. Because of this, nominal GDP needs to be adjusted if you wish to take out the effects of inflation. This inflation-adjusted figure is called *real GDP*.

Table 4.2: Real versus Nominal GDP.

Column 1	*Column 2*	*Column 3*
Year	**Nominal GDP**	**Real GDP**
2000	$\text{Prices}_{2000} \times \text{Quantities}_{2000}$	$\text{Prices}_{2012} \times \text{Quantities}_{2000}$
2012	$\text{Prices}_{2012} \times \text{Quantities}_{2012}$	$\text{Prices}_{2012} \times \text{Quantities}_{2012}$
2019	$\text{Prices}_{2019} \times \text{Quantities}_{2019}$	$\text{Prices}_{2012} \times \text{Quantities}_{2019}$
	Nominal GDP rises if Prices rise and Quantities remain the same.	*Real GDP rises only if Quantities rise.*

Table 4.2 shows that real GDP is calculated by summing the quantities produced in a given year multiplied by the prices in a specified *base year*. If 2012

were the base year, then real GDP in 2000 would be the sum of prices in 2012 multiplied by the quantities produced in 2000, and real GDP in 2019 would be the sum of prices in 2012 multiplied by the quantities produced in 2019. With real GDP, the prices do not vary. The only way real GDP can change is if quantities change. Therefore, real GDP is a better measure of a nation's economic health than nominal GDP and plays a more prominent role in most serious macroeconomic analyses.

Calculating the GDP Price Index

Once a nation's nominal GDP and real GDP are known, its GDP price index can be calculated by dividing yearly nominal GDP by real GDP. Table 4.3 shows the results when 2012 is used as the base year. On average, if prices rose from 2000 to 2012, then the price index for 2000 would be less than 1.0. If prices continued to rise, on average, from 2012 to 2019, then the price index in 2019 would be greater than 1.0. The price index in the base year always equals 1.0.

Table 4.3: Deriving the Price Index when the Base Year = 2012.

Year	GDP Price Index	≡	$\frac{\text{Nominal GDP}}{\text{Real GDP}}$	≡	$\frac{\text{Prices}_{\text{Given Yr}} \times \text{Quantities}_{\text{Given Yr}}}{\text{Prices}_{\text{Base Yr}} \times \text{Quantities}_{\text{Given Yr.}}}$	
2000	$\text{Price Index}_{2000}$	≡	$\frac{\text{Nominal GDP}_{2000}}{\text{Real GDP}_{2000}}$	≡	$\frac{\text{Prices}_{2000} \times \text{Quantities}_{2000}}{\text{Prices}_{2012} \times \text{Quantities}_{2000}}$	
2012	$\text{Price Index}_{2012}$	≡	$\frac{\text{Nominal GDP}_{2012}}{\text{Real GDP}_{2012}}$	≡	$\frac{\text{Prices}_{2012} \times \text{Quantities}_{2012}}{\text{Prices}_{2012} \times \text{Quantities}_{2012}}$	= 1
2019	$\text{Price Index}_{2019}$	≡	$\frac{\text{Nominal GDP}_{2019}}{\text{Real GDP}_{2019}}$	≡	$\frac{\text{Prices}_{2019} \times \text{Quantities}_{2019}}{\text{Prices}_{2012} \times \text{Quantities}_{2019}}$	

Suppose information on a nation's nominal GDP and price index were available, but not for its real GDP. Table 4.4 shows that calculating real GDP is as easy as dividing nominal GDP in any given year by the price index for that year. This has the effect of removing the influence of price changes from the nominal GDP measure and replacing it with a common (base year) price.

On average, if prices rose from 2000 to 2012, then, the price index for 2000 would be less than one. Therefore, when nominal GDP in 2000 is divided by this price index, it inflates the 2000 GDP to 2012 price levels. If prices continued to rise from 2012 to 2019, then the price index for 2019 would be greater than one. Therefore, when nominal GDP in 2019 is divided by this price index, it deflates the 2019 GDP to 2012 price levels.

Table 4.4: Calculating Real GDP Using Nominal GDP and Prices.

Year	Real GDP	≡	$\frac{\textbf{Nominal GDP}}{\textbf{Price Index}}$	
2000	Real GDP_{2000}	≡	$\frac{\text{Nominal } GDP_{2000}}{\text{Price Index}_{2000}}$	
2012	Real GDP_{2012}	≡	$\frac{\text{Nominal } GDP_{2012}}{\text{Price Index}_{2012}}$	=1
2019	Real GDP_{2019}	≡	$\frac{\text{Nominal } GDP_{2019}}{\text{Price Index}_{2019}}$	

Table 4.5 shows the nominal GDP, GDP Price Index, and real GDP for the United States from 2000 to 2017. Notice that 2012 is the base year. We know this because the price index for 2012 is 1.0. Also, notice how the real GDP figures for each year before 2012 are greater than the nominal GDP figures, indicating that prices in 2012 (the base year) were higher than in these previous years. For similar reasons, real GDP is less than nominal GDP in all years after 2012.

The Rest of the Story

Weaknesses of the CPI

The CPI has weaknesses that should be kept in mind because they affect the interpretation of its inflation figures. Among the most important are the use of nonrepresentative market baskets and the inaccurate treatment of quality changes, new products, and substitution effects.

Nonrepresentative Market Basket for Consumers

The CPI measures price changes of a *typical* market basket consumed by the *average* consumer, but many individuals and groups have highly dissimilar spending patterns (e.g., young families versus the elderly). If these weights do not reflect the spending patterns of a particular group, then the CPI will not be a good measure of how inflation affects the group's cost of living.

Because the CPI measures price changes only for the goods and services included in the typical market basket, it is not an accurate cost-of-living index, which would include a much broader range of factors that affect living standards, such as water quality, access to public goods, education, noise levels,

Table 4.5: U.S. Nominal GDP, GDP Price Index, and Real GDP: 2000–2017 (Base year = 2012).

Year	Nominal GDP	Price Index*	Real GDP
2000	10,252	0.780	13,137
2001	10,582	0.798	13,261
2002	10,936	0.810	13,500
2003	11,458	0.825	13,882
2004	12,214	0.848	14,411
2005	13,037	0.874	14,919
2006	13,815	0.900	15,341
2007	14,452	0.925	15,628
2008	14,713	0.942	15,611
2009	14,449	0.950	15,211
2010	14,992	0.961	15,600
2011	15,543	0.981	15,842
2012 – Base Year	16,197	1.00	16,197
2013	16,785	1.018	16,493
2014	17,522	1.037	16,901
2015	18,219	1.047	17,397
2016	18,707	1.059	17,670
2017	19,485	1.079	18,061

* Chain index using 2012 as the base year.
Note: price indexes, such as the GDP Price Index and Consumer Price Index, are conventionally set to 100 in the base year, which means the values in column 3 are multiplied by 100.
Source: Bureau of Economic Analysis, National Economic Accounts, https://www.bea.gov/data/economic-accounts/national (accessed September 1, 2019).

leisure, and safety.[8] At the same time, the CPI is timely, well-known, and considered by many to be a fair measure of changing prices and their effects on household living costs. Therefore, it is frequently used in salary negotiations by unions and individuals. Because the CPI is linked directly to operating costs, business managers are well advised to understand it.

Many nations, like the United States, publish city and regional CPI statistics to supplement their national CPI figures. They do this because the cost of living

8 See U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Price Indexes: Frequently Asked Questions,* https://www.bls.gov/cpi/questions-and-answers.htm (accessed September 1, 2019).

in any particular city or region may be quite different from the national average. Therefore, the best price index to use is the one that most closely represents the particular living costs of a company's workers. If a firm is located in Boston, then the Boston-area CPI should be used.

One of the problems with having wages and salaries tied to the CPI is that profits can be squeezed between stagnant or declining product prices and rising operating costs. A rising CPI causes labor costs to rise in tandem, but just because consumer prices are rising, on average, does not mean that the product prices for any particular company or industry must increase at the same rate. Prices in highly competitive, sluggish, and fading industries usually increase at rates that are slower than the CPI. They may even fall. Consequently, managers in these industries, who grant CPI-based salary increases, should have a clear idea of how to reduce per unit costs in other areas. If they do not, company profits will decline.

It is important for managers to keep in mind that, if they do not compensate their employees, at least, for the rate of inflation, they are at risk of losing their most qualified workers. One of the keys to business success is for managers to surround themselves with people who are better than they are. Therefore, any business strategy that is based on earning profits at the expense of the workforce is bound to fail.

Measuring Quality Changes, New Products, and Substitution Effect

An accurate measure of inflation must correctly account for quality changes and the introduction of new products because price increases caused by quality improvements are not inflationary. To do this, the CPI's market basket of goods and services should be (but is not) constantly updated to include new inventions (e.g., biomedicines, electric cars, magnetic resonance imaging (MRI), the internet, global positioning systems (GPS), pacemakers, and new synthetic materials), novel discoveries (e.g., polymerase chain reaction, coronary bypass surgery, and HIV protease inhibitors), and improvements in product speed and functionality (e.g., computers, advanced robotics, and artificial intelligence).[9]

9 The BLS makes hedonic (which means "pleasure") quality adjustments to the CPI for changes in product quality and the introduction of new products. They are estimates of improved consumer pleasure and are based on regression models. See BLS, Frequently Asked Questions about Hedonic Quality Adjustment in the CPI, https://www.bls.gov/cpi/quality-adjustment/questions-and-answers.htm (accessed September 1, 2019).

To understand better how new products and quality improvements can mask inflation, consider only the advances surrounding smartphones, social media, and online streaming. What would you need to be paid to give up (for just a year) your smartphone—Facebook, Google, Instagram, LinkedIn, Snapchat, Spotify, Twitter, WeChat, WhatsApp, and YouTube? What would it have cost 20 years ago to duplicate them–if even possible?

Consider the functions of a new smartphone. We use these portable devices as flashlights, travel alarms, and credit cards, as well as gaining access to information on virtually any topic. Apps are available for almost any conceivable purpose, including book and audio downloads, tracking calories, diets, and exercise plans, flower recognition, language lessons, movies, music, online shopping, podcasts, real estate services, shared calendars, weather conditions, and trading stocks, bonds, and cryptocurrencies. There are free apps that convert areas, currencies, data, fuel mileage, length, power, pressure, speed, temperature, time, volume, and weight into familiar units. Apps are available that can correct grammar, record phone conversations, store memos, provide access to countless games, and even measure our pulses, distances, and heart rates while jogging. In general, these quality improvements and new product attributes mask inflation unless they increase prices, which relentless competition has helped to control.

Just as new products, novel attributes, and quality improvements can cause the CPI to overestimate actual price changes, an upward bias can also be caused by not accounting for substitution effects. When the relative prices of goods and services change, consumers make substitutions. For example, rising prices cause consumers to purchase relatively low-priced, private-label products instead of national brands (e.g., Safeway yogurt instead of Dannon or Yoplait), shop more frequently at factory outlets, and visit discount stores. To the extent the CPI measures price changes of a fixed market basket, these substitution effects will not be reflected accurately in the inflation rate.

Given the strong and meaningful linkages between the CPI and employment contracts or government policies, even small biases can be significant. For example, U.S. tax brackets and social welfare expenditures are automatically indexed to the CPI. Over the course of a decade, a difference of just 1% between the actual and reported CPI could change the federal government's debt by as much as $1 trillion.

Conclusion

The GDP Price Index, PPI, PCE, CPI, and core price index are the five most common measures of a country's price level. Therefore, percentage changes in

these indexes are the most popular measures of inflation rates. The GDP Price Index is the broadest inflation index. Changes in the PCE Index and CPI provide the best information on how inflation influences household living costs, and changes in the core price index is a favored guide for policymakers, looking for a consumer-related inflation rate over which they can exert significant control. Finally, the PPI shows price changes at the wholesale level, before retail markups, taxes, and distribution costs are added.

Nominal GDP fluctuates with prices, but higher prices do not mean better living standards. To make GDP a more useful measure of human well-being, the effects of inflation must be removed. In effect, real GDP multiplies the amount produced in a nation each period by the price level in a base year. Because base-year prices are common to all periods, the only way real GDP can change is if output changes.

This chapter represents an essential first step toward understanding and measuring inflation. It is also a valuable starting point for distinguishing between real and nominal economic variables. In Chapter 5, "Inflation: Who Wins, and Who Loses," we will broaden our analysis of real and nominal economic variables to determine how (and whether) inflation hurts or helps individuals, businesses, governments, and the nation as a whole.

Key Points

- Inflation and Deflation
  - Inflation is a sustained increase in the average price level.
  - Inflation occurs when the percent weighted average of prices increases.
  - Price stability typically means a low, nonvolatile inflation rate.
- Price Indexes
  - The GDP Price Index is the broadest measure of prices because it covers all final goods and services (except imports) produced over a period.
  - The Producer Price Index (PPI) measures price changes at the wholesale level and excludes imports.
  - The Personal Consumption Expenditure Index (PCE) measures price changes associated with the consumption component of GDP. Unlike the CPI, the PCE does not measure price changes for a fixed market basket of goods and services.
  - The Consumer Price Index (CPI) is the weighted average change in prices for a market basket of goods and services (including imports) purchased by the typical consumer.
- Nominal versus real GDP
  - Nominal GDP is equal to the sum of all final goods and services produced during a period times their market prices.

- Real GDP is equal to nominal GDP after adjusting for the effects of price changes (i.e., inflation or deflation).
- The GDP Price Index is used to convert nominal GDP into real GDP.
- The CPI often ignores quality changes, new products, and the substitution of low-priced products for high-priced ones.

Review Questions

1. What is inflation?
2. Of what value is information on the "core inflation" rate if it ignores increases in the prices of energy and food?
3. What is price stability?
4. Does an increase in prices always cause an increase in nominal GDP? Explain.
5. Why do economists prefer using real GDP growth instead of nominal GDP growth to measure changes in economic activity?
6. If real GDP were $500 billion and the price index were 0.8, what would nominal GDP be?
7. "If Japanese prices decreased each year from 2000 to 2020, and 2012 was the base year, then Japan's nominal GDP should have been less than real GDP in each year." Is this statement true or false? Explain.
8. What does *The Wall Street Journal* mean when it says that China's economy grew by 6% during the past year? Explain.
9. What are the shortcomings of the CPI as measure of prices?

Discussion Question

10. Since 2013, the Bank of Japan has set a goal to raise the nation's annual inflation rate to 2%. Explain why a targeted increase in the nation's CPI may not reflect the true, underlying inflation rate. In short, why might the Bank of Japan's 2% inflation goal have an impact on consumers and businesses that is less than 2%?

Chapter 5
Inflation: Who Wins, and Who Loses?

Inflation has the power to give and to take—especially when it is unexpected. For any business, high and variable inflation can create uncertainty that leads to lower investment levels, falling profits, and reduced demand for labor. Inflation can also damage a business's international competitive position, thereby eroding earnings and further dimming expansion hopes. At the same time, companies that correctly anticipate inflation can make considerable profits. The key is in knowing how.

For individuals and governments, inflation also has the power to give and to take. Rising inflation can make paupers of those with few debts and a portfolio full of fixed income securities, such as bonds and notes. At the same time, it can give a king's ransom to those with investment assets that rise with inflation, like real estate, antiques, and precious metals. As for governments, the taxes they collect and the real burden of the debts they owe are affected by inflation. Thus, rising prices can play a significant role in what governments can and cannot afford to do.

This chapter discusses how inflation reduces purchasing power and can redistribute income—hurting some groups and helping others. Which sectors of the economy benefit from inflation? Which sectors are hurt? How do businesses fare when inflation increases? Can they always raise prices fast enough to hit their profit targets? How about the average taxpayer, debtor, creditor, or the nation as a whole? Does inflation reduce a nation's overall well-being, or does it merely redistribute purchasing power among competing groups? We will use these questions as springboards for our discussion of the victims and beneficiaries of inflation.

The Basics

Inflation Diminishes Purchasing Power

The "purchasing power" of money or income is the value of the currency expressed in terms of how many goods and services it can buy. Inflation is like a silent thief that steals purchasing power from our bank accounts and paychecks. To understand why, suppose your employer agreed to pay you $100,000 per year for the next decade, with no chance of a pay increase. Figure 5.1 shows the

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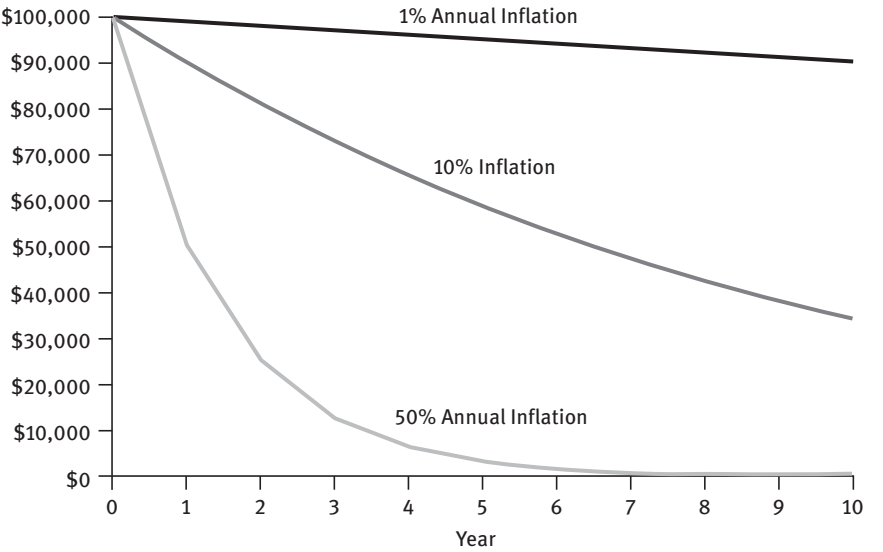

Figure 5.1: Effects of Inflation on the Purchasing Power of $100,000 Salary.

corrosive effects that inflation would have on the purchasing power of your income. If the annual inflation rate were 1%, your income's purchasing power after 10 years would fall from $100,000 to $90,438. At 10% your purchasing power would fall in 10 years to $34,868, and at 50% the purchasing power of $100,000 would fall to a mere $98!

Inflation gives the illusion of prosperity without the substance. Between January 1990 and January 2019, the U.S. Consumer Price Index rose from approximately 127 to 252, which is an increase of nearly 100%. Something costing $10 in 1990 cost about $20 in 2019. If you earned a yearly salary of $100,000 in 1990, you would have needed nearly $200,000 in 2019 to break even with inflation.[1] That is a substantial salary increase to stay in the same place.

Framing the Inflation Issue

Though it may seem obvious from the previous examples that inflation harms a nation, the case is hard to prove. The circular flow diagram helps explain why

1 You would have required even more if taxes took an increasing share of your income.

more scrutiny is needed (see Figure 5.2). In Chapter 2, "Taking an Economic Pulse," we learned that the circular flow diagram shows how businesses and consumers interact via the product and resource markets. The product market (i.e., the top portion of the circular flow) is where consumers in the household sector demand goods and services, and producers in the business sector supply them. From this interaction between supply and demand, prices and the annual rate of a nation's output (i.e., real GDP) are determined.

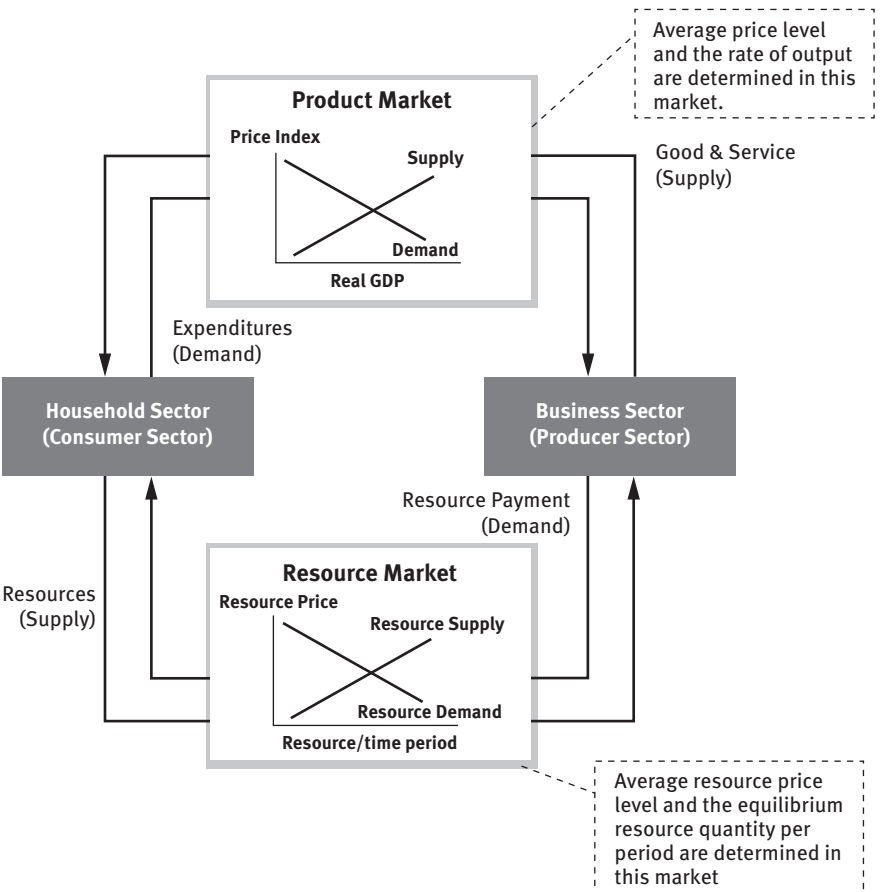

Figure 5.2: The Circular Flow Diagram.

Inflation is the percentage change in the average price of goods and services. Therefore, it is a measure that relates to the top portion of the circular flow

diagram—but what about the bottom part? We know from the circular flow diagram that any financial flows that are channeled through the product market (i.e., the top portion of the diagram) also must flow through the resource market (i.e., the bottom part). In other words, what goes around must come around. If consumers are paying higher prices for goods and services, then someone has to be earning them. These funds might be going to labor in the form of higher wages and salaries, to natural resource owners (e.g., owners of land, oil, and forests) in higher rents, capital owners in higher returns, or businesses in higher profits.

The point is that higher prices mean higher resource earnings, but if some individuals' incomes are increasing at rates slower than inflation, then other individuals' incomes must be rising at rates faster than inflation. For this reason, proving that a nation's *overall* well-being is harmed by inflation is more complicated than it might first seem. At the end of this chapter, we will address how inflation could affect a nation's overall standard of living, but before we do, let's investigate more closely the redistributive effects of inflation.

Debtors Versus Creditors

Suppose you are the chief financial officer (CFO) of a public company and, at a quarterly investor analysts meeting, are asked the following question: "In times of inflation, is your strategy to increase or decrease the company's debt level?" There may be many ways to explain your approach to handling high or low inflation, but in the end, the answer to this particular question will probably be "It depends." Furthermore, this answer would be the same regardless of whether the question was asked to a CFO, professor of economics, or head of a typical household. Let's see why.

If you borrowed funds at 8% during a year when inflation was relatively high—for example, 5%—then the effective annual cost of borrowing would be 3% because, even though you would be paying back 8% more dollars, each dollar's purchasing power would be worth 5% less. As a result, the *real* (inflation-adjusted) interest rate would be only 3%. Therefore, inflation seems to benefit borrowers and hurt lenders.

The problem with this conclusion is that it assumes lenders are always victims of inflation, with no ability to change their circumstances. What is often forgotten is that lenders have alternatives, one of which is to invest their funds in assets that will rise with the rate of inflation.

Nominal interest rates are the rates we see daily in the news. They are the rates that borrowers pay and what lenders and savers receive. When expected inflation increases, lenders tend to restrict the supply of funds to the

credit markets, which raises nominal interest rates and thereby compensates them for the effects of expected inflation. Similarly, higher expected inflation causes borrowers to raise their demands for credit, thereby increasing nominal interest rates. Neither lenders nor borrowers determine interest rates. Instead, they are determined jointly, by the forces of supply *and* demand, which is why expected inflation affects nominal interest rates in a very predictable way. At low levels of expected inflation, the nominal interest is (approximately) equal to the real interest rate plus the expected rate of inflation (see Figure 5.3).[2]

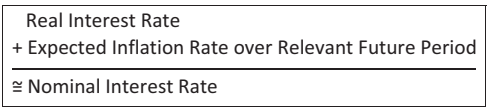

Figure 5.3: Relationship Among Nominal Interest, Real Interest, and Expected Inflation Rates.

Real Interest Rate

The *real interest rate* reflects a nation's *time value of money*. This means that it mirrors the extent to which lenders are willing and able to give up goods, which they could have purchased today, for goods and services that they will be able to buy in the future. *Expected inflation* is the anticipated percent by which a debt's real burden or an investment's real return will be reduced. It is important to note that nominal interest rates are influenced by the *expected* inflation rate, rather than the current or past inflation rate. This should make sense because funds are lent and borrowed over future periods. Therefore, the inflation rates that are expected over these future periods should influence the nominal rates.

If the annual *desired real* interest rate were 3%, then lenders would expect to be 3% better off next year, and borrowers would expect to pay this 3% charge for the opportunity of getting funds today that otherwise might not be available. At a real interest rate equal to 3%, if expected inflation were 0%, then the nominal interest rate should be 3% because lenders would not have to be compensated for any expected reduction next year in the purchasing power of their loans (see Figure 5.4).

2 The relationship among the nominal interest rate, real interest, and expected inflation is known as the "Fisher Equation," after a mid-twentieth century economist, Irving Fisher. See Irving Fisher, *The Theory of interest*, Philadelphia: Porcupine Press (1930).

Expected real interest rate (*beginning of the period*)	3%
+ Expected inflation rate (*beginning of the period*)	+ 0%
= Actual nominal interest rate *(beginning of the period*)	**3%**

Figure 5.4: Effects When Expected Inflation = 0%.

By contrast, if expected inflation were 5%, then borrowers and lenders would expect prices to strip 5% of the purchasing power from any funds received next year. As a result, the nominal interest rate should rise to 8% (i.e., 3% real interest plus 5% expected inflation) to compensate lenders for the anticipated loss of the currency's purchasing power (see Figure 5.5).

Expected real interest rate (*beginning of the period*)	3%
+ Expected inflation rate (*beginning of the period*)	+ 5%
= Actual nominal interest rate (*beginning of the period*)	**8%**
– Actual inflation rate during the period	– 5%
= Actual real interest rate (*end of the period*)	**3%**

Figure 5.5: Effects When Expected Inflation = Actual Inflation.

To show how unexpected changes in inflation redistribute income, suppose you lent me $100,000 for one year, figuring that, if the future will be anything like the past, you would be happy at the end of the year being 3% better off in real terms. In short, you could purchase 3% more goods and services at the end of the year than you could at the beginning of the year. If the expected inflation rate for the coming year were 5%, then charging me an 8% interest rate would compensate you for the anticipated loss of purchasing power due to inflation. If the actual inflation rate turned out to be 5%, your real return would be exactly what you expected to receive, and my real payment would be exactly what I expected to pay. Under these circumstances, inflation would not have benefited or harmed either one of us (see Figure 5.5).

By contrast, if the actual inflation rate turned out to be only 2%, I (the borrower) would be harmed, and the *unexpectedly low* inflation would help you (the lender). You would have earned a real rate of return equal to 6% (i.e., 8% nominal rate minus the 2% loss of purchasing power due to inflation) rather

than 3% (i.e., 8% nominal rate minus 5% expected inflation). Similarly, I would be harmed because I paid a real rate of 6% rather than 3% (see Figure 5.6).

Expected real interest rate (*beginning of the period*)	3%
+ Expected inflation rate (*beginning of the period*)	+ 5%
= Actual nominal interest rate (*beginning of the period*)	**8%**
– Actual inflation rate during the period	– 2%
= Actual real interest rate (*end of the period*)	**6%**

Figure 5.6: Effects When Expected Inflation > Actual Inflation.

Suppose the actual inflation rate were 7%, rather than the expected 5%. Under these circumstances, your real return (and my real payment) would be only 1%. The unexpectedly high inflation would have reduced your purchasing power and reduced the real burden of my payments. I would have gained, and you would have lost, from the actual inflation rate exceeding the expected inflation (see Figure 5.7).

Expected real interest rate (*beginning of the period*)	3%
+ Expected inflation rate (*beginning of the period*)	+ 5%
= Actual nominal interest rate (*beginning of the period*)	**8%**
– Actual inflation rate during the period	– 7%
= Actual real interest rate (*end of the period*)	**1%**

Figure 5.7: Effects When Expected Inflation < Actual Inflation.

Indeed, if the inflation rate turned out to be higher than the nominal interest rate of 8%, you could actually earn a negative real rate of interest, which means you would be worse off at the end of the year (i.e., in terms of your purchasing power) than you were before the loan was made. For example, if the actual inflation rate turned out to be 12%, the actual real interest rate would equal –4% (see Figure 5.8).

Expected real interest rate (*beginning of the period*)	3%
+ Expected inflation rate (*beginning of the period*)	+ 5%
= Actual nominal interest rate (*beginning of the period*)	**8%**
– Actual inflation rate during the period	– 12%
= Actual real interest rate (*end of the period*)	**– 4%**

Figure 5.8: Effects When Nominal Interest Rate < Actual Inflation.

Let's return to the original question: Is it better to be a borrower or a lender in times of inflation? We can conclude the following from our analysis so far: The answer depends on whether the actual inflation turns out to be greater than, less than, or equal to expected inflation. If actual inflation is equal to expected inflation, then neither lenders nor borrowers would be hurt or helped by inflation. If the actual inflation is higher than expected inflation, then lenders would be hurt and borrowers would be helped. If the actual inflation is lower than the expected inflation, then lenders would be helped and borrowers would be hurt. Note that this result does not depend on whether actual inflation rises or falls, but rather on whether it rises or falls more than expected. It is also worth mentioning here that, if an unexpected change in inflation remains at its new rate for an extended period, eventually people will come to expect it and the nominal interest rate will rise or fall to restore the equilibrium real interest rate (assuming it has not been affected). Figure 5.9 summarizes our results and leads us to the conclusion that, in terms of borrowers and lenders, for every beneficiary, there appears to be a victim. As a result, inflation (so far) does not appear to have a *net* negative effect on the entire nation.

Event	**Hurt**	**Helped**
Actual inflation > Expected inflation	Lenders	Borrowers
Actual inflation = Expected inflation	No one	No one
Actual inflation < Expected inflation	Borrowers	Lenders

Figure 5.9: When Are Lenders and Borrowers Hurt and Helped by Inflation?

Businesses Versus Workers

Relative to their employees, are businesses helped or harmed by inflation? Businesses are not always helped. If they were, companies and industry associations would hire lobbying groups and find other means to sway public opinion and policymakers' actions *toward* raising the inflation rate. In the struggle between shareholders and workers for their portion of company earnings, we will find that inflation is not the knife that divides them. Instead, the blade that distributes business earnings is the difference between actual and expected inflation.

Suppose you are the executive responsible for negotiating annual salary increases with a company's labor union. Both sides agreed to an average wage increase of 9%, based on the expectation that labor productivity will rise by 3% and inflation will increase by 6%. Once this pay-raise is negotiated, how could the company or union members be harmed (or helped) by inflation? As was the case with lenders and borrowers, workers could be harmed or helped only if the actual inflation rate turned out to be different from the rate expected. If the expected inflation next year was 6% and the negotiated wage increase was 9%, then workers would be harmed if the actual inflation rate turns out to be higher than 6%.[3]

For example, if the actual inflation were 8%, workers would earn only a 1% increase in their real incomes instead of the 3% they expected. At the same time, businesses would be helped because they expected to pay 3% more in real wages but ended up paying only 1% more. This unexpected inflation would increase the prices of newly produced goods and services and the value of business inventories by 8% annually, causing profits to rise in tandem.

If actual inflation is less than expected inflation, just the opposite occurs (i.e., in terms of which group will be harmed by unexpected inflation and which group will be helped). Figure 5.10 summarizes how labor and business groups are hurt or helped when a nation's expected inflation is different from its actual inflation.

In general, the stronger a particular resource's bargaining position, the better its chances to benefit at the expense of businesses and other resource groups. For instance, in an industry where demand is increasing, resources with specialized skills are needed, and talent is scarce, individuals and unions have considerable

3 This discussion glosses over a timing issue. If businesses can raise their prices continually, and workers negotiate their salaries only at the end of the year, then workers' real wages fall throughout the year and catch up only at year's end. By contrast, if prices fall, the reverse is true. Real wages rise until year's end when they are adjusted.

Event	Hurt	Helped
Actual inflation > Expected inflation	Labor	Business
Actual inflation = Expected inflation	No one	No one
Actual inflation < Expected inflation	Business	Labor

Figure 5.10: When Are Labor and Businesses Hurt and Helped by Inflation?

power. As a result, they can command an increasing share of the inflated national revenues at the expense of other resource groups.

As was the case with borrowers and lenders, when analyzing the beneficiaries and victims of inflation, it appears as if labor wins whenever business loses, and vice versa. If the winners and losers offset each other, then can we infer that the nation as a whole is not harmed by inflation? Again, let's wait until the end of the chapter to determine this.

Governments Versus Taxpayers

Governments are usually large borrowers. Therefore, inflation affects them in the same way it affects private debtors. When inflationary expectations rise (fall), the nominal cost of issuing new debt increases (falls). Also, when the actual inflation rate exceeds the expected rate, governments (as debtors) are helped, and lenders are hurt.

Let's look at how inflation affects a government's need to borrow. As inflation rises, so do the prices of goods and services the government purchases. At the same time, the government's tax base also increases. If a progressive, nonindexed income tax system were in place, higher nominal incomes would force taxpayers into elevated income tax brackets and act as a hidden source of tax revenue for the government. As a result, inflation would benefit the government at the expense of taxpayers, regardless of whether the inflation was expected or not.

In some countries, this is precisely what happens. It was not until 1985 that the U.S. federal income tax system was reformed so that tax brackets were adjusted each year to keep them inflation-neutral. With the passage of this legislation, the U.S. government eliminated the benefits of this particular source of passive income. At the same time, it remains the silent beneficiary where taxes were not indexed—for instance, the capital gains tax.

Does Inflation Hurt Retirees?

Most people are quick to point out that the apparent victims of inflation are people on pensions and those collecting Social Security benefits. Inflation robs purchasing power from their fixed incomes and turns the job of making ends meet into a much more difficult chore. It is almost sacrilege to dispute the claim that these individuals are victims of inflation. Some of them do suffer from rising prices, but others do not.

One reason the effects of inflation are nebulous is that not all pensions are fixed. Some of them rise automatically with the inflation rate or are adjusted periodically by companies to account for the effects of inflation or to reflect changing norms in pension compensation.

Furthermore, even though inflation erodes the purchasing power of fixed incomes, it also increases the value of assets owned by retirees, such as houses, jewelry, clocks, watches, paintings, precious metals, and stamps. Many retirees would be reluctant to sell assets, like their homes or heirlooms, to earn the capital gains, but many that downsize their homes reap capital gains by moving into condominiums and senior living communities. In addition, new financial vehicles have been developed that permit the elderly to liquidate assets and cash in their equity. Borrowing based on collateral and home equity loans are two examples. Reverse mortgages are another example because they pay retirees fixed monthly amounts based on the equity values of their homes. The main point is that inflation may help some members of the fixed income group.

The impact that inflation has on retirees also depends significantly on their spending patterns. The Consumer Price Index (CPI) reflects expenditures of an average consumer, but most retired individuals do not spend like the average consumer. Therefore, they could be affected by rising prices more or less than average. For instance, retirees are likely to be more affected than average by increasing medical costs. At the same time, they are probably less concerned by rising borrowing rates because retirees often own their homes and, therefore, are not in the market for real estate loans. They may even benefit from rising interest rates if they are net investors with floating-rate investments.

Many retired individuals receive Social Security benefits from the government, which may increase over time, due to newly passed legislation or cost-of-living adjustments. The U.S. Social Security System is a good case in point. Legislated changes in these benefits since 1950 and automatic cost-of-living adjustments since 1975 have significantly elevated benefits for the elderly.

This is not to say that fixed income earners are usually helped by inflation. The point is simply that not all of them are harmed. Those with fixed incomes, no additional benefits, and few assets are the actual victims of inflation; but if

this is the case, how large is the total loss, and should the government implement economic policies solely to alleviate the burdens on this one group? Might a better alternative be implementing policies, such as government aid and special taxes breaks, which address the problems of this particular group within the "elderly" population, rather than enacting policies that affect everyone?

Does Inflation Hurt the Nation as a Whole?

We know from the circular flow diagram that "what goes around must come around." As a result, it *may appear* as if inflation has no net effect on a nation's overall well-being because it only redistributes income from one group to another. This is not the case.

It is true that, so long as inflation does not destroy work incentives or reduce productivity, it is possible for real GDP to continue growing in nations with rapidly rising prices. Germany is a good example. For most of the hyperinflation years of the early 1920s, Germany's real GDP increased. It was only near the end, when individuals found it more profitable to speculate than to work, that the economic system collapsed.

Even though economic growth and high inflation *can* coexist, there are many reasons why they usually will not. For one, relatively high inflation can hurt a nation's international competitiveness. Whenever exchange rates do not adjust quickly and accurately enough to relieve international inflation rate differences, competitive gaps open. For instance, a 15% rise in a nation's average price level combined with a 4% decline in its currency value translates into an approximate 11% increase in the price of domestic goods and services relative to foreign prices. Therefore, changes in relative international inflation rates that are not offset by equal and opposite nominal exchange rate changes can cause a nation's exports to fall and imports to rise.[4]

In an environment of rapidly rising prices, the ability to decipher how relative prices are changing becomes much more difficult. As a result, the potential for strategic errors and misallocations of resources increases. Inflation—especially rapid and unpredictable inflation—can cause dramatic shifts in relative prices, which can translate into significant and unexpected changes in real earnings and real returns. Contracts are negotiated with expected inflation rates in mind. Therefore, disparities between expected and actual inflation

4 We will discuss exchange rates in Chapter 14, "Foreign Exchange Basics," and Chapter 15, "Foreign Exchange Markets."

rates can cause serious harm to those who misjudged. The uncertainty of future inflation is a risk that adds a premium to the cost of doing business.

Inflation also affects "menu costs," which are the added expenses that companies pay for bookkeeping, accounting, and marketing. How can companies advertise or establish fixed prices for customers when prices are rising daily or by the hour? The whole notion of distributing printed catalogs evaporates when fixed prices cannot be maintained for any substantial period. If the prices quoted today must be changed tomorrow, then how are these new prices communicated to the consuming public?

In the age of the internet, the electronic transmission of information could help in this regard. Price changes can be communicated quicker and cheaper than in previous years. Nevertheless, it takes time and effort to make these changes, and the added costs (costs that would not be present at lower inflation rates) reduce productivity and profitability.

Inflation can also affect buying and selling patterns. For example, to protect themselves against rapidly rising prices, companies tend to negotiate purchase-and-sales agreements with ever-shorter time horizons. The constant need to renegotiate contracts can raise the costs of doing business. For companies fighting for survival in high-inflation environments, the need to forecast price changes correctly also increases along with the financial penalties of forecast errors.

Inflation can seriously complicate valuation estimates, producing problematic results. High and volatile inflation makes it difficult for companies to accurately value their assets and liabilities and predict their expenses and revenues. A constant need to perform valuation exercises increases costs, and higher prices render historic benchmarks invalid.

One of the biggest potential threats of excessive inflation is on the political side. When inflation rises beyond acceptable levels, politicians often pass price control legislation. These laws artificially restrict prices and only serve to mask the fundamental sources of inflation. The controls create an array of new problems—often more prominent than the original inflation itself. For instance, even though price controls reduce or eliminate the open manifestation of inflation, they can create shortages, cut quality and size, as well as increase administrative overhead, due to the number of added government employees needed to oversee the controls.

With ever-rising inflation, markets may come to expect that next year's inflation rate will be higher than this year's rate. As inflation premiums are built into price schedules, a nation could find itself with *self-perpetuating* inflation. When this happens, price increases can take on a life of their own and inflation can become self-fulfilling because people have to estimate the future inflation rate to conduct regular business. The expectation that prices will be higher

next year than this year could result in high inflation without any fundamental causes. Like a speeding, runaway car, the inertia of higher prices would be enough to propel them forward.

There are no historical examples of high and sustained inflation rates caused purely by inflationary expectations. Eventually, pure expectation-driven inflation dies from a lack of nourishment. To survive, sustained inflation needs to be fed by increases in a nation's money supply. Nevertheless, in the short run, expectation-driven inflation can make the job of fiscal and monetary policymakers much more difficult. Not only must they address the underlying causes of inflation, such as a natural disaster or crashing exchange rate, but they must also address the public's perceptions about future inflation.

The Rest of the Story

Indexation

Indexation is a way to protect the interests of society from the arbitrary, redistributive effects of unexpected inflation by *automatically* adjusting contracts for the actual rate of inflation. Think of what it would be like to live in a country with nationwide indexation. Borrowers, lenders, employees, businesses, and customers would no longer need to incorporate the expected rate of inflation into their contracts. Instead, they would negotiate a real interest rate, real wage rate, or real price level and then adjust it afterward for the actual amount of inflation.

For example, suppose borrowers and lenders negotiate a real interest rate equal to 3% per year. If the actual inflation rate during the year were 0%, then borrowers would pay back, each year, the principal plus 3% interest. If the actual inflation were 5%, they would pay 8% interest, and with actual deflation of 2% (i.e., inflation equal to −2%), they would pay 1%.

Similarly, suppose labor and management negotiated a real wage rate increase of 3% per year (i.e., 0.25% per month). When salaries and wages were paid each month, compensation would be increased or decreased by the actual amount of inflation during that month. Finally, businesses and their customers would negotiate real prices and, upon payment, adjust these prices to reflect the actual amount of inflation or deflation.

To illustrate with an example, suppose a family earns $80,000 a year, has $10,000 in a bank deposit, and holds a 30-year mortgage. With full indexation and an actual inflation rate of 10%, the following adjustments would occur at year's end:

- The $80,000 salary would automatically rise to $88,000 [i.e., $80,000 × (10% of $80,000) = $88,000], and any further increase in salary beyond 10% (e.g., due to productivity improvements or exceptional performance) would be negotiated separately;
- Interest on the $10,000 bank account would rise automatically to reflect the actual inflation rate. If the real interest earned on the account were 3%, the depositor would receive 13%, which means the bank account at the end of the year would be $11,300;
- The base value of the mortgaged house would rise by 10%, and if the house were sold, this 10% increase would not be taxed as a capital gain;
- The mortgage rate would rise by the rate of inflation, and
- The homeowner's insurance cost would rise to reflect the newly inflated value of the house.

One of the significant benefits of indexation is that it substantially neutralizes the redistributive effects of unexpected inflation. The type of inflation it deals with best is inflation caused by increases in demand (i.e., demand-pull inflation).[5] For example, if the central bank were to increase the money supply, thereby giving the nation more spending power, this increased demand would put upward pressure on the prices of goods, services, and resources. Assuming the increased money supply did not change real GDP, higher inflation would mainly redistribute income among various income groups. Indexing would prevent (or at least reduce) the income redistribution effects of any unexpected inflation.

By contrast, indexation is not as effective in dealing with inflation that originates from the supply side of the market. Consider Indonesia's earthquake and tsunami in 2018, which leveled entire cities and left more than 330,000 people homeless. No amount of indexation could make the resulting change in prices neutral. The nation would no longer be trying to distribute an existing or larger pie equitably. Instead, it would be trying to divide a smaller one, and this is a process that always claims more victims than beneficiaries.

Indexation is also criticized because it may build inflation into the system, causing last year's inflation to influence this year's supply and demand conditions. To the extent that expectations alone could be a cause of persistent inflation, this criticism has merit because these expectations could impede the success of monetary policies.

5 In Chapter 11, "Real Goods and Services Markets," demand-pull inflation will be explained thoroughly, along with cost-push inflation and spiral inflation.

Indexation is not a newly discovered means of neutralizing the redistributive effects of unexpected inflation. It is centuries old, with evidence dating as far back as 1567.[6] Over its many years, indexation has been used in numerous ways, such as on alimony payments, bank deposit rates, labor contracts, interest rates on government securities, long-term delivery contracts, leases, food stamp payments, Social Security benefits, insurance premiums, and mortgage rates. In general, the popularity of indexation varies directly with the prevailing rate of inflation. When the inflation rate is relatively low, scarcely a word is heard about it, but when inflation rises (especially to high levels), grassroots sentiment in favor of indexation surges.

How to Profit from a Negative Real Interest Rate

We see nominal interest rates most often in the news, but they are not the ones that mainly influence our behavior. Instead, real interest rates affect borrowing and lending decisions. An example might show why this is true.

Suppose the historic real interest rate was 3%, expected inflation was 4%, and the nominal interest rate was 7%, but *you* expected the inflation rate over the coming year to be 12%. According to your expectations, the nominal interest rate should be 15% (i.e., the 3% real rate plus the 12% expected inflation). Under these conditions, a nominal interest rate of only 7% would be quite a bargain, but how could you profit from your expectation? The answer is to borrow up to your limits at the 7% nominal rate, invest the funds in goods that will rise in value with your expected inflation rate, store them for a year, and then sell the products at a 12% higher price to earn a 5% real return.

For example, suppose you borrowed $100,000 at the 7% nominal interest rate, purchased gold, and stored it. After a year, the principal and interest repayment on your loan would amount to $107,000 (i.e., $100,000 principal plus 7% interest), but your inventories of gold could be sold for $112,000 ($100,000 plus 12%, due to inflation), thereby leaving you with a $5,000 (i.e., 5%) gain.[7]

Let's look at this same example through another lens. If you expected inflation during the coming year to be 12% and the nominal interest rate was only 7%, then your (expected) real interest rate would be −5%, because the real interest

6 The first modern-day usage of indexation in the United States occurred in the 1940s when the United Auto Workers won this provision as part of its negotiated settlement.

7 Storage costs would be deducted from your earnings.

equals the nominal interest minus expected inflation (i.e., −5% = 7% − 12%). An anticipated real interest rate equal to −5% means that, instead of paying to borrow, you expect to be reimbursed by borrowing at the artificially low nominal rate and investing in an inflation-neutral (or better) asset.

To reinforce the point that real interest rates, rather than nominal interest rates, affect borrowers' and lenders' behavior, let's take the opposite situation from above, and assume you expected inflation to be lower than the 4% rate incorporated into the market 7% nominal interest. If your forecast was for a 1% inflation rate during the next year, you could profit by lending as much as possible at 7%. If your expectations were correct, after a year, inflation would strip away 1% of the purchasing power, leaving you with a 6% real return (i.e., 7% nominal rate minus the 1% inflation). If inflation equaled 4%, you would have earned only 3%.

Calculating Nominal Interest Rates with the Precise Formula

Adding expected inflation to the real interest rate provides a good approximation of the nominal interest rate when expected inflation is very low. As expected inflation rises, this approximation becomes increasingly less reliable because it does not account for the lost purchasing power of the interest earned. In other words, an *interaction term* between the real interest rate and expected inflation is missing.

To understand the interaction term, suppose you lent \$1 million (mm), expecting to receive back the (1) principal, (2) a real rate of return (r), and (3) the expected inflation (%ΔPE). Therefore, you expected to receive \$1mm × (1 + r) × (1 + %ΔPE). Cross-multiplying these terms yields [(\$1mm × 1) + (\$1mm × r) + (\$1mm × %ΔPE) + (\$1mm × r × %ΔPE)].

- (\$1mm × 1) is the principal you will receive at the end of the year
- (\$1mm × r) is the real return you will receive on the amount lent
- (\$1mm × %ΔPE) is the return to compensate you for expected inflation
- (\$1mm × r × %ΔPE) is an interaction term, representing compensation for the loss of purchasing power on the real interest you earn

At low inflation rates, the interaction term is close to zero and is typically dropped. At high inflation rates, it can be significant and, therefore, must be included. Thus, a more precise relationship between the nominal interest rate and expected inflation for high-inflation countries is shown in Figure 5.11.

Real interest rate
+ Expected inflation rate
+ (Real interest rate × Expected inflation rate)
= Nominal interest rate

Figure 5.11: Precise Formula: Relating Real Interest, Nominal Interest, and Expected Inflation Rates.

Estimating Market Expectations about Future Inflation

Now that we understand how a nominal interest rate incorporates the real interest rate and the market's expectation about future inflation, how can the average person determine what "the market" is expecting? This question is especially crucial for those entering into contracts looking to make good deals or speculators who feel they can outsmart the market and earn above-average returns. Good deals are made and above-average profits earned when an individual's inflationary expectations turn out to be more accurate than the market's expectations.

This section explains three alternative methods that can help uncover the market's inflationary expectations. As you might expect, none is perfect, but they at least provide a credible way to start the process of calculating the market's inflationary expectations so the estimates can be compared to your own.[8] The verdict is still out on which of the three methods is best. In the future, new forecasting methods are bound to appear.

Method #1: Conducting Surveys

One of the best ways to uncover market sentiment about future inflation is to conduct surveys and ask people for their opinions. Surveys on expected inflation are conducted around the world by private organizations, governments, and central banks. Some of them randomly choose and interview individuals.

8 To learn more about determining a nation's expected inflation rate, see Bharat Trehan, "Survey Measures of Expected Inflation and the Inflation Process," *Federal Reserve Bank of San Francisco Working Papers* (February 2010), http://www.frbsf.org/publications/economics/papers/2009/wp09-10bk.pdf (accessed September 1, 2019); Wilbert van der Klaauw, Wändi Bruine de Bruin, Giorgio Topa, Simon Potter, "Rethinking the Measurement of Household Inflation Expectations: Preliminary Findings," *Federal Reserve Bank of New York Staff Reports*, no. 359 (December 2008), http://www.newyorkfed.org/research/staff_reports/sr359.html (accessed September 1, 2019).

Others question financial professionals, such as economists and bankers, who work daily with issues such as these and are likely to provide more objective answers than the average household member.

In the United States, a few of the most prominent surveys are the (1) University of Michigan Survey of Consumers,[9] (2) Thomson Reuters/Ipsos Primary Consumer Sentiment,[10] (3) Livingston Survey (LS),[11] and (4) Survey of Professional Forecasters (SPF).[12] The United States is not alone in its use of surveys to uncover the market's expected inflation. Central banks and private financial institutions in many European Union nations, Australia, and South Africa conduct regular inflation surveys. Many of these surveys are qualitative. For example, they ask only if inflation will rise, fall, or stay the same, instead of asking for the specific inflation rate they expect. When they are qualitative, statistical methods are often used to derive reportable, quantitative inflation estimates.

Method #2: Using Treasury Inflation-Protected Securities (TIPS)

One way the U.S. government borrows is by issuing Treasury Inflation Protected Securities (TIPS),[13] which provide investors with a source of shelter against unexpected inflation.[14] TIPS are offered with a fixed *real* rate of interest and then, semiannually, both the coupon and principal are adjusted for the actual inflation that occurs. Inflation increases the periodic coupon payments on TIPS and increases the principal that will be received at maturity. Deflation reduces them. TIPS are issued in 5-year, 10-year, and 30-year maturities, and they come in denominations as low as $100.

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9 University of Michigan, Surveys of Consumers, http://www.sca.isr.umich.edu/ (accessed September 1, 2019).

10 Thomson Reuters/Ipsos Primary Consumer Sentiment, https://www.refinitiv.com/en/financial-data/indices (accessed September 1, 2019).

11 Federal Reserve Bank of Philadelphia, *Livingston Survey*, http://www.phil.frb.org/research-and-data/real-time-center/livingston-survey/ (accessed September 1, 2019).

12 Federal Reserve Bank of Philadelphia, *Survey of Professional Forecasters*, https://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/ (accessed on September 1, 2019).

13 Charles T. Carlstrom and Timothy S. Fuerst, "Expected Inflation and TIPS," *Federal Reserve Bank of Cleveland Commentary* (November 2004), https://www.clevelandfed.org/newsroom-and-events/publications/economic-commentary/economic-commentary-archives/2004-economic-commentaries/ec-20041101-expected-inflation-and-tips.aspx (accessed September 1, 2019).

14 TreasuryDirect, "Treasury Inflation-Protected Securities (TIPS)," www.treasurydirect.gov/indiv/products/prod_tips_glance.htm (accessed September 1, 2019).

Let's see how TIPS can be used to help determine the expected U.S. inflation rate. Suppose the return on a 5-year TIPS, which incorporates no expected inflation premium, was 3%, and the return on a 5-year conventional Treasury security, which includes an expected inflation premium, was 7%. The difference (i.e., 4%) can be viewed as an estimate of the expected annual inflation rate for the coming five years.[15]

Method #3: Making Econometric forecasts Using Time Series Models

Economists, financial analysts, central banks, and think tanks use sophisticated econometric methods to forecast inflation rates and uncover market expectations about inflation. Forecasts are usually based on past movements and historical causes of inflation. These models can be highly accurate, but their accuracy depends on the previous causes and patterns of inflation repeating themselves in the future.

Inflation and the Cost of Higher Education

Let's end this chapter by considering a disquieting example relating to inflation and its effect on educational costs (see Table 5.1). During the 2017–2018 academic year, the average cost of a year's worth of private, university-level education in the United States was about $50,000.[16] Suppose your child is born today, the yearly cost of college is $50,000, and the annual inflation rate is

15 Caution is advised when using this method because Treasury securities and TIPS are not homogeneous. Therefore, their interest differential might misestimate expected inflation. One difference is the liquidity in their respective markets. The TIPS market is less liquid than the Treasury securities market, so this liquidity premium should also be part of the interest differential. Another reason these securities are not homogeneous is that the coupon payments and principal (at maturity) for conventional treasury securities are fixed (i.e., they do not vary from issuance to maturity). By contrast, the coupon and principal on TIPS fluctuate with the actual inflation rate. See Refet Gurkaynak, Brian Sack, and Jonathan H. Wright, "The TIPS yield curve and inflation compensation," *American Economic Journal*: Macroeconomics 2(1), 70–92 (2010), and Josh Stillwagon, "TIPS and the VIX: Spillovers from Financial Panic to Breakeven Inflation in an Automated, Nonlinear Modeling Framework." *Oxford Bulletin of Economics and Statistics* 80(2), 218–235 (2018).

16 During the 2017–2018 academic year, the average cost of an in-state public college/university was $25,290, and the average cost of a private college/university was $50,000. COLLEGEdata, "What's the Price Tag for a College Education?" https://www.collegedata.com/en/pay-your-way/college-sticker-shock/how-much-does-college-cost/whats-the-price-tag-for-a-college-education/ (accessed September 1, 2019).

Table 5.1: Cost of a U.S. University Education for One Year at Various Inflation Rates.

Annual Inflation Rate	Year Your Child Is Born	Your Child Is 6 Years Old	Your Child Is 12 Years Old	Your Child Is 18 Years Old
1%	$50,000	$53,076	$56,341	$59,807
3%	$50,000	$59,703	$71,288	$85,122
6%	$50,000	$70,926	$100,610	$142,717
10%	$50,000	$88,578	$156,921	$277,996
15%	$50,000	$115,653	$267,513	$618,773

expected to be 10% for the next 18 years, at which point your child would be old enough to attend a university. When your child is six years old, the cost of just one year at a university would be $88,578, but your child would still be too young to attend. If inflation continued at the same 10% annual rate, by the time your child is 12 years old, a year's worth of university-level education would cost almost $156,921, but again, your child would still be too young to attend. Finally, by the time your child is 18 years old and ready to attend a university, the annual price tag would be $277,996 (see Table 5.1)!

Conclusion

One of the essential lessons from this chapter is that it is hard to identify the victims and beneficiaries of inflation until after inflation occurs. Markets incorporate inflationary expectations into nominal interest rates, prices, and resource costs. Therefore, it is only when expected inflation is different from actual inflation that income redistribution occurs. For the nation as a whole, inflation mainly redistributes income from people in weak negotiating positions to people in strong negotiating positions. At the same time, if inflation and price volatilities curtail business investments, change work incentives, or diminish productivity in any way, they can reduce a nation's overall well-being.

Key Terms

- Inflation can increase business risks, erode international competitiveness, and threaten household wealth.
- From the circular flow diagram, we know that what is paid for goods and services must be earned by someone as income. Therefore, the adverse effects of unexpected inflation are primarily due to the redistribution of income.

- Nominal versus real interest rates
  - The real interest is society's time value of money.
  - A nominal interest rate equals the real interest rate plus expected inflation.
  - Nominal interest rates are the ones we see in the news and pay or earn when we borrow or lend.
  - The expected real interest rate is the rate that market participants anticipate paying and earning after taking out the influence of expected inflation.
  - Nominal interest rates are influenced by the expected inflation rate, rather than current or past inflation rates.
- Victims and beneficiaries of inflation
  - Borrowers are helped and lenders harmed if actual inflation is greater than expected inflation (and vice versa).
  - Businesses are helped and labor harmed if actual inflation exceeds expected inflation (and vice versa).
  - Because most governments are large debtors, they are influenced by inflation in the same way private debtors are affected.
  - Governments could be the beneficiaries of inflation if tax brackets are not indexed and inflation pushes business and household incomes into higher tax brackets.
  - If actual inflation is greater than expected inflation, then the real cost of resources falls for businesses and increases profits. Businesses gain at the expense of resource owners.
  - Not all fixed income earners are harmed by inflation. It depends on factors such as their spending patterns and wealth composition.
  - Inflation hurts the nation as a whole if it reduces work incentives and productivity.
- Costs of inflation
  - Inflation can distort relative price signals and increase business risk.
  - Inflation increases menu costs.
  - Inflation can shorten contract periods.
  - Inflation can complicate valuation estimates.
  - Inflation may prompt governments to impose wage and price controls.
  - Indexation substantially neutralizes the redistribution effects of unexpected inflation.

Review Questions

1. Why do lenders demand a higher nominal interest rate during periods in which inflation is high?
2. Suppose the real interest rate is 2%, the past year's inflation rate is 5%, and the expected inflation rate for the coming year is 4%. What should the nominal interest rate equal?
3. Suppose the real interest rate demanded by investors is 7%. Based on the information available today, the expected inflation rate is 4%. Calculate the actual nominal interest rate at the beginning of the period and actual real interest rate at the end of the period in each of the following cases. Explain whether lenders or borrowers are hurt in each situation:

a. Actual inflation turns out to be 4%
b. Actual inflation turns out to be 6%
c. Actual inflation turns out to be 1%
d. Actual inflation turns out to be 15%

4. "Lenders are always hurt by an increase in the inflation rate." Comment on the validity of this statement.
5. Are wage earners usually hurt by unexpectedly high inflation? Explain.
6. Comment on the validity of this statement: "Governments always benefit from inflation."
7. How might retirees be hurt by unexpectedly high inflation? How might they be helped by unexpectedly high inflation?
8. Explain the costs and benefits of indexation.
9. Is the approximation formula for calculating nominal interest rates most useful in times of relatively high inflation or relatively low inflation? Explain.
10. Suppose the real interest rate is 3%, the past year's inflation rate was 30%, and the expected inflation rate for the coming year is 40%. Use the approximation formula to determine the nominal rate of interest. What would the nominal interest rate equal using the more precise formula?
11. Based on what you believe the inflation rate will be during the coming year, suppose you estimate that the current real interest rate equals –15%. What can you do to profit from this expectation? How much do you expect to gain? Are you arbitraging (i.e., earning a locked-in return) or speculating? If you are speculating, what might cause you to lose on your bet?

Discussion Questions

12. Suppose a business analyst argued that Argentina should reduce inflation drastically because nominal interest rates would fall with lower expected inflation and thereby stimulate economic activity. Do you agree with this opinion?
13. "If a nation has indexation, then all the redistributive gains and losses from unexpected inflation will be eliminated." Comment on the validity of this statement."
14. "Inflation (either high or low) reduces the entire nation's standard of living." Comment on the validity of this statement.
15. You have been asked by your boss to create a five-year financial forecast. Your company will not be borrowing any new funds over the next five years, and it has fixed interest rate return on the existing debt. How important is it to consider the potential effects of inflation in your five-year forecast?
16. What does it mean for a country to index its interest rates to inflation? Is indexation a positive or negative characteristic for foreign companies that are considering direct investments (e.g., plant and equipment expenditures) in a country such as Chile?

Chapter 6
Monetary Aggregates

What is *money*? As individuals, we never seem to have enough of it because the more we have, the more we can buy, but the situation is different for nations. Unless a nation's production increases in tandem with its money supply, only inflation and income redistribution occur. The problem with money is that it can give the illusion of greater wealth, higher purchasing power, and increased well-being when nothing has actually changed—or things have gotten worse.

Money is a lubricant that makes economic transactions more efficient. For that reason, we are all better off with money than without it. At the same time, an ever-increasing money supply does not imply ever-increasing production, jobs, or efficiency. Once a nation has reached a threshold level of money where routine transactions can be managed efficiently, the impact of newly created money on economic activity is mainly through its effects on prices, expectations, and speculation.

This chapter explains money, its functions, the way inflation erodes these functions, and why nations measure it. Understanding the basics of money is essential because Chapter 7 "Financial Intermediation" will discuss the value added of private financial intermediaries (e.g., banks) and the essential role they play in nations' payment systems. Chapter 8, "Money Creation" is a key to the rest of the book because it explains how financial institutions create the money, which can fuel nations' growth and inflation. In Chapter 9, "Central Banks," we will go on to discuss how central banks control the ability of financial institutions to lend and, therefore, how they control the money supplies of their nations or currency areas. Finally, Chapter 10, "Credit Markets" expands our scope to discuss all the factors, including money supply changes, that affect real and nominal interest rates. Figure 6.1 provides and overview of the path we will take.

The Basics

Commodity Money Versus Fiat Money

Why do people and businesses accept coins and paper currency in exchange for valuable goods and services, when they realize that the intrinsic value of a currency, like the dollar or euro, is far less than its purchasing power? For

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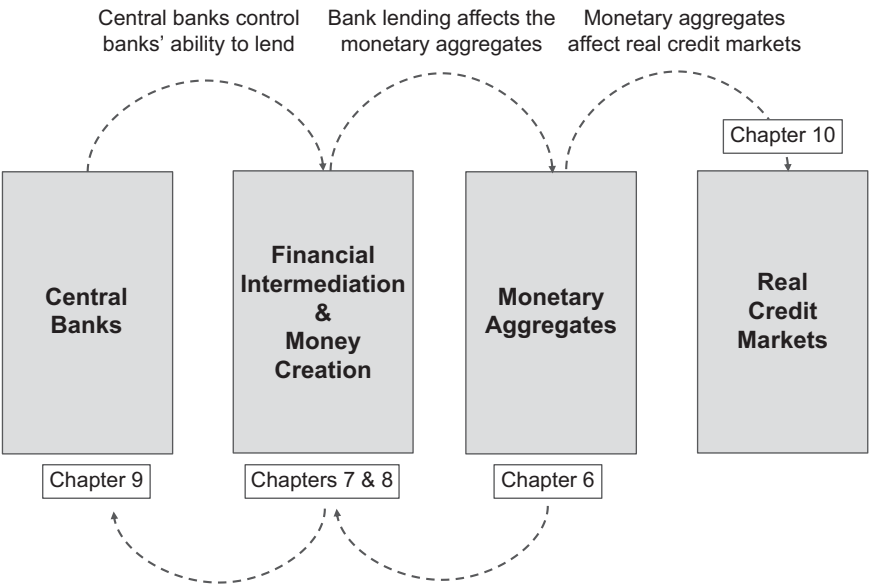

Figure 6.1: Road Map for Chapters 6 to 10.

example, in the United States, it costs slightly more than five cents to produce a one-dollar bill, but its purchasing power is still one dollar.[1]

Few of us spend much time thinking about questions such as these, but the answer is *trust*. People and businesses accept money because they trust that others will accept it from them. For this reason, central banks play a pivotal role as monetary gatekeepers, whose job is to ensure that the trust people have in their currencies is maintained.

Societies have used money, in one form or another, for hundreds of years before governments or central banks existed. Therefore, its use and creation do not depend on governments or monetary authorities. Money exists to make life

1 Each year, the Federal Reserve Board projects the likely demand for new currency and places an order with the U.S. Treasury Department's Bureau of Engraving and Printing, which manufactures U.S. currency and charges the Fed for the cost of production. The 2019 cost of printing a $20 or $50 note was 11.5 cents each; a $1 or $2 note cost 5.5 cents; a $5 note cost 11.4 cents; a $10 note cost 11.1 cents; and a $100 note cost 14.2 cents. Board of Governors of the Federal Reserve System, Current FAQs: *How Much Does It Cost to Produce Currency and Coin?* www.federalreserve.gov/faqs/currency_12771.htm (accessed September 1, 2019).

easier. It is usually durable, easy to carry or access, and divisible into smaller units. For these reasons, gold, silver, copper, gems, beads, shells, and cigarettes have all been used, at one time, as money.

One significant benefit from using commodity currencies is, if worse comes to worst, the material object, such as gold, jewelry, or wheat, can be used or consumed instead of spent. Another advantage of commodity money is that it is more difficult to produce than paper money and, therefore, cannot be as easily manipulated for political advantage. Consequently, there are strong advocates in many countries who favor a return to currencies backed by a precious metal, such as gold.

Currencies that are not backed by commodities, such as precious metals of equal value, are called *fiat money* (which means "money by decree"). In almost all countries, monopoly institutions, such as central banks, have the power to issue fiat money. Governments enhance its acceptability by giving the currency *legal tender* status, which means it must be accepted for particular transactions, such as the payment of debts. For taxes, it may be the only acceptable means of payment. At the same time, just because the government issues currency does not mean it will be accepted and used for other, everyday transactions.

Functions of Money

In general, money serves three primary purposes. It is a unit of account, medium of exchange, and store of value. These functions are easiest to understand if you think of "dollar," "euro," "peso," or "yen," every time the word "money" is used.

The *unit-of-account* function means that money is the basis for valuing goods and services, as well as establishing relative prices between them. The *medium-of-exchange* function means that individuals exchange goods and services for money and then re-exchange it for other goods and services. Money is not held for its own sake but rather for the things it can buy, which means holding money is just a temporary respite between selling one thing and buying or investing in something else. Money's *store-of-value* function relates to its use over a period. Money is a store of value because it is one way to accumulate wealth.

Inflation Erodes the Functions of Money

Nothing erodes the usefulness, effectiveness, and convenience of money more than inflation. If inflation is high and volatile enough, it can completely erase

the trust that people have in their currencies and force them to transact business in other ways, such as bartering goods and services or accepting only foreign currencies.

To see why, imagine yourself in a country where the daily inflation rate is 100%. If the price of a loaf of bread on Monday were $1, it would be $2 on Tuesday, $32 by Saturday, and $536,870,912 by the end of the month. Under these circumstances, who would be willing to accept such a rapidly depreciating asset in exchange for intrinsically valuable goods? The answer is "almost no one" because inflation would have destroyed virtually all of the significant benefits from having money.

With such high inflation, money would no longer be a *store of value* that linked present saving to future buying power. Only if an interest return existed that compensated for the inflationary loss in expected purchasing power would you be willing to hold money.

High inflation would also destroy money's role as a *medium of exchange* because few would be willing to accept it. Remember that fiat money has value only if others accept it. Once it loses acceptability in exchange, money loses its value as a medium of exchange.

Finally, excessively high rates of inflation would destroy money's use as a *unit of account*. If the currency were no longer used as either a medium of exchange or store of value, there would be little reason to value goods, services, or contracts in terms of it. It would force merchants to bear the cost of continually having to raise their prices or quoting them in foreign currencies.

Why Do Nations Measure Their Money Supplies?

Because of the link between changes in the money supply and changes in a nation's spending patterns, there is widespread interest in knowing both how fast the money supply is growing and how quickly it should grow. Central bankers have an interest in measuring money supply changes so they can prevent both excessive spending, which could cause inflation, and protect against insufficient liquidity that might trigger a recession. For planning purposes, business executives are equally interested in knowing the rate of change in the money supply. An increased money supply implies greater nominal purchasing power and subsequent changes in key economic variables, such as nominal interest rates, exchange rates, prices, and wages. Understanding how those factors should change lends itself to rational decisions concerning pricing, borrowing, hiring, and production.

There is virtually no controversy in financial circles that changes in a nation's money supply affect nominal expenditures, but there is disagreement about the transmission mechanism. Two mainstream schools of thought on this issue capture the debate. One is called *Keynesian theory* and the other, *monetarist theory*.

Keynesians believe there is an indirect link between changes in a nation's money supply and changes in its expenditures (see Figure 6.2). Their reasoning is as follows: if a nation's *real* (i.e., inflation-adjusted) money supply increases, the added liquidity should cause *real* interest rates to fall; and if real interest rates fall, businesses and consumers should borrow and spend more, which increases expenditures for goods and services.[2] Keynesian theory's indirect link between money and economic activity seems logical, and it is often used in economics—especially for short-run analyses. Chapters 18 to 20 of this book use the Keynesian perspective to investigate the short-term effects of monetary policies.

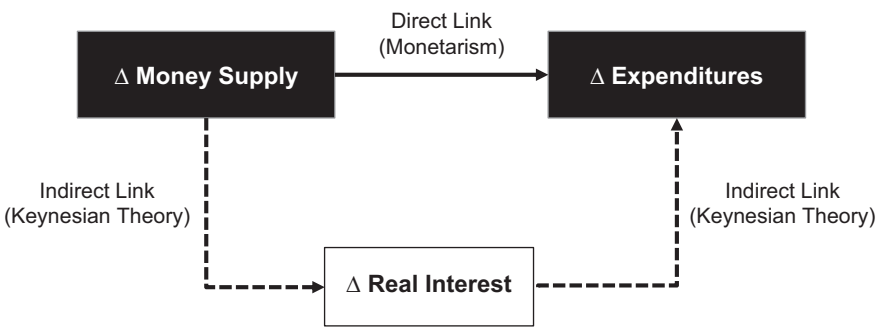

Figure 6.2: How Do Changes in a Nation's Money Supply Affect Expenditures?

Monetarists believe there is a direct link between changes in a nation's money supply and changes in expenditures. Therefore, regardless of whether a nation's real interest rate fluctuates, expenditures should eventually change when its money supply changes. Their reasoning is as follows: If a central bank increases the money supply above the public's demand to hold it, the resulting

2 The important distinction between real interest rates and nominal interest rates should be kept in mind. Real borrowing increases only if real interest rates fall. We return to this vital distinction in Chapter 10, "Real Credit Markets."

disequilibrium (i.e., money surplus) creates incentives for individuals and businesses to get rid of the extra cash they are holding. As a result, they spend and invest the funds, thereby stimulating economic activity. This direct link between money and economic activity also is logical, and it is often used in economics—especially in long-run analyses. Therefore, in Chapter 23, "Long-Term Inflation, Exchange Rates, and Unemployment," we will use the monetarist perspective for our analyses of the long-term effects of monetary policy.

Keynesians and monetarists focus on different pages of the financial press. For Keynesians, fluctuations in the money supply are significant, mainly if they change real interest rates, so Keynesians focus on the financial pages dealing with money market interest rates, bond yields, and expected inflation. By contrast, monetarists focus on central bank statistics showing changes in the money supply and other monetary aggregates. In terms of transparency and timeliness, money supply statistics are published once a week in the United States, but nominal interest rates are reported second-by-second throughout each working day, and an average or ending-rate is published daily in newspapers.

You might ask why there is a need to choose. Why not consider both measures? As a practical matter, most analysts do consider changes in the money supply *and* changes in interest rates, but if these measures give conflicting signals (e.g., an expanding money supply and rising real interest rates), then a choice must be made.

Monetary Aggregates

What assets are included in a nation's money supply? What assets should be included? Two criteria help us decide. First, it should be linked closely to spending and, second, reported promptly. Over time, new financial assets are developed, and spending patterns change. Therefore, money supply measures that once captured these two criteria might fail to do so in the future. This is why central banks change the components of their money supply definitions and why many nations have more than one money supply measure.

M1, M2, and the Monetary Base

The names given to our money supply measures are, to say the least, uninspired. "M1" and "M2" top the list, but there are also "M3," "M4," and others. The U.S. Federal Reserve focuses on the M2 measure, and the European Central Bank and Bank of England focus on M3 and M4, respectively.

Each central bank can decide for itself what specific financial assets to include in its targeted money supply measures, which means there are differences among countries. For this reason, global organizations, such as the International Monetary Fund, try to overcome discrepancies by compiling and reporting standardized statistics, which facilitate the job of comparing countries.

Money supply definitions are organic, in the sense that they change over time. As a result, it is far less important to memorize the specific financial assets included in a nation's money supply as it is to know where to find the most recent figures and definitions. For this, one of the best sources is the home page of the country's central bank.[3]

One of the main factors determining whether a financial asset should be included or excluded from a country's or currency area's money supply is its *liquidity*. Liquidity is the ability to convert an asset into cash quickly and without substantial loss of value. Therefore, cash is the most liquid asset, and durable assets, such as houses, airplanes, and heavy machinery, are among the least liquid.[4]

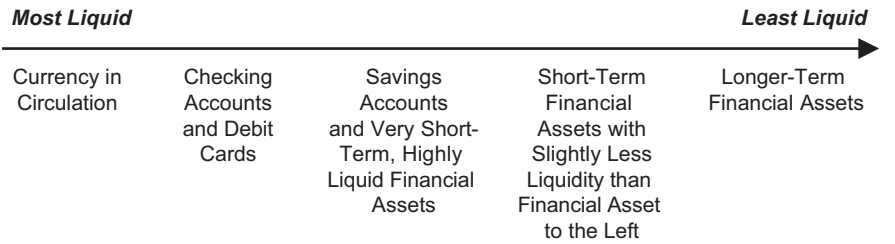

Figure 6.3: Financial Assets Arranged in Terms of Their Liquidity.

Figure 6.3 shows a continuum of financial assets that vary in liquidity (real or perceived). The most liquid assets are on the left, and as we move to the right, they become progressively less liquid. When people have no cash, what do they use? Most of them turn to (and often prefer) checking accounts, credit cards, and debit cards. Otherwise, they rely on other liquid financial assets, like savings accounts, money market mutual funds, money market deposit accounts, and time deposits.

3 A list of 31 major central banks and their home page URLs is included at the end of Chapter 9, "Central Banks."

4 A $300,000 house might sell quickly if the homeowner is willing to settle for a very low price, such as $50,000, which is why a "liquid" asset's market value must remain steady.

M1 Money Supply

The M1 money supply includes only financial assets that fulfill all three functions of money, which are a unit of account, medium of exchange, and store of value. Therefore, it includes currency in circulation and checking accounts because these financial assets can be used to pay for almost all goods and services.[5]

"Currency in circulation" includes only the currency (notes and coins) outside banks, the national treasury, central bank, and other financial institutions. To understand why, suppose you had $100 in your wallet. Those funds would represent $100 worth of potential purchasing power to you and, therefore, would be part of the money supply. If you deposited these funds into a checking account, what would happen to your purchasing power? The answer is "nothing" because the currency you held would fall by the same amount your checking account rose. In short, you would still have only $100 of purchasing power. All you did was to replace the currency with an equivalent-value in your checking account.

In discussions about money, the same is true for the nation as a whole. By excluding currency inside private financial intermediaries, the national treasury, and the central bank, a country's money supply remains constant when people deposit funds into and withdraw funds from their checking accounts. Consider what would happen if the money supply included both currency inside and outside financial intermediaries. It would rise every time someone made a cash deposit into a checking account and fall whenever funds were withdrawn into cash.

In Figure 6.4, a vertical line is drawn just after "checking accounts." All financial assets to the left are included in M1, and all financial assets to the right are excluded.

M2 Money Supply

M2 includes everything in M1 as well as other, highly liquid short-term financial assets that have a significant impact on spending. Let's take a closer look at the difference between M1 and M2.

5 How about credit cards? Many people use credit cards if they have no cash, but care must be taken with credit cards because they are not part of a nation's money supply until they are used. Here's why: Suppose Ann Talope has a credit card with a $5,000 line of credit. Until the card is used, the credit line is not recorded as part of the nation's money supply because it is neither currency in circulation nor a checking account. Things change when Ann uses her credit card to purchase, say, a $50 sweater. As a result of this transaction, Ann's credit card company transfers $50 to the merchant's (sweater seller's) checking account, and Ann ends up with the equivalent of a zero-interest loan until her credit card bill comes due.

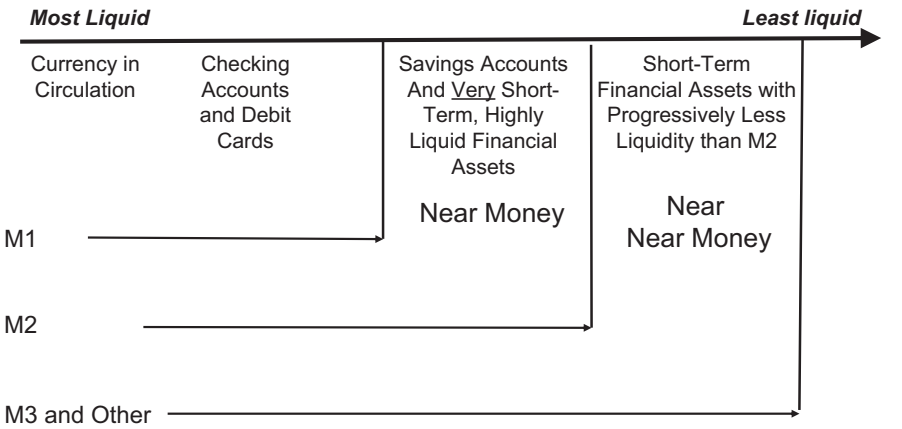

Figure 6.4: Money Supply Measures: M1, M2, and M3.

M1 includes only those assets that can be readily used as a medium of exchange. Therefore, they are strongly connected to the spending activities of individuals and businesses. When public holdings of M1 rise, so should spending, but if the purpose of measuring the money supply is to establish a link between spending and a collection of financial assets called "money," then perhaps the M1 definition of money is too narrow.

How much people spend is influenced not only by the amount of currency they have in their wallets and size of their checking accounts but also by other highly liquid assets, such as savings accounts, small time deposits, and money market mutual funds.[6]

For this reason, broader measures of money are reported, which include these less liquid financial assets. In most cases, these assets cannot be spent directly, or they have restrictions on their use. Nevertheless, if they have a significant influence on spending, then there is a strong argument for measuring and including them in the money supply definition.

After currency in circulation and checking accounts, the financial assets with the highest levels of liquidity are called *near money*. Therefore, the M2 definition in Figure 6.4 has a vertical line after the categories of financial assets that include M1 and near money.

6 *The Rest of the Story* section, entitled "Financial Assets Included in the U.S. M1 and M2 Money Supplies" explains these financial assets.

M3 and Other Money Supply Measures

This book spotlights only the M1 and M2 money supplies. We stop at M2 because it is the focus of the U.S. Federal Reserve. Other central banks, such as the European Central Bank,[7] concentrate on M3, and still others, such as the Bank of England,[8] focus on M4. M3 and M4 include financial assets with increasingly less liquidity than M2. Figure 6.4 refers to this group of financial assets as *near near money*. It includes assets that are more closely related to wholesale investments by institutional investors and large corporations than they are to the expenditure patterns of individuals and businesses.

Money Supply Definitions Are Not Fixed

As new financial instruments are invented and work their way into widespread use, central banks redefine their money supply measures to include them. Similarly, as old financial instruments fall into disuse or as money supply measures fail to provide central banks with useful information, they are redefined or dropped. Therefore, the broad conceptual differences between money supply definitions, such as M1 and M2, should be kept in mind, but the specific financial assets included in any money supply measure should always be double-checked.

The United States provides an excellent example of how mercurial money supply measures can be. In March 2006, the Board of Governors of the U.S. Federal Reserve stopped publishing the M3 money supply figures.[9] The Fed felt that M3 provided no more information about economic activity than M2, and annual reporting costs outweighed the benefits of having timely access to this figure.[10] Discontinuing M3 in the United States stood in stark contrast to other nations and currency areas, such as the European Monetary Union, where M3 was (and is) the primary indicator and target for monetary authorities.

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7 Interested readers can find the European Central Bank's M3 definition on its home page. See European Central Bank, Monetary aggregates, https://www.ecb.europa.eu/stats/money_credit_banking/monetary_aggregates/html/index.en.html (accessed on September 1, 2019)/

8 Interested readers can find the Bank of England's M4 definition on its home page. See Bank of England, Further details about M4 data, https://www.bankofengland.co.uk/statistics/details/further-details-about-m4-data (accessed on September 1, 2019).

9 Federal Reserve, Discontinuance of M3, Federal Reserve Release H.6. Money Stock Measures, November 10, 2005, www.federalreserve.gov/releases/h6/discm3.htm (accessed www.federalreserve.gov/releases/h6/discm3.htm). The Federal Reserve also announced that it would stop reporting repurchase agreements and Eurodollar deposits.

10 Interested parties can still obtain M3 information, albeit much less frequently, by using the U.S. Flow of Funds Accounts, which are reported quarterly by the Federal Reserve.

Total (Bank) Reserves and the Monetary Base

In addition to the major money supply measures (e.g., M1 and M2), nations have other monetary aggregates, which are essential for conducting monetary policy and attract a great deal of media attention. Two of them are bank reserves and the monetary base.

Total (Bank) Reserves: *Total (bank) reserves* are the assets that private financial intermediaries hold in relatively strict proportion to their deposit liabilities. In part, they are held to satisfy central bank requirements, and failure to comply can result in sanctions and penalties by monetary authorities. Any reserves held above the required level are excess, and banks can lend or invest them as they please.[11]

Reserves are a critical monetary aggregate for two reasons. First, they are the basis for the financial system's ability to lend. Increased reserves mean increased lending potential. Second, they are heavily controlled by central banks, in the sense that the banking system's aggregate reserves change when the central bank wants them to change.

In the United States, two assets qualify as reserves: cash in the vaults of financial intermediaries and the deposits of these financial institutions at the central bank (i.e., the Federal Reserve).[12] Cash earns no interest, so banks have a clear incentive to minimize the amounts they hold. By contrast, the Fed pays interest on the deposits that financial intermediaries hold there.[13] In holding excess reserves, banks must consider the tradeoff between having liquid financial assets that are safely tucked away in the Fed versus having them earn higher (but riskier) returns if invested or lent elsewhere.

Monetary Base: The monetary base (sometimes called *high-powered money or MO*) is composed of reserves held by financial institutions and currency in circulation. It is one of the most important of all monetary aggregates because the

11 We will see in Chapter 8, "Money Creation," how excess reserves held by U.S. banks skyrocketed after the Great Recession (2007–2009).

12 Assets that qualify as bank reserves can vary by country. Some central banks have expanded their asset lists by permitting safe, interest-earning assets, such as government securities, to be counted as reserves.

13 The Financial Services Regulatory Relief Act of 2006 authorized the Federal Reserve to pay interest on the reserve balances that banks hold at the Fed. See U.S. Congress, S. 2856 (109th): Financial Services Regulatory Relief Act of 2006, https://www.govtrack.us/congress/bills/109/s2856/text/enr (accessed September 1, 2019).

monetary base is the raw material from which a nation's money supplies are made. It is also worth remembering because (with only a few minor exceptions) changes in the monetary base are caused solely by central banks. In contrast, central banks have less control over M1 and M2 because these monetary aggregates are also affected by the behavior of the nonbank public (e.g., businesses and individuals) as well as by banks and other financial intermediaries.

In Chapter 8, "Money Creation," we will discuss how central banks lose some control over M1 and M2, via the actions of financial intermediaries and the nonbank public. In doing so, we will also investigate how changes in a nation's monetary base cause amplified changes in a nation's money supply. In general, as a central bank changes the monetary base, the nation's money supply rises or falls by a multiple (see Figure 6.5).

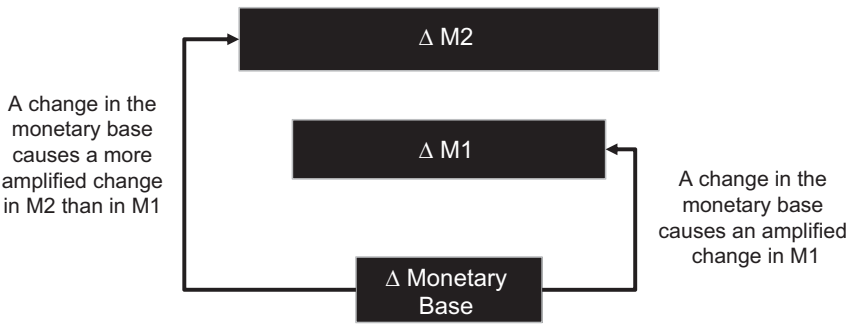

Figure 6.5: Relationship Between Changes in the Monetary Base and Changes in M1 and M2.

The Rest of the Story

U.S. Monetary Aggregates

Until this point, we have been very general about what financial assets are included in the M1 and M2 money supply definitions because there can be slight variations among nations. Now let's get specific and see what the United States includes in its major monetary aggregates.[14]

14 U.S. money supply measures and historical information on them can be found at: Board of Governors of the Federal Reserve System, Data Download Program, www.federalreserve.gov/datadownload/Choose.aspx?rel=h6 (accessed September 1, 2019).

M1

The M1 money supply includes currency in circulation (paper bills and coins) and checking deposits (sometimes called *transactions accounts* or *checkable deposits*). Figure 6.6 shows financial assets that qualify as "checking deposits"—namely, demand deposits, NOW accounts, ATS accounts, and credit union share drafts—but all of these accounts have one common characteristic—checks can be written on them.

M1 ≡ Currency in Circulation + Checking Deposits
Currency in circulation includes: – Notes and coins outside the U.S. Treasury, Federal Reserve Banks, and the vaults of depository institutions. It also includes travelers' checks issued by nonbank issuers.
Checking deposits include: – Demand deposits at commercial banks (excluding those amounts held by depository institutions, the U.S. government, and foreign banks and official institutions) minus cash items in the process of collection and Federal Reserve float. – Other checkable deposits, consisting of negotiable orders of withdrawal and automatic transfer service accounts at depository institutions, credit union share draft accounts, and demand deposits at thrift institutions.

Figure 6.6: U.S. M1 Money Supply Definition.
Source: Federal Reserve, Federal Reserve Statistical Release: H.6. Money Stock Measures, www.federalreserve.gov/releases/h6/current/h6.htm (accessed May 25, 2019).

The U.S. central bank ("the Fed") makes a preliminary announcement of the nation's M1 supply on Thursday of each week, which is then reported in the financial press (e.g., *The Wall Street Journal* and *Financial Times*) on the following Friday or Monday. Changes in these monetary aggregates are closely monitored because they signal potential shifts in future spending and possible central bank reaction to the changing economic climate.

The M1 figures that are reported each week are based on sample data from approximately 15 large U.S. banks. They provide only a rough initial estimate of the actual U.S. money supply. Over the course of the following few weeks, as more information becomes available, these preliminary figures are revised (often substantially) by the central bank.

Despite any initial measurement inaccuracies, weekly money supply figures have considerable influence on the financial markets. Many bond brokers, financial analysts, politicians, and business executives closely follow these weekly fluctuations. Numerous transactions and decisions are based on expected changes in

these money supply figures, and many careers have been spawned or destroyed by correctly or incorrectly estimating them.

M2

Figure 6.7 the financial assets included in M2. Notice that it includes all the financial assets in M1 plus a select group of other (slightly) less liquid assets. Currently, the U.S. Federal Reserve focuses primarily on M2. Like the M1 money supply, M2 figures are released weekly by the Federal Reserve.

M2 ≡ M1 + Near Money

M1 includes:
- Currency in Circulation plus
- Checking Deposits

Near money includes:
- Savings deposits (including money market deposit accounts)
- Small-denomination time deposits (time deposits in amounts of less than $100,000), less individual retirement account (IRA) and Keogh balances at depository institutions
- Balances in retail money market mutual funds, less IRA and Keogh balances at money market mutual funds

Figure 6.7: U.S. M2 Money Supply Definition (M2 = M1 + Near Money).
Source: Federal Reserve Statistical Release, H.6 Money Stock Measures, Release Date: Nov 29, 2018, www.federalreserve.gov/releases/H6/Current/ (accessed September 1, 2019).

Financial Assets Included in the U.S. M1 and M2 Money Supplies

Currency in Circulation (Part of M1 and M2)

Currency in circulation includes all coins and bills issued by the U.S. Treasury and Federal Reserve which are held outside private financial intermediaries (e.g., banks), the Federal Reserve District banks, and the U.S. Treasury. Currency in circulation also includes traveler's checks of nonbank issuers (e.g., American Express). Traveler's checks issued by depository institutions are already part of demand deposits.

Demand Deposits (Part of M1 and M2)

Demand deposits are non-interest-earning checking accounts offered by commercial banks (as opposed to other thrift institutions, such as savings and loan

associations, credit unions, or mutual savings banks). Checks must be honored by the bank "on demand" (i.e., with no waiting period).

Nonbank-Issued Traveler's Checks (Part of M1 and M2)

Traveler's checks are purchased by individuals for cash from nonbank financial institutions. They can be used to buy goods and services throughout the world. If the traveler's checks are lost or stolen, the issuer reimburses the owners at no cost.

NOW Accounts (Part of M1 and M2)

NOW accounts are interest-earning savings accounts on which depositors can write "negotiable orders of withdrawal." Negotiable orders of withdrawal are identical to demand deposits, except that they earn interest, and the bank can require a depositor to wait a short period (e.g., 30 days) before honoring them. They enabled banks during the 1970s to evade a federal rule prohibiting depositors from earning interest on their checking accounts.

Automatic Transfer Service Accounts—ATS Accounts (Part of M1 and M2)

ATS accounts give depositors "automatic transfer service" from their savings accounts to their checking accounts. They enabled banks during the 1970s to evade a federal rule prohibiting depositors from earning interest on their checking accounts.

With ATS accounts, depositors open two accounts at their banks, namely, interest-earning savings accounts and non-interest-earning demand deposits. All their deposited funds are placed into the interest-earning savings accounts, with the non-interest-earning checking accounts carrying zero balances.

Customers are then allowed to write checks on the accounts with zero balances. To prevent these checks from bouncing, depositors authorize their banks to transfer funds, as needed, from their savings accounts to their demand deposits. In this way, depositors have the convenience of checking accounts and the interest earnings of savings accounts.

Credit Union Share Drafts (Part of M1 and M2)

Credit union share drafts are interest-earning checking accounts (like NOW accounts) offered by credit unions.

Savings Deposits (Near Money - Part of M2)

Savings deposits are interest-earning deposits on which checks cannot be written. They are generally open-ended, which means depositors can withdraw or deposit any amount they wish, but banks do have the ability to require a short waiting period before honoring withdrawals (though they seldom do). Savings deposits are less volatile and have relatively lower reserve requirements than checking accounts. Therefore, financial institutions are generally able to offer higher interest rates on savings deposits than they can on checking deposits.

Small Time Deposits (Near Money - Part of M2)

Small time deposits are interest-earning accounts with fixed maturities and values less than $100,000. Because early withdrawals carry interest penalties, these deposits are less volatile sources of funds for financial intermediaries than checking accounts and savings accounts. They also have relatively lower reserve requirements than checking accounts. Therefore, small time deposits usually earn higher interest rates than checking accounts.

Money Market Mutual Funds (Near Money - Part of M2)

Money market mutual funds permit investors to pool their funds in large financial institutions, which buy and manage large-denomination, high-interest-earning securities that a single investor might not be able to afford, such as $1 million Eurodollar deposits or large repurchase agreements. Because these funds purchase many securities, they give small investors the ability to diversify their portfolios far beyond what they could do individually. Technically, depositors are buying shares of money market mutual funds and receiving dividends (rather than interest) as their returns. Depositors/investors can write checks on these accounts, but such privileges are typically limited in some ways, such as a minimum amount per check or a maximum number of checks per month.

Money Market Deposit Accounts (Near Money - Part of M2)

Money market deposit accounts were created to help banks compete with money market mutual funds. Previously, banks were required to bear more stringent regulatory burdens than nonbank financial intermediaries offering money market funds. Under the Garn–St. Germain Act of 1982, banks were given the right to offer deposits equivalent to money market mutual funds. Unlike money market mutual funds, money market deposit accounts are federally insured.

Conclusion

Money is useful because it serves as a unit of account, medium of exchange, and store of value, but its usefulness does not necessarily increase by creating more of it. Once a nation has enough money to meet its basic needs, more is useful only if it increases production, jobs, or efficiency. Money is not something that needs to be ordained by the government. Instead, the public uses whatever financial instruments it finds most convenient.

Due to the strong link between changes in a nation's money supply and changes in spending, there is widespread interest in knowing the best way define it, how fast the money supply is growing, and how quickly it should grow. Central bankers want to measure money so they can prevent excessive liquidity, which would lead to inflation, and insufficient liquidity, which might trigger recessions. For planning purposes, business executives are equally interested in knowing how the money supply will change in the future. Increases portend greater nominal purchasing power and credit availability, both of which influence prominent macroeconomic variables, such as nominal interest rates, exchange rates, prices, and wages.

Each central bank can define its nation's or currency area's money supply, but the definitions they use are not static. Instead, they change as new financial instruments are introduced and old ones are abandoned. If the goal is to define money in a way that reflects potential purchasing power, then the invention and use of new financial assets will continuously stimulate the need for finding the most appropriate money supply measures.

Key Points

- Money is an economic lubricant that makes economic transactions more efficient.
- Trust is the key to money's acceptability.
- Fiat money is not backed fully by a commodity, such as gold or silver, which means it may have no intrinsic value.
- Changes in the money supply affect a nation's nominal purchasing power.
- Keynesian theory focuses on the indirect link, via real interest rates, between money supply changes and fluctuations in spending.
- Monetarist theory focuses on the direct link between money supply changes and fluctuations in spending.
- The financial assets included in a country's money supply should have close connections to the nation's spending and be reported frequently.
- Liquidity is the ability to convert an asset into cash quickly and without substantial loss of value.

- M1 includes currency in circulation and checking deposits.
- M2 includes all the financial assets in M1 plus near money.
- Banks hold reserves to back deposit liabilities. All excess reserves can be safely lent.
- The monetary base includes currency in circulation plus the reserves of financial intermediaries.
- In the United States, bank reserves include cash in the vault plus financial institutions' deposits at the Federal Reserve. For the rest of this book, we will assume (worldwide) that bank reserves equal cash in the vault and deposits at the central bank.

Review Questions

1. In Hungary after World War II, goods and services were purchased with pengös (the domestic currency), but inflation was so high that prices were quoted in dollars. What functions of money were pengös fulfilling in Hungary? What functions were dollars fulfilling? Briefly explain.
2. What effect will each of the following transactions/events have on the monetary base and M2 money supply? Briefly explain.
   a. You take a $20,000 loan (in the form of a check) from the Bank of America and use it to buy a new car.
   b. The car dealer in Question 2a. places the $20,000 in her checking account.
3. In the following cases, what happens to the size of M1, M2 and the monetary base as a direct result of each transaction? *(In Chapter 8, "Money Creation" we will introduce the money multiplier. Some of the following transactions may affect this multiplier. Please do not consider these potential multiplier effects in this exercise.)*
   a. You deposit $5,000 cash into your checking account at Wells Fargo Bank.
   b. You take $1,000 out of your checking account and put them into a savings account.
   c. A firm borrows $50 million from angel investors.
   d. The U.S. government collects $30 million in taxes.
   e. Citibank makes a $10 million loan (in cash) to a start-up company.
   f. The start-up company from the previous question repays the $10 million bank loan. (*There is no need to consider the interest expense.*)
   g. Bank of America makes a $300,000 mortgage loan to the Smith family, which is made in the form of a checking account.
   h. JPMorgan Chase purchases corporate bonds worth $5 million.
   i. Citizens Bank requests $100,000 in cash from the Federal Reserve for its ATMs.
4. Suppose Skip Tumalu deposits $400 cash in his checking account at a bank in Atlanta, Georgia. As a result of this transaction, what happens to the size of M1 and M2?
5. If U.S. residents take funds out of their checking accounts and put them into time deposits, explain what happens, if anything, to the size of M1, M2, and the monetary base.
6. Which of the following statements (there could be more than one) is correct? If a statement is incorrect, provide a corrected version.
   a. To calculate the monetary base, one must add currency held both inside financial intermediaries and outside financial intermediaries to the deposits that financial intermediaries hold at the central bank.

b. To calculate the monetary base, you do not have to know the level of customer deposits in the banking system.
c. To calculate the monetary base, one must determine only the amount that financial intermediaries hold in reserves, as the two terms (i.e., monetary base and reserves) mean the same thing.

Discussion Questions

7. Should a nation's money supply be backed by a commodity such as gold? What are the advantages, and what are the disadvantages?
8. Why do nations measure their money supplies?
9. In terms of the functions of money, is there really any functional difference between M1 and M2?

Chapter 7
Financial Intermediation

For most businesses, having sufficient access to lines of credit at banks or other financial institutions is as essential to their health and survival as adequate access to water is for families. In the course of providing liquidity to businesses and individuals, financial intermediaries do more than just channel funds from lenders and savers to borrowers. They also act as independent money creators for the nation as a whole. The speed at which a nation's money supply changes is important because it affects the rate and sustainability of real economic growth and development, as well as inflation. A central bank's job is to ensure that the money supply is not growing so slowly that it causes a recession or too rapidly that it causes unwanted inflation.

Central banks control financial intermediaries by regulating and supervising both the structure and size of their balance sheets. This chapter discusses the bank assets and liabilities that are important to the money creation process, as well as the vital role that a nation's check-clearing process plays in our financial system. *The Rest of the Story* section of this chapter discusses how companies use check clearing in their cash management systems, the process of international check clearing, financial *dis*intermediation, and ten major causes of bank failures.

The Basics

Financial Intermediaries

What role do financial intermediaries play in an economy? Why do people place funds in financial intermediaries, such as banks and thrift institutions[1] when they could lend directly to borrowers and earn higher returns?

Direct Versus Indirect Financing

To frame our discussion, let's divide the economy into two segments, with ultimate lenders and savers (lenders/savers) on one side and ultimate borrowers on the other side (see Figure 7.1). When funds flow directly from lenders/savers

1 Examples of thrift institutions are savings and loan associations, savings banks, and credit unions.

https://doi.org/10.1515/9781547401437-007

to borrowers, they engage in *direct financing*, such as when companies make new stock or bond issues. Rather than borrow deposited funds, which are pooled in financial intermediaries, these companies acquire funds from national and international stock and bond markets.

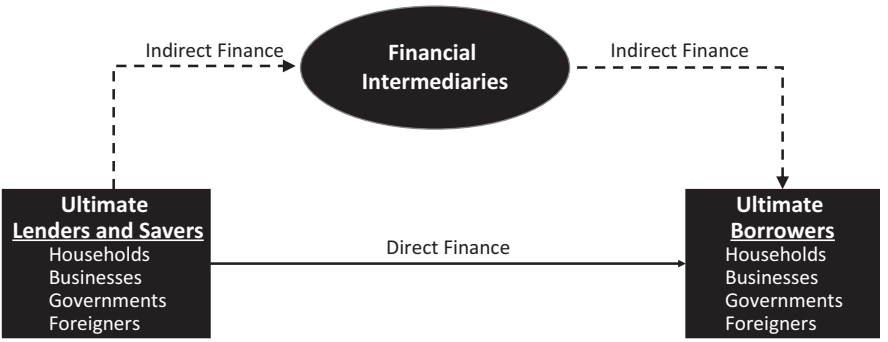

Figure 7.1: Direct and Indirect Finance.

Borrowers that directly tap financial markets use the services of financial institutions, such as investment banks, and pay fees for their services, but the source of these borrowed funds is from the market and not from the investment banks. By contrast, financial intermediaries pool funds and lend to customers, which adds a layer of costs that are not incurred with direct finance. A primary goal of this section is to explain the benefits that lenders/savers and borrowers derive from using financial intermediaries and why the net benefits of doing so are likely to be greater than the costs that financial intermediaries charge.

Value-Added of Financial Intermediaries

Financial intermediaries provide nations with many essential services. Among them are:

1. Pooling savers' funds and supplying them to individuals and businesses in need of liquidity
2. Offering services, such as efficient payment administration and systems
3. Engaging in maturity transformation, by taking in funds with short-term maturities, such as checking accounts, and placing them in assets with longer-term maturities, such as mortgages and auto loans

4. Monitoring borrowers' credit
5. Moderating financial risks through diversification
6. Protecting deposited funds and customers' identities

Among the many participants in the network of financial institutions are brokerage firms, central banks, commercial banks, credit unions, financial advisors, insurance companies, internet banks, investment banks, investment trusts, factoring services, investment trusts, mortgage companies, mutual funds, pension funds, retail banks, and savings and loan associations. The particular functions that each offers depend on the type of customer it was created to serve. While their purposes may vary, their overall value hinges on how efficiently and effectively they channel funds from those who have excess liquidity to those who need it and are both willing and able to pay.

Financial Intermediaries and Financial Risks

Among the significant financial risks to intermediaries are liquidity, credit, and market risks.

Liquidity Risk

Liquidity risk is the chance that a financial intermediary will be unable to pay its immediate bills. This inability could be caused by a lack of borrowing power or insufficient access to funds because available assets cannot be sold quickly and without substantial loss of value. Liquid securities are ones traded in large volumes each day. For their owners, selling these assets is relatively easy because their transactions are an insignificant part of the overall volume. By contrast, lightly traded securities present liquidity risks because investors cannot be sure these assets can be sold quickly and at firm prices. Deposits of financial intermediaries are highly liquid because depositors have almost instant access to them.

Credit Risk

Credit risk (also called default risk) is the chance that a borrower will be unable or unwilling to repay its debts, thereby leaving lenders/savers with worthless or devalued financial assets. These risks are based on the creditor's solvency, operational performance, and continued access to liquidity. A valuable function of financial intermediaries is their expertise in evaluating credit risks. Strong governments usually have very high credit ratings and low credit risks because their debts are denominated in home-country currencies, which they

can tap via taxation or their ability to print money.[2] For them, savers and lenders do not need financial intermediaries to provide expert credit-risk assessments.

A solvent company has total assets worth more than its total liabilities. Correctly forecasting a potential borrower's solvency is one of the primary functions of financial intermediaries and a key to their success because insolvency leads to bankruptcy and the possible loss of both interest and principal.

It is useful to keep in mind the differences between credit risk and liquidity risk. Solvent companies can (and do) fail from a lack of liquidity. For example, consider a company that has borrowed to purchase real estate and long-term bonds. It may be solvent because its total asset values exceed total liabilities, but an urgent need for cash could threaten the company's survival if it does not have access to short-term bank loans or liquid markets in which acquired assets can be sold. Illiquidity can also prevent companies from making significant strategic moves and threaten profitability due to the losses suffered by selling these long-term, illiquid assets at severely discounted prices.

Financial intermediaries need expertise in evaluating the credit rating of others, but they also need attractive credit ratings for depositors and investors to place funds in them. Typically, these institutions have relatively low credit risks because their loan and security portfolios are diversified. Risks to customers are often reduced even further by deposit insurance, as well as sensible and effective legislation and regulation. Furthermore, the market itself is a major regulator because poorly managed financial institutions tend to lose depositors—especially large depositors, such as institutional investors and wealthy individuals, whose balances exceed insurance limits.

Market Risk

Market risk is the chance that a financial asset's value will fall due to unfavorable movements in macroeconomic variables, such as interest rates, product prices, and exchange rates. Even government securities, which have almost no default or liquidity risk, may risk face market risk. If interest rates rise, the value of fixed-interest-rate securities falls. Customers with short-term deposits at financial intermediaries face minimal market risk. These accounts mature rather quickly.

2 By adopting the euro as their common currency, member countries of the European Monetary Union (EMU) have given up their rights to create and control money, and they have handed over this power to the European Central Bank. Despite their powers to tax, there are EMU countries with credit ratings lower than some large multinational companies. The reason is clear. More than just money creation *or* taxing powers are needed for nations to have high credit ratings, as witnessed by relatively recent defaults occurred in Argentina (2001), Greece (2015), and Venezuela (2017).

If interest rates rise, depositors can roll over (i.e., redeposit) their maturing funds and earn higher returns. As a result, interest rate fluctuations do not affect the value of financial intermediaries' deposits as significantly as they affect the value of long-term, fixed-rate financial instruments, such as bonds.

Overview of a Typical Bank's Balance Sheet

A *balance sheet* records both the type and value of a company's assets, as well as the claims on these assets. Claims on a company's assets by non-owners are called *liabilities*, and the claims on these assets by the owners of the company are called *stockholders' equity*.

Two Helpful Accounting Relationships

Assets must be owned by someone, so an important accounting tautology (i.e., truism) is that the assets of a bank must equal the sum of its liabilities (outsiders' claims) plus stockholders' equity (insiders' claims) (see Figure 7.2). We call this "Accounting Tautology #1."

Assets ≡ Liabilities + Stockholders' Equity

The symbol ≡ means that the relationship is definitional (*i.e., a tautology*)

Figure 7.2: Accounting Tautology #1.

This accounting tautology is valid for all banks, in all countries, at all times. For example, if a bank had assets worth €100 million and liabilities equal to €80 million, its stockholders' equity must equal €20 million. The meaning is the same as saying that 80% of the assets belong to individuals outside the bank, and 20% belong to the bank's owners.

Ordinarily, the values attached to a bank's assets and liabilities are *book values*, which means they reflect the cost of these assets and liabilities at the time they were acquired. Valuing assets and liabilities at their historical prices is problematic because the older an asset, such as real estate or machinery, the more distorted its book value can be from its current market value. This difference could be significant because, in the event of liquidation, creditors and shareholders divide the resale value of the company at current market prices and not the book value. Therefore, creditors may not be fully compensated, and shareholders may end up with much less (or more) than they expected.

Because a bank's assets must equal its liabilities plus stockholders' equity, changes in its assets must equal changes in the sum of liabilities plus stockholders' equity (see Figure 7.3). We call this "Accounting Tautology #2."

Δ Assets ≡ Δ Liabilities + Δ Stockholders' Equity

The symbol Δ, which is the Greek letter delta, means "a change in."

Figure 7.3: Accounting Tautology #2.

The tautological relationship between changes in assets and changes in the sum of liabilities plus stockholders' equity is worth remembering because it highlights the fact that a bank can acquire new assets only by increasing its liabilities or stockholders' equity. In other words, the *sources of funds* for a bank come from increasing liabilities and stockholders' equity, and the *uses of funds* go toward acquiring assets. A bank makes profits only if there is a positive difference (i.e., spread) between the average cost of its sources of funds and the average return on its uses of funds (see Figure 7.4).

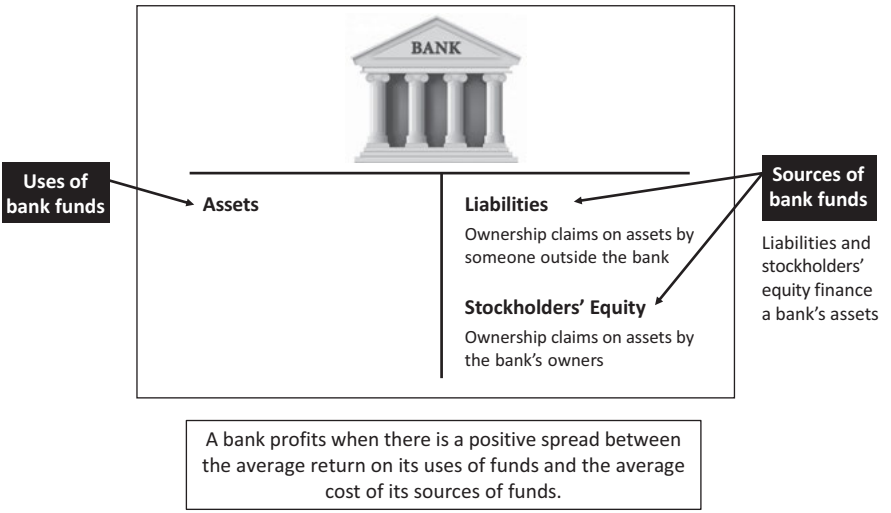

Figure 7.4: Sources and Uses of Bank Funds. (Imagery used: © Sarah Maher/123rf)

Bank Assets, Liabilities, and Stockholders' Equity

Figure 7.5 shows the major assets of a typical bank, along with its liabilities and stockholders' equity. To more fully understand the business of banking, let's describe each of them, which will dovetail into our discussion of check clearing.

Assets	Liabilities + Stockholders' Equity
Reserves – Cash in the vault – Deposits at the central bank **Loans** – Principal and interest due **Securities** – Bonds, bills, and notes **Deposits at other banks** – Called the "interbank market" – In the U.S., called the "federal funds market **Other assets** – Buildings, computers, and other	**Deposits** – Checking deposits – Savings deposits – Time deposits – Certificates of deposit **Borrowing from the central bank** – Interest charged is called the "discount rate" **Borrowing from other banks** – Called the "interbank market" – In the U.S., called the "federal funds market" **Stockholders' equity** – Also called "Shareholders' equity" – Also called "Owners' equity" – Also called "Capital account"

Figure 7.5: A Typical Bank's Balance Sheet.

Bank Assets

Reserves

Reserves are assets banks hold for three primary reasons: namely, to (1) meet regulatory requirements (i.e., "reserve requirements"), (2) satisfy customer demands for cash, and (3) facilitate check clearing. Central banks or governments determine both the minimum reserve requirements for banks and the particular assets that qualify as reserves.[3] For example, in the United States, only cash in

3 The U.S. Federal Reserve gives interest on the deposits of banks. Because the Fed is unlikely to become insolvent or illiquid, these deposits are virtually risk-free. Nevertheless, as interest rates rise and the differential between safe Fed deposits and riskier loans and securities rise, this opportunity cost increases.

bank vaults and bank deposits at the central bank (the Federal Reserve) count as reserves. Cash earns no interest return, and deposits at the Federal Reserve receive a relatively low yield compared to other asset alternatives, such as loans. As a result, banks that hold more reserves than required could be trading off profitability for safety and liquidity.

Required reserves are usually set as a fixed portion of a bank's deposit liabilities, with the most volatile sources of funds burdened with the highest required reserve ratios. For example, the reserve ratio on checking accounts (the most volatile deposits) might be 10%, while the required reserve ratio for savings accounts is 2% or even 0%.

Before ending our discussion of bank reserves, it is useful to highlight two key points. First, the cash held in banks' vaults is not part of a nation's money supply. When cash is deposited in a bank, the funds move from "currency *in* circulation," which is a part of the money supply, to "currency *out of* circulation," which is not. Second, reserves are needed not only to meet banks' reserve requirements and to satisfy depositors' demand for cash, but also for the check-clearing process. An efficient check-clearing system is crucial to the health and well-being of any nation's financial system. Understanding check clearing is also essential for conceptualizing how banks and the banking system create money, which is why it is included as a separate section of this chapter.

Loans

Banks make short-, medium-, and long-term loans to businesses and individuals. Businesses of all sizes borrow from banks for a variety of reasons. For instance, many small- and medium-sized companies lack the credit ratings and widespread name recognition needed to tap the financial markets directly, so they use banks as their primary funding sources.

Large companies also use banks even though they have direct access to the financial markets through their ability to issue financial instruments, such as commercial paper, notes, bonds, and shares. Large companies use banks for financing short-term, operational cash flow imbalances, such as working capital to finance inventories and accounts receivable. Usually, this borrowing and lending process is simplified by companies arranging lines of credit with their banks. When funds are needed, they draw funds from available credit lines.

To protect themselves, banks must keep a careful watch on customers' financial health and changes in business conditions. If a company fails to uphold the banks' borrowing agreements, its credit lines are likely to be reduced. Big customers with large, safe capitalization levels and healthy credit ratings get the largest credit lines, but banks protect themselves by putting maximum limits on the lines they extend to any individual customer. Typically, these limits are set

relative to the stockholders' equity of banks. For example, the maximum line extended to any one customer may be limited to 15% of a bank's stockholders' equity. Therefore, if the bank had $100 million in stockholders' equity, its maximum credit exposure to any individual customer would be $15 million. Maximum limits on credit lines are imposed, so the failure of a large customer does not significantly impair or bankrupt the financial institution. They are also imposed to ensure that large customers do not have an undue influence on banks. Consider the old saying: "If you owe a bank $100, the bank owns you, but if you owe a bank $100 million, you own the bank."

Banks also make short-term and long-term loans to individuals. The short-term ones finance purchases of goods and services, such as cars, appliances, and vacations. Long-term loans are for expenditures, such as mortgage financing for houses and condominiums.

Securities

Securities are classified into two categories: debt instruments and equities (i.e., stocks). Debt instruments earn interest returns but offer no ownership rights in the companies that issue them. Interest-earning securities have reimbursement priority when companies fail and their assets are liquidated.

Equities offer ownership rights in the companies that issue them. They provide two potential sources of income to the equity holders, namely, dividends and capital gains. If a company declares bankruptcy, equity holders have the lowest order of reimbursement priority upon liquidation.

In some countries, like the United States, banks' ability to own stocks is restricted. One reason for this restriction is to ensure that financial institutions do not play disproportionate roles in the management and governance of nonfinancial companies. These restrictions are also imposed to avoid possible conflicts of interest. For example, if a large customer is performing poorly and needs additional funding, a shareholder bank might feel compelled to extend loans to the ailing company just to keep it alive. These loans may not be in the best interests of the bank's depositors and shareholders.

Deposits at Other Banks

Interbank borrowing and lending is vital to banks' liquidity management. Every bank employs at least one money trader whose job is to borrow when the bank has temporary shortages of funds and to lend when it has surpluses. Banks borrow and lend in the interbank market throughout the working day. Most of these transactions have overnight maturities, but longer-term deposits are frequently transacted.

Picture yourself as a money trader in a bank. It is 10:00 a.m., and a large deposit has just been made. Having no immediate need for the funds, such as for financing loans or funding the purchase of securities for the bank's portfolio (also known as the *nostro account*), your job is to invest these funds as soon as possible so that the bank can start earning a return on them. The interbank market provides money traders with a large-volume, low-margin market on which funds can be transferred almost instantaneously.[4] This market is also significant for bank regulators because changes in interbank interest rates are often good reflections of the relative availability of funds in the banking system.

Other Assets

Banks have hundreds of other assets, such as buildings, land, furniture, supplies, and computer equipment. Because these assets are not closely related to the money creation process, we will not discuss them and, instead, turn our attention to the major bank liabilities.

Bank Liabilities

Banks have many potential sources of funds. One of the main ones is from deposits, from both domestic and foreign customers, in the form of checking-, savings-, and time- deposits/accounts. Banks also borrow from other banks and the central bank.

Deposits

Checking Accounts: Checking accounts, checking deposits, checkable deposits, and transaction accounts are just different names for the same financial liabilities of banks. From a bank's perspective, checking accounts are vulnerable sources of funds because they can be withdrawn immediately and without notice. Demand deposits, which are checking accounts owned mostly by companies, got their name because they can be withdrawn "on demand."

Because checking accounts are highly liquid and vulnerable sources of bank funds, they earn relatively little (or no) interest. The longer a bank can be assured that funds will remain in place, the higher the interest it is willing and able to pay for these funds. As mentioned in the previous chapter, checking accounts are included in the M1 and M2 money supply definitions.

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4 In the United States, the interbank market for lending and borrowing is called the federal funds market. The adjective "federal" is used because the funds are transferred daily between bank accounts located at the Federal Reserve System (i.e., the U.S. central bank). This market is not related to the U.S. federal government.

Savings Deposits: Savings deposits are more stable sources of funds for banks than checking accounts because they are usually kept on deposit for extended periods. In contrast to checking accounts, savings accounts are not available to depositors on demand. Even though most of us have never been denied access to our savings accounts when we wanted to withdraw funds, banks have the right to deny access for short periods.

Depositors cannot directly spend savings deposits. Instead, they must first withdraw the funds in cash or transfer them to checking accounts. As a result, savings deposits are not as liquid as checking accounts and, therefore, earn higher rates of interest than checking accounts. In the United States, savings accounts are included in the M2 definition of money but not in M1.

Time Deposits: Time deposits are interest-earning accounts with fixed maturities. Early withdrawals usually trigger interest penalties, which makes them less liquid than savings deposits. Because they are less volatile than either checking deposits or savings deposits, time deposits usually earn higher interest returns than savings accounts. In the United States, small time deposits (i.e., $100,000 or less) are included in the M2 definition of money but not in M1. Small time deposits are considered to be more closely connected to spending than large time deposits, which are often owned by institutional investors.

Borrowings from Other Banks

We have already discussed how money traders at banks deposit surplus funds in other banks. Borrowing from other banks is the other side of the coin because banks borrow on the interbank market when they are short of funds. For example, if the credit department of a bank extended a jumbo loan to a corporate customer, the money trader would be contacted to secure the needed funding. If the funds were not available internally, the money trader could finance the loan temporarily by borrowing them in the interbank market.

Borrowings from the Central Bank

Banks do not have to rely on deposits from customers or the interbank market as their sole sources of financing. They can also borrow from the central bank, and the interest rate charged on these loans is called the *discount rate*. Discount loans are for short periods and collateralized with acceptable ("eligible") securities. This rate is set by a nation's central bank rather than by market forces of supply and demand. We will discuss the discount rate more thoroughly in Chapter 9, "Central Banks."

Stockholders' Equity

Stockholders' equity (also called *shareholders*' *equity*, *owners*' *equity*, or the *capital account*) includes funds contributed to a bank by its owners (i.e., shareholders) in the form of paid-in equity and accumulations of undistributed profits earned by the bank. A bank is solvent only as long as its assets are worth more than its liabilities, which means a solvent bank has a positive stockholders' equity. To promote banking health and safety, regulators require banks to hold equity in proportion to their risk-weighted assets.[5]

With a bank's balance sheet in mind, let's turn our attention to check clearing. Every advanced nation has a highly sophisticated network of financial communication and transportation systems, which ensures that checks are cleared quickly, accurately, reliably, and efficiently.

Check Clearing

Check clearing is done through financial intermediaries called "clearinghouses"—central depositories in which banks deposit funds and through which checks are efficiently routed. When a check reaches a clearinghouse, two transactions occur. First, the account of the bank on which the check was written falls, and, second, the account of the bank where the check was deposited increases. For the clearinghouse, the net effect is zero. Funds owed to one bank are now owed to another.

In most countries, the central bank is an integral part of the clearing system. One of the most important clearinghouses in the United States is the Federal Reserve (the Fed), but U.S. banks also have the option of using private financial intermediaries if doing so is cheaper or more convenient.

Let's use an example to help explain the check clearing process. We will assume the Federal Reserve is the clearinghouse for the two banks involved in the transaction (see Figure 7.6). Suppose John Johnson purchases a small sailboat from Maria Martin by writing a check for $1,000 on his account at Colonial Bank in Providence, Rhode Island. Suppose further that Martin deposits the check in Sovereign Bank, Boston. At the end of the day, Sovereign Bank would send Johnson's check (along with all the other checks deposited that day) to

5 These regulations are part of an international effort, called the "Basel Accords."

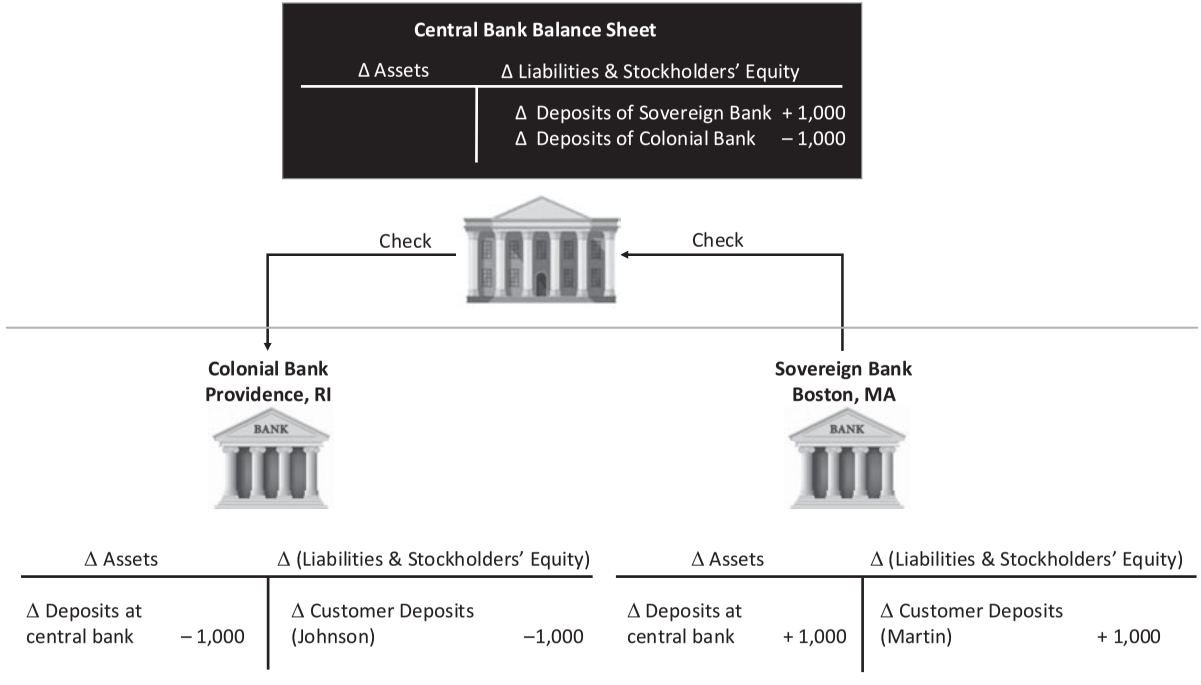

Figure 7.6: Check Clearing Through the Central Bank. (Imagery used: © MicroOne/Shutterstock; © Sarah Maher/123rf)

the Fed.[6] When the Fed receives Johnson's check, it would increase Sovereign Bank's account by $1,000 and reduce Colonial Bank's account by the same amount.

Sovereign Bank would now have a new liability in the $1,000 it owes to Martin, and it would have a new asset in the $1,000 deposit at the Fed. Because deposits at the central bank count as reserves, Sovereign Bank would have $1,000 of additional reserves.

Upon receiving the cleared check (or upon receiving notification that the check was written), Colonial Bank would reduce Johnson's account by $1,000 and reduce, by the same amount, its deposits at the Fed. Because Colonial Bank's reserves fell by the same amount Sovereign Bank's reserves rose, the banking system's total reserves and the U.S. monetary base would remain the same. Notice that check clearing does not affect the nation's money supply. Johnson's checking account fell at Colonial Bank by the same amount Martin's checking account rose at Sovereign Bank (see Figure 7.7).

Δ M2	≡	**ΔCC**	+	**ΔD**			+	**ΔN**
$0	=	$0	+	+Δ Martin's Checking Account +Δ Johnson's Checking Account Net	= = =	+$1,000 −$1,000 $0	+	$0
Δ M2 means a change in the M2 money supply Δ CC means a change in currency in circulation Δ D means a change in checking deposits Δ N means a change in near money deposits								

Figure 7.7: Effect of Check Clearing on the M2 Money Supply.

Today, in the twenty-first century, many countries have abandoned physical check clearing or migrated toward clearing checks electronically. As a result, processing times have been reduced, and efficiency has increased. Nevertheless, the basics are the same. In the clearinghouse, when the notification arrives, one bank's deposits increase, and another's decreases.

6 Actually, the check or electronic image would be sent to the Boston branch of the Federal Reserve System. The Boston Fed is one of 12 Federal Reserve banks in the Federal Reserve System.

The Rest of the Story

Financial Disintermediation

Financial *disintermediation* occurs when customers try to withdraw funds from the banking system and place them directly in nonbank assets or offshore accounts, which are either safer or have higher expected yields. If these withdrawals are swift enough, they are like solar plexus punches to affected banks, but instead of desperately gasping for air, their search is for liquidity.

In the past, financial disintermediation has been caused by misguided regulations and bank runs, which are often the result of lost customer confidence. More recently, the internet and introduction of cryptocurrencies, such as bitcoin, have presented disintermediation challenges to banks and their regulators. Let's consider each of these financial disintermediation causes.

Financial Disintermediation Caused by Regulations

Government or central bank regulations can cause financial disintermediation. For example, in the United States, Regulation Q was passed during the 1930s to restrict the yields that domestic banks could offer on deposits. This regulation was not a problem in most years because market interest rates remained below the ceilings, but during the 1970s they rose above the limit. As a result, depositors massively withdrew funds from banks and invested them in higher-earning, unregulated assets, such as Treasury bills and offshore deposits. As a result, the ability of many banks to finance commercial and mortgage loans was curtailed.

Financial Disintermediation Due to Bank Runs

The second type of financial disintermediation is due to bank runs, which are usually caused by fear and sometimes misinformation. A "run" occurs when there are heavy customer withdrawals from banks or other financial institutions, often due to concerns about the bank's solvency or liquidity. Most financial institutions have long-term assets and short-term liabilities, so runs increase the chances of default because these intermediaries do not have sufficient sources of short-term funding. Any hint that a bank or other financial intermediary will fail or delay making payments can spur an immediate reaction by customers to withdraw funds as quickly as possible and invest them in safer, nonbank assets. Some individuals choose to hold cash.

To meet these immediate customer demands, banks respond by using cash held in their vaults, withdrawing deposits at other banks, reducing excess reserves at the central bank, and selling other highly liquid assets. Usually, these

immediately salable assets are just a small fraction of total deposit liabilities and, therefore, are insufficient to meet the rising tide of demand. Adding to the problem are fear and panic, which reinforce each other, and can cause systemic shortages of funds in the financial system.

During the Great Depression of the 1930s, before U.S. bank accounts were insured, runs were rampant throughout the United States. Thousands of banks failed. Similarly, during the Great Recession from 2007 to 2009 and afterwards, despite having deposit insurance that covered most customers, runs caused the demise or acquisition of prominent banks and securities firms, such as Countrywide Financial (August 2007), Bear Stearns (March 2008), IndyMac (July 2008), and Wachovia (September 2008). In foreign nations, runs also occurred at well-known banks, such as Northern Rock in England (September 2007), Landsbanki in Iceland (October 2008), and Laiki Bank in Cyprus (March 2013).

Financial Disintermediation Caused by the Internet

The internet has challenged "traditional" banking in new and interesting ways. Web-based companies offer price, safety, and convenience benefits that have allowed them to compete in niche markets and forced banks to reconsider the fees they charge for connecting ultimate lenders/savers and ultimate borrowers.[7] The internet has been instrumental in moving countries, such as Sweden, Denmark, and Norway, toward cashless societies by using digital wallets.

Digital wallets are smartphone applications (apps) that allow users to make electronic payments, keep track of transaction histories, and remember both loyalty card and coupon information. They connect iPhones, iPads, and Androids to readers that are linked to bank accounts, credit cards, or debit cards. Some scan credit cards for just a few cents per transaction. Others allow users to transfer cash via media apps, such as Twitter and Facebook. These apps compete based on convenience and cost-effectiveness, such as offering digital banking services, hands-free checkout, automatic links to merchant credit cards, different levels of identity protection, and ease of bilateral payments among friends. Some have fees, limits on transaction sizes, or restrictions on the number of sending or receiving transactions per period. While the United States is well on its way to a "less-cash" society, countries such as Sweden are significantly ahead.

Internet competition, as it exists today, is just the tip of an ever-growing iceberg. Banks have reacted and will be sure to respond in the future to these

7 Among the most popular internet alternatives have been Apple Wallet, Cash App (formerly known as Square Cash), Chirpify, Dwolla, Google Wallet, iCache Geode, Lemon Wallet, PayPal, Snapchat, Venmo, and Zipmark.

challenges, but one point is clear: evolving technological capabilities are transforming our financial systems, which means the future is likely to be very different from the past.

Financial Disintermediation, Distributed Ledgers, Blockchain, Cryptocurrencies, and Smart Contracts

Distributed ledger technology, in general, and blockchain, in particular, seem destined to change the face of many industries—especially in the financial sector. Blockchain technology, on which numerous cryptocurrencies are based, has captured the imagination of many since it was first introduced in 2009 and has the potential to cause disruptive financial disintermediation.

Blockchain made its first appearance with the issuance of the cryptocurrency bitcoin in 2009 and is called a *distributed ledger* technology because the historic record of ownership is not held by any financial intermediary but rather by all network users. Blockchain creates a near-immutable series of data blocks showing historic ownership rights. For example, with a cryptocurrency such as bitcoin, the blockchain is a complete historic record of all the bitcoins created and all changes in ownership. When a new data block is added to the historic chain, existing bitcoin ownership rights change and new bitcoin ownership rights are added with increases in the cryptocurrency's supply.[8]

Both the historic chain and new data block have associated "hashes," which are like electronic fingerprints. Individuals and businesses, called "miners," work to match the historic hash (fingerprint) with the new data block's hash (fingerprint) and also meet additional constraints, which are intended to make the creation of a new block difficult. This mining process is expensive and competitive. The miner who manages to match the fingerprints and satisfy the additional hurdles, which is a process called "proof of work," allows a new data block to join the old data chain. For these efforts, the successful miner earns new bitcoins as a reward and the bitcoin money supply grows.

Transaction verification is done by a system of *consensus*, which starts with miners competing to match hashes (i.e., electronic fingerprints) and ends with all miners agreeing that the new data block is valid. One major feature of the distributed ledger technology is it prevents a cryptocurrency, such as bitcoin, from being double-spent. A significant benefit is the technology permits peer-to-peer transactions, thereby circumventing all financial intermediaries.

8 Using bitcoin's algorithms, individuals and businesses reveal only their complex computer addresses (public keys), rather than their legal identities.

This technology holds the promise of substantial cost savings—especially if it is combined with smart contracts, which are set up under a given set of mutually agreed upon rules and permit automatic contract execution and enforcement (i.e., without human involvement). The results could be game changing, in terms of lower costs, superior compliance, greater counterparty transparency, and corruption abatement. At the same time, leaders in this area seems to be distancing themselves from creating smart contracts with settlement in volatile cryptocurrencies.

The combination of distributed ledger technology and smart contracts holds the potential for substantial financial disintermediation and disruption. If distributed ledger technology allows users to circumvent financial intermediaries, and smart contracts allow agreements without human involvement, then what is the fate of existing intermediaries and of individuals who approve contracts, underwrite insurance, provide legal advice, clear checks, or render mortgage brokering services? Is the threat that any transaction requiring intermediation can (and will) be replaced by a smart contract?

Like the internet, blockchains that support cryptocurrencies can be viewed as information networks that offer users a variety of attractive product attributes, among which are protocols on which new and better financial applications can be built. To gain widespread acceptance, a cryptocurrency needs public trust, which means *trust* it will be accepted for the purchase of for goods and services, *trust* that it will be accepted for debt and tax payments, and *trust* that the currency will retain its value.

The advancement of distributed ledger technology and cryptocurrencies has come with some distinct problems. First, the paucity of crypto legal standards has opened the door to tax avoidance, money laundering, ransomware, market manipulation, cyberattacks on cryptocurrency exchanges, conflicts of interest, spoofing, commingling of cryptocurrency funds, shilling, and questionable accounting practices. Because cryptocurrencies, like bitcoin, have no lender of last resort, systemic risks associated with cryptocurrency runs are also present. With time and the continued movement toward legacy financial structures, cryptocurrency standards should materialize, which encourage transparency, consumer protection, accountability, and self-regulation.

International Check Clearing

To clear checks internationally, banks follow an almost identical process as clearing them domestically. The only difference is the first step. Foreign banks plug into the domestic check-clearing system through correspondent banks. To

see how, let's modify our last example by assuming that John Johnson visited Zurich, Switzerland, where he bought a $1,000 sailboat from Heidi Meier, a Swiss resident who banked at Credit Suisse in Zurich.

At the end of the day, after Meier deposited Johnson's dollar-denominated check, Credit Suisse would send it (along with all the other U.S. checks deposited that day) to its correspondent banks in the United States. Suppose that Sovereign Bank was one of Credit Suisse's correspondent banks. When Sovereign Bank received Johnson's check, it would increase Credit Suisse's deposits by $1,000 and send the check to the Fed for clearing. Once the check was cleared, Sovereign Banks's account at the Fed would increase by $1,000. Therefore, Sovereign Bank would have a new liability to Credit Suisse for $1,000 and an equal amount of new assets in its deposits at the Fed (see Figure 7.8).

Upon receiving the cleared check (or upon receiving electronic notification that the check was written), Colonial Bank would reduce both Johnson's account by $1,000 and its deposits at the Federal Reserve. In the end, Credit Suisse would have a new deposit liability to Heidi Meier equal to $1,000 and a new $1,000 asset in its correspondent bank deposits at Sovereign Bank in Boston.

Check Clearing and Company Cash Management

How does check clearing fit into companies' cash management systems? Are there opportunities to profit from the check-clearing process? Check clearing affects the period between when a check is written and when it is settled. Lengthening or shortening this period can influence profitability and the timing of cash flows. Therefore, clearing times should be considered by companies when they establish domestic and international cash management systems.

Companies have incentives to shorten the time it takes to collect receivables and to lengthen the time it takes to settle payables. In doing so, they can earn additional days of interest on bank accounts and marketable securities and postpone borrowing costs on credit lines. In businesses where transactions are often for millions of dollars, euros, yen, or pesos, shortening the receivable time or lengthening payable times by only a day or two can, after a year of accumulation, significantly affect a company's cash flows and bottom line.

Using Lockboxes to Shorten Receivable Collection Periods

One way to shorten the time it takes to collect receivables is by setting up lockboxes. A *lockbox* is simply a checking account that companies open at banks near their customers. Suppose your company is headquartered in

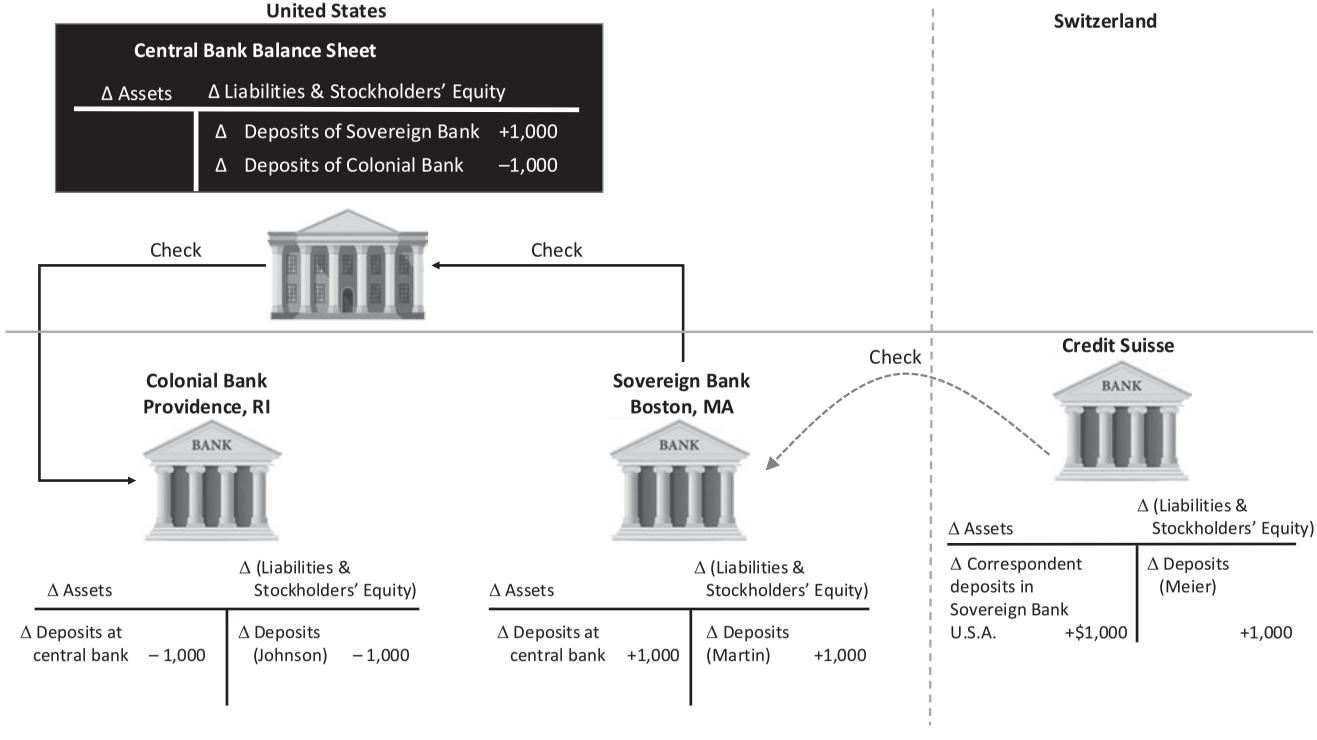

Figure 7.8: International Check Clearing. (Imagery used: © MicroOne/Shutterstock; © Sarah Maher/123rf)

New York City, but many of your customers are located in California. When customers pay their invoices, the checks they write may take two to three days before they arrive at your headquarters in New York City, and it may take another day or two before your accounting staff processes the checks internally and deposits them in a bank. Every day that a customer's check is in transit or being processed is a day of lost interest earnings. Lockboxes help to speed the collection process.

Instead of customers mailing their checks to New York City, they would be asked to send them to mailbox addresses in nearby towns, perhaps in the same city as the customers are located. For a fee, local banks clear out these lockboxes each day (or a few times each day) and credit your account with the receipts. Lockboxes can be used for national and international check-clearing purposes. Typically, companies with sound cash-management systems have lockboxes, online payments (whenever possible), and standing orders for their banks to sweep any surplus funds at the end of each working day into interest-earning deposits.

Using the Extended Disbursements Float to Lengthen Payables

The *extended disbursements float* is the time it takes between when a check is written and when it is cleared through the banking system. One way companies can lengthen this period is by writing checks on banks that are as remote as possible from their suppliers' headquarters, core banks, or lockboxes. For example, to pay suppliers located in San Francisco, a company might originate payments from a New York City bank. To pay suppliers in Tampa, Florida, it might originate payments from a bank in Nome, Alaska. Of course, cash management practices such as these could result in the loss of supplier goodwill because the payee loses the days gained by the payer. For this reason, many business payments are made electronically so that physical checks do not have to be processed and settlement is instantaneous.

Causes of Bank Failures

A vast majority of bank failures have been caused by a relatively small number of identifiable reasons.[9] The most common are as follows:

9 Sal Bommarito, "Financial Meltdown 101: 10 Reasons Why Banks Fail," *Mic*, June 27, 2012, https://mic.com/articles/10304/financial-meltdown-101-10-reasons-why-banks-fail#.YomOnYLSL (accessed May 25, 2019).

Nonperforming Loans

Ill-considered loans can be made to both insiders and outsiders. The results are the same. They reduce banks' future cash flows and profits by diminishing or eliminating both interest and principal repayments. The full impact of such losses falls on banks' thin equity bases, causing some to fail. Partial relief may come to banks that extend loans with collateral, which can be sold at market prices.

Lack of Liquidity

Banks fund long-term assets, such as mortgages, with short-term liabilities, such as checking accounts. This maturity mismatch can create liquidity problems when depositors demand back their deposits and banks do not have sufficient access to funds for repayment.

Excessive Balance Sheet Risks

Significant balance sheet risks are created when banks mismatch the maturities, currency denominations, or interest-rate resetting dates of their assets and liabilities. If fluctuations in market rates and prices are large enough, they can trigger bank failures.

Disproportionate Proprietary Trading

Banks that speculate by making poorly considered loans and investments with their own money (nostro accounts) can put at risk the deposits of customers. Relatively slender equity levels intensify threats to these financial institutions' financial health and solvency.

Pursuing Unprofitable Nonbank Activities

A wave of financial deregulation between 1980 and 2010 expanded bank activities into relatively unfamiliar areas, such as investment banking, consumer finance companies, real estate investment trusts, and leasing. The profitability and solvency of some banks were challenged by their lack of understanding and poor performance in these new territories. Many of these activities were managed through bank holding companies or subsidiaries.

Risk Management Mistakes

Banks measure their market risks with statistical, financial measures, such as value-at-risk and contingent value-at-risk analysis, but these measures have three significant problems, which have been at the heart of some significant financial fiascos. First, they assume the future will be like the past; second, they assume

returns are normally distributed around a constant mean; and finally, they assume the people interpreting these measures understand what they mean.

Excessive Speculative Use of Derivatives

Financial derivatives (contracts based on an underlying asset or set of assets) are like fire. If used properly, they can be highly useful and reduce bank risks; if not, they can be dangerous—even fatal. Due to their high leverage levels, changes in market prices of the underlying assets can cause considerable and quick changes in financial derivative values, which can threaten a bank's liquidity and solvency.

Rogue Employees

Giving employees both back-office and front-office responsibilities is a recipe for problems because it invites virtually undetectable fraud and deception—until it is too late. Prominent financial institutions, such as Barings Bank and Société Générale, have learned the hard way about risks and losses associated with employees who know the back alleyways between their financial accounts.

Regulatory Costs

Changes in regulations can burden banks with substantial compliance costs that make the continuation of operating activities impossible. The relatively recent trend in the United States to lighten regulatory burdens on community banks relative to large banks is evidence that regulatory costs can be onerous.

Bank Runs

Individuals and businesses, fearing their deposited funds are at risk, will withdraw them quickly and in vast amounts. Under these circumstances, virtually no bank could survive unless bailed out by a central bank or consortium of friendly financial institutions.

Conclusion

Financial intermediaries can compete with direct financing alternatives, such as debt and equity markets, because they offer a combination of risk and return benefits that would be hard to duplicate otherwise at reasonable costs. To lenders/savers, financial intermediaries help optimize their concerns about credit-, liquidity-, and market risks. To borrowers, financial intermediaries provide safe and continued access to reasonably priced liquidity. Most individuals, as well as small- and medium-sized companies, use financial intermediaries because they

cannot directly tap the debt or equity markets. Even large companies that can directly tap the financial markets often use financial intermediaries for their convenience and attractive short-term-funding costs. With the knowledge that we have gained of financial institutions' assets and liabilities, the check-clearing process, and financial markets, let's explore the money creation powers of banks and the banking system, which is the topic of Chapter 8, "Money Creation."

Key Points

- Deposits at financial institutions are generally convenient, low-cost, and safe investments, with relatively low credit-, liquidity-, and market risks.
  - Diversification, regulation, and market forces jointly help to reduce the credit risks of financial intermediaries.
- Banks earn profits when the average return on their uses of funds (i.e., assets) exceeds the average cost of their sources of funds (i.e., liabilities).
- Bank assets
  - The cash in bank vaults is not part of a nation's money supply.
  - Bank reserves are held to meet reserve requirements, satisfy customer demands for cash, and facilitate check clearing.
  - Bank loans and lines of credit are essential sources of liquidity for businesses of all sizes.
  - The interbank deposit market provides a convenient and safe way for banks to invest short-term funds.
- Bank liabilities
  - Checking accounts are the most liquid and potentially most volatile bank liabilities. Therefore, they usually have the highest required reserve ratio.
  - Savings deposits and time deposits are less liquid and potentially less volatile sources of funds for banks than checking deposits. Therefore, they usually have low required reserve ratios relative to checking accounts.
  - Banks can borrow short-term funds from the interbank market and from the central bank.
- Domestic Check clearing
  - Check clearing is done through clearinghouses, and central banks are usually major clearinghouses.
- Financial disintermediation occurs when customers attempt to withdraw funds from financial intermediaries. Among its causes are the loss of trust in a financial institution or financial system, regulatory limits on the interest rate banks can offer customers, internet banking, and use of cryptocurrencies.
- International check clearing
  - International check clearing is done through correspondent bank relationships.
  - Optimizing check-clearing times is an important consideration in any company's cash management system.

  - The extended disbursements float is the time it takes a check to clear. The longer the interval, the more access payers have to funds in their bank accounts and the less time payees have access to these funds.
- Most bank failures can be traced to about ten causes.

Review Questions

1. Why don't borrowers and lenders interact directly? What are the advantages of using financial intermediaries?
2. Which of the following is an example of direct financing, and which is an example of indirect financing?
   a. Fred Fornow borrows $20,000 to purchase a new car.
   b. Gloria Gregory deposits $10,000 in a money market mutual fund.
   c. DuPont Inc. makes a $100 million 10-year bond issue to finance the building of a plant in China.
   d. Henrietta Hernandez purchases $15,000 worth of Bank of America shares in a new stock issue.
   e. IBM issues $400 million in five-year notes yielding 6.5%. The notes are purchased mainly by foreign residents.
3. Explain credit-, market-, and liquidity risks.
4. Explain the type(s) of risk Lafayette Bank takes in the following examples.
   a. Lafayette Bank extends a one-year loan to Joe Johnson to purchase a new washer and dryer for his home.
   b. Lafayette Bank extends a 30-year, fixed-interest-rate loan to Joe Johnson for the purchase of a new home.
   c. Lafayette Bank extends a 30-year, floating-interest-rate loan to Joe Johnson for the purchase of a new home.
   d. Lafayette Bank purchases $100,000 in 10-year government bonds.
   e. Lafayette Bank purchases $200,000 in 10-year municipal bonds.
5. Explain the difference between insolvency and illiquidity.
6. Suppose XYZ Inc.'s equity was 100% of its assets (i.e., the company had no liabilities). Explain if it is possible for this company to default due to liquidity risk.
7. Under what circumstances, if any, is it possible for a bank's assets not to equal the sum of its liabilities plus stockholders' equity?
8. Is it true that the sources of a bank's funds must equal its uses? Explain.
9. Why does every bank have a vested interest in optimizing its reserve assets? What does a bank lose by keeping too many reserves? What does it risk by keeping too few reserves?
10. Why would a bank impose limits on the amount it lends to any single customer? What risk is it trying to mitigate?
11. When Bank A clears a check written on Bank B:
    a. What happens to Bank B's reserves and excess reserves?
    b. What happens to Bank A's reserves and excess reserves?
    c. What happens to the banking system's total reserves?

12. What is financial disintermediation?
13. Explain how government or central bank restrictions on banks' deposit rates could cause financial disintermediation.
14. What is a bank run?
15. What are lockboxes? How do they relate to a nation's check-clearing system? Why are they important to many companies' cash management systems?
16. Explain the extended disbursements float. How is it related to a nation's check clearing system? How can companies use it for cash management purposes?

Discussion Questions

17. Is it accurate to say that indirect finance exists mainly because of the encouragement given by governments and central banks?
18. How does diversification reduce risk?

Chapter 8
Money Creation

Using money is such a routine part of our daily lives that it is easy to overlook the fact that the *creation of money is a business*, which is conducted by financial institutions to make profits. Therefore, when central banks regulate their nations' money supplies, they also regulate financial intermediaries' profits.

This chapter discusses the money creation powers of financial intermediaries. Because most nations have a wide variety of them (e.g., commercial banks, savings banks, credit unions, and other thrift institutions), we will focus on those financial intermediaries that *take deposits and make loans*. As a group, we will call them "banks."

One of the best ways to understand the money-creation process and the power a single bank possesses to create money is by analyzing the effect a loan has on the bank's balance sheet and the nation's money supply. From this discussion, it is a natural step to discuss the money-creation powers of the *banking system*[1] and how it amplifies the powers of a single bank. In Chapter 9, "Central Banks," this foundation will be vital to understanding how central banks regulate financial intermediaries and, thereby, control their nations' money supplies.

The Basics

Creation of Money by a Single Bank

Banks have the power to change a nation's money supply. They do so by making loans and purchasing securities because these bank assets are paid for with newly created checking accounts or with cash from banks' vaults. Let's trace the effects that loans and security purchases have on a bank's balance sheet and then show the impact these changes have on a nation's money supply.

Figure 8.1 shows the balance sheet of First National Bank before making a loan. Notice that total assets equal $10,000 million, and the sum of the bank's liabilities plus stockholders' equity also equals $10,000 million.

1 The network of financial intermediaries that takes deposits and makes loans will be referred to as the "banking system."

https://doi.org/10.1515/9781547401437-008

First National Bank's Balance Sheet (*Figures in millions of dollars*)			
Assets		Liabilities & Stockholders' Equity	
Cash in vault	400	Deposit Liabilities	6,000
Deposits at central bank	500	Borrowing from the Central Bank	400
Loans	5,000	Borrowing from Other Banks	2,500
Securities	2,000	Other Liabilities	300
Other assets	2,100	Stockholders' Equity	800
Total assets	10,000	Total liabilities & stockholders' equity	10,000

Figure 8.1: First National Bank's Initial Balance Sheet: How Much Can It Lend?

First National Bank has total reserves, composed of cash in the vault and deposits at the central bank, equal to $900 million, but what is the minimum amount it is required to hold? To answer this question, we must know the banking system's required reserve ratio, which is set by the central bank.

The *required reserve ratio* is the portion of a bank's deposit liabilities that must be held as reserve assets (see Figure 8.2). We abbreviate this relationship as "RR/D," where RR is the abbreviation for required reserves, in the form of cash in the vault and deposits at the central bank, and D is the abbreviation for checking deposits. For example, if the central bank imposed a 10% reserve ratio, then for every dollar of deposit liability, a bank would be required to hold $0.10 in reserve assets.

Required reserve ratio ≡ Required reserves per dollar of deposit liabilities

Figure 8.2: Required Reserve Ratio.

Central banks regulate the reserves that financial institutions must hold in two important ways. First, they set and determine the required reserve ratio for each type of deposit liability. The reserve ratio usually varies from one deposit liability to another, depending on its perceived volatility (i.e., riskiness). For

example, the required reserve ratio for checking accounts is usually the highest because these deposits are considered the most volatile sources of bank funds. Savings deposits, time deposits, and other relatively stable bank accounts carry lower (sometimes zero) reserve requirements.

The second way central banks control the reserves that banks must hold is by defining which particular assets qualify as reserves. For instance, in the United States, only cash in the vault and deposits at the Federal Reserve qualify as reserves. U.S. banks are not required to hold reserves against stockholders' equity or non-deposit liabilities, such as borrowings from other banks or borrowings from the central bank. The Federal Reserve could change these rules at any time by allowing a broader range of assets to qualify as reserves or by requiring a wider range of liabilities to be backed by reserves.

Let's return to our example. Suppose the banking system's only deposit liabilities were checking accounts, and the central bank imposed a 10% reserve ratio (RR/D) on them. Because First National Bank's checking deposits equal $6,000 million, it would be required to hold reserve assets equal to $600 million. First National Bank is holding reserves equal to $900 million. Therefore, the extra $300 million are *excess reserves*, and a single bank can always safely lend its excess reserves without worrying about violating central bank regulations (see Figure 8.3). Let's see why.

(*Figures in millions of dollars*)						
Total Reserves	=	Cash in the vault 400	+	Deposits at Central Bank 500	=	900
– Required reserves	=	– Reserve ratio 10%	×	Checking Accounts 6,000	=	– 600
Excess Reserves	**=**	**Total Reserves**	**–**	**Required Reserves**	**=**	**300**

Figure 8.3: Calculating First National Bank's Excess Reserves.

Suppose First National Bank lent all its excess reserves (i.e., $300 million) to Alice Atwood for the purchase of Texas real estate owned by Bart Brewster (see Figure 8.4). What effect would this loan have on First National Bank's balance sheet and the nation's money supply? Let's examine two possible ways the loan could be made, namely, by lending cash or by creating a new checking account for Atwood, the borrower.

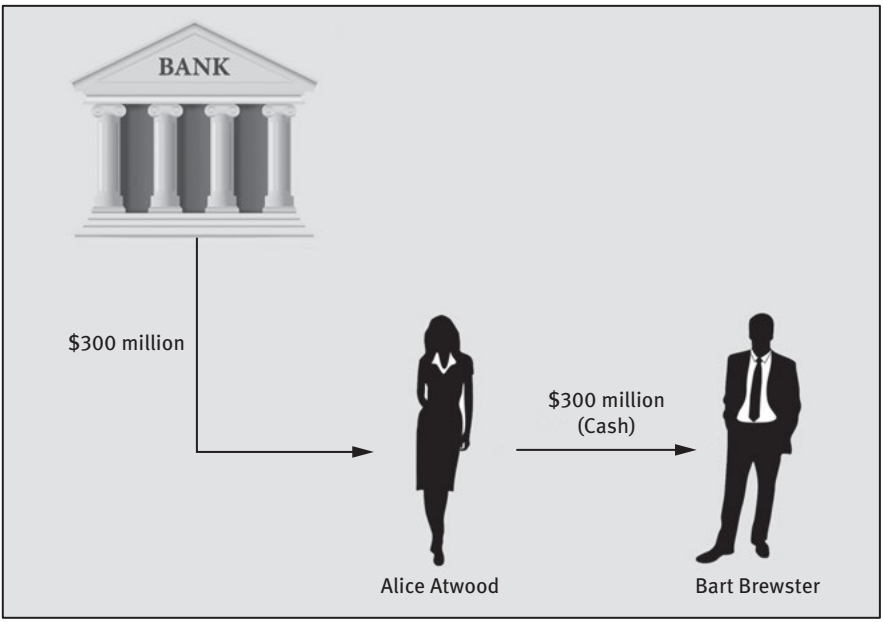

Figure 8.4: $300 Million Loan to Alice Atwood. (Imagery used: © Sarah Maher, liravega258/123rf)

Effects if the Loan is Made in Cash

Lending Atwood $300 million would change First National Bank's balance sheet in two ways. First, a loan to Atwood would increase the asset called "*Loans*" in First National Bank's balance sheet by $300 million. If the loan were made in cash, then the bank's "cash in the vault" would fall by $300 million. Figure 8.5 shows how this loan would change the composition of First National Bank's assets from noninterest-earning cash reserves to an interest-earning loan.

(*Figures in millions of dollars*)					
Δ Assets			**Δ (Liabilities and Stockholders' Equity)**		
Δ Cash in the vault	=	– 300			
Δ Loans		+ 300			
Δ Total Assets	**=**	**0**	**Δ (Total Liabilities and Stockholders' Equity)**	**=**	**0**

Figure 8.5: Changes in First National's Balance Sheet Due to the Cash Loan.

Lending $300 million in cash to Atwood would increase the M1 and M2 money supplies because the nation's "currency in circulation" would rise by that amount (see Figure 8.6).

(*Figures in millions of dollars*)						
ΔM1	**≡**	**ΔCC**	**+**	**ΔD**		
300	**=**	**300**	**+**	**0**		
ΔM2	**≡**	**ΔCC**	**+**	**ΔD**	**+**	**ΔN**
300	**=**	**300**	**+**	**0**	**+**	**0**

Figure 8.6: Effect on M1 and M2 of a $300 Million Cash Loan.

Figure 8.7 shows First National Bank's revised balance sheet after the cash loan. Because the bank lent all its excess reserves, First National Bank's lending power should be exhausted. Let's see if this is true.

(*Figures in millions of dollars*)			
Assets		**Liabilities & Stockholders' Equity**	
Cash in vault	**400 – 300 = 100**	**Checking Accounts**	6,000
Deposits at central bank	500	**Borrowing from the Central Bank**	400
Loans	**5,000 + 300 = 5,300**	**Borrowing from Other Banks**	2,500
Securities	2,000	**Other Liabilities**	300
Other assets	2,100	**Stockholders' Equity**	800
Total assets	**10,000**	**Total liabilities & stockholders' equity**	**10,000**

Figure 8.7: First National Bank's Balance Sheet After the Cash Loan.

First National Bank's total reserves are now equal to $600 million, and the bank's checking accounts have not changed. Thus, its required reserves (RR)

equal 10% of the $6,000 million deposit liabilities, or $600 million. Because First National Bank's total reserves equal its required reserves, excess reserves are equal to zero (see Figure 8.8).

(*Figures in millions of dollars*)						
Total Reserves	=	Cash in the vault 100	+	Deposits at Central Bank 500	=	600
– Required reserves	=	– Reserve ratio 10%	×	Checking Accounts 6,000	=	– 600
Excess Reserves	**=**	**Total Reserves** **600**	–	**Required Reserves** **600**	**=**	**0**

Figure 8.8: First National Bank's Excess Reserves After the Cash Loan.

Effects of a Loan if the Borrower Receives a Checking Account

Let's do the same exercise as in the last section, but this time we will consider what happens if First National Bank lends Alice Atwood $300 million, by crediting her checking account (rather than paying her cash). We will trace the effects on First National Bank's balance sheet as the loan is made, spent, and cleared. Afterward, we will calculate First National Bank's excess reserves. They should equal zero.

The loan to Atwood increases "*Loans*" in First National Bank's balance sheet by $300 million and, simultaneously, increases the bank's checking account liabilities to Atwood by $300 million (see Figure 8.9).

(*Figures in millions of dollars*)					
Δ Assets			**Δ (Liabilities and Stockholders' Equity)**		
Δ Loans to Atwood	=	+ 300	Δ Checking Deposits of Atwood	=	+ 300

Figure 8.9: Balance Sheet Changes for Loans Made with Checking Accounts.

Atwood then pays Bart Brewster for the Texas land, and Brewster deposits the check in his bank, which we will assume is the Second National Bank (see Figure 8.10).

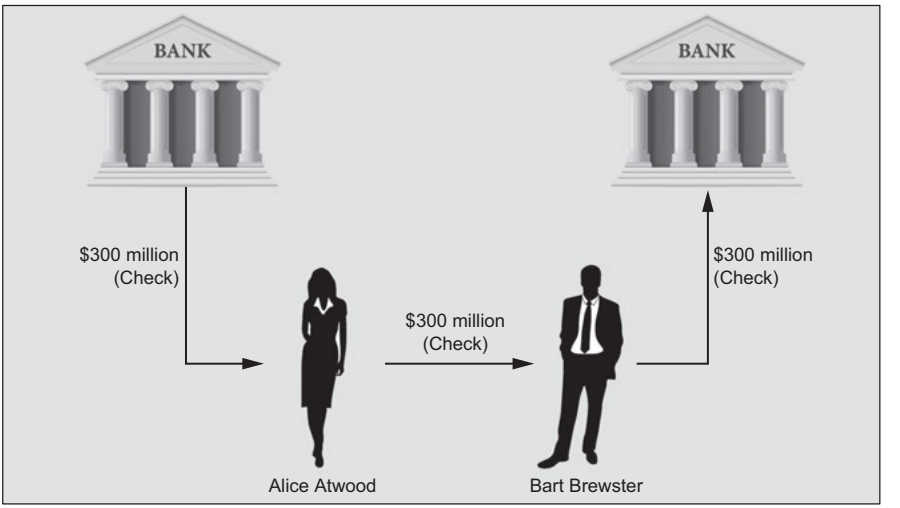

Figure 8.10: Bart Brewster Deposits Check in Second National Bank. (Imagery used: © Sarah Maher, liravega258/123rf)

At the end of the day, Second National Bank sends the check to the central bank for clearing. The central bank increases Second National Bank's account by $300 million and reduces First National Bank's account by an equal amount. Then, the central bank sends the check to First National Bank (see Figure 8.11).

As Figure 8.11 shows, when First National Bank receives the check, it reduces Atwood's checking account by $300 million and reduces its deposits at the Central bank by $300 million.

Figure 8.12 summarizes all the changes in First National Bank's balance sheet that are caused by the loan. When the loan is made, First National Bank's loans to Atwood rise by $300 million, and Atwood's checking account rises by $300 million. After the loan is spent and cleared, Atwood's checking account falls by $300 million, and First National Bank's deposits at the central bank fall by $300 million. Therefore, the net effect is for First National Bank's deposits at the central bank to fall by $300 million and its loans to rise by $300 million.

We can now calculate First National Bank's excess reserves to see if it has any additional lending power. Figure 8.12 shows that, after the loan has cleared, First National Bank's total reserves equal $600 million because cash in the vault and deposits at the central bank equal $400 million and $200 million, respectively. The bank's deposit liabilities equal $6,000 million. Therefore, First National Bank's required reserves also equal $600 million because it must

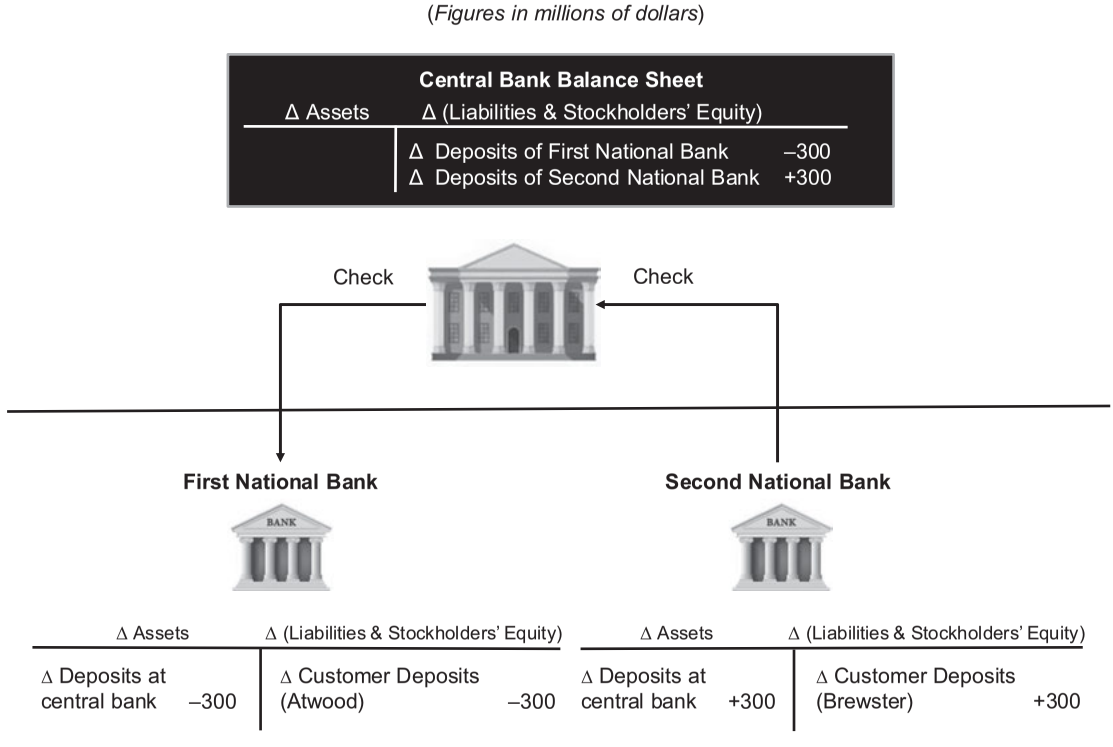

Figure 8.11: Check Clears from Second National Bank to First National Bank. (Imagery used: © MicroOne/ Shutterstock; © Sarah Maher/123rf)

(*Figures in millions of dollars*)			
Assets		**Liabilities & Stockholders' Equity**	
Cash in vault	**400**	**Former checking accounts**	**6,000**
Former deposits at central bank	**500**	**Atwoods's new checking account**	**+300**
Effect of cleared check	**–300**	***Effect after Atwood spends funds***	**–300**
New deposits at central bank	**200**	**New checking accounts**	**6,000**
Former Loans	**5,000**	**Borrowing from the Central Bank**	**400**
Loan to Atwood	**+300**	**Borrowing from Other Banks**	**2,500**
New Loans	**5,300**	**Other Liabilities**	**300**
Securities	**2,000**	**Stockholders' Equity**	**800**
Other assets	**2,100**		
Total assets	**10,000**	**Total liabilities & stockholders' equity**	**10,000**

Figure 8.12: Summary of Changes in First National Bank's Balance Sheet.

(*Figures in millions of dollars*)						
Total Reserves	=	Cash in the vault 400	+	Deposits at Central Bank 200	=	600
– Required reserves	=	– Reserve ratio 10%	×	Checking Accounts 6,000	=	– 600
Excess Reserves	**=**	**Total Reserves** **600**	**–**	**Required Reserves** **600**	**=**	**0**

Figure 8.13: First National Bank's Excess Reserves after the Loan Is Made, Funds Spent, and Check Cleared.

hold 10% of the $6,000 million in deposit liabilities. As a result, First National Bank's excess reserves equal zero (see Figure 8.13).

Figure 8.14 shows that when banks make loans using checking accounts, the *initial* effect on a nation's money supply is the same as when a cash loan is made. Atwood's loan causes the nation's checking accounts to rise by $300 million, and therefore, the nation's M1 and M2 money supplies rise by $300 million.

(*Figures in millions of dollars*)						
ΔM1	**≡**	**ΔCC**	**+**	**ΔD**		
300	**=**	**0**	**+**	**300**		
ΔM2	**≡**	**ΔCC**	**+**	**ΔD**	**+**	**ΔN**
300	**=**	**0**	**+**	**300**	**+**	**0**

Figure 8.14: Effect on M1 and M2 of a $300 Million Loan Paid in Checking Account Form.

Once a loan is made, the nation's money supply rises and stays elevated until the loan is repaid. When Atwood pays Brewster for the Texas real estate, Atwood's checking account at First National Bank falls by $300 million, but Brewster's checking account at Second National Bank rises by $300 million. Therefore, the net effect on M1 and M2 from using already-borrowed funds to purchase the real estate is zero. Settlement merely transfers the new $300 million checking account from Atwood to Brewster (see Figures 8.10 and 8.11).

Money Creation by Purchasing Securities

Banks with excess reserves can lend them, but they also have the option of purchasing securities with these funds. Securities can be acquired either with cash or checking accounts. Their purchase has the same effect on a nation's money supply as loans and have virtually the same impact on a bank's balance sheet. The only difference is that an asset called "*Securities*" increases instead of "*Loans*."

Understanding that banks have the alternative to lend or to purchase securities provides a useful insight into bank management. Suppose you were a bank manager with excess reserves to lend, but the economy was in a deep recession and loan demand was sluggish, despite low interest rates. What could you do with the excess reserves? One alternative is to invest the noninterest-earning or low-interest-earning excess reserves in interest-earning securities. Even if loan demand were strong, bank managers might decide to purchase securities to diversify their risks or provide needed liquidity, due to the deep secondary markets for marketable securities compared to loans.

Money Creation by the Banking System

After lending $300 million to Alice Atwood, First National Bank exhausted its ability to lend more, but the loan did not exhaust the banking system's ability to lend. Let's trace the lending potential of the banking system that was unlocked by First National Bank's loan.

Recall that Atwood's loan increased the M1 and M2 money supplies by $300 million. When Atwood paid Bart Brewster, the newly created checking accounts were transferred from First National Bank to Second National Bank. Brewster's deposit had the effect of increasing Second National Bank's reserves (i.e., deposits at the central bank) by $300 million, and increasing its checking account liabilities to Bart Brewster by $300 million (see Figure 8.15).

(*Figures in millions of dollars*)					
Δ Assets			**Δ (Liabilities and Stockholders' Equity)**		
Δ Deposits at central bank	=	+ 300	Δ Checking deposits of Brewster	=	+300

Figure 8.15: Changes in Second National Bank's Balance Sheet after Brewster's Deposit.

Of the $300 million in new deposit liabilities, Second National Bank must hold 10% (i.e., $30 million) as required reserves. Because Second National Bank's total reserves rose by a full $300 million, its excess reserves increased by $270 million (see Figure 8.16), and these funds can be safely lent without violating central bank reserve requirements.

(*Figures in millions of dollars*)						
Δ Total Reserves	=	Δ Cash in the vault 0	+	Δ Deposits at Central Bank +300	=	+ 300
– Δ Required reserves	=	– Reserve ratio 10%	×	Δ Checking Accounts +300	=	– 30
Δ Excess Reserves	**=**	**Δ Total Reserves** **300**	–	**Δ Required Reserves** **30**	**=**	**+ 270**

Figure 8.16: Second National Bank's Excess Reserves after Brewster's Deposit.

Suppose Second National Bank lent the entire $270 million to Carol Carter (CC) for the purchase of a steel mill owned by Douglas Durrant. After payment was made, suppose Durrant deposited the check in the Third National Bank. Figure 8.17 shows the changes in Third National Bank's balance sheet after the check cleared.

(*Figures in millions of dollars*)					
Δ Assets			**Δ (Liabilities and Stockholders' Equity)**		
Δ Deposits at central bank	**=**	**+ 270**	**Δ Checking deposits of Durrant**	**=**	**+ 270**

Figure 8.17: Changes in Third National's Balance Sheet after Durant's Deposit.

Third National would have $270 million in new deposit liabilities (i.e., checking accounts) and $270 million in new reserves (i.e., deposits at the central bank). Of these new reserves, Third National would be required to hold 10% (i.e., $27 million). As a result, Third National's excess reserves would rise by $243 million (see Figure 8.18).

(*Figures in millions of dollars*)							
Δ Total Reserves	=	Δ Cash in the vault 0	+	Δ Deposits at Central Bank +270	=	+270
– Δ Required reserves	=	– Reserve ratio 10%	×	Δ Checking Accounts +270	=	–27
Δ Excess Reserves	**=**	**Δ Total Reserves 270**	–	**Δ Required Reserves 27**	**=**	**+243**

Figure 8.18: Third National's Excess Reserves after Durrant's Deposit.

The initial $300 million of excess reserves at First National Bank would work their way through the economy and banking system in repeated *lend-spend-deposit* cycles. With each iteration of the cycle, the nation's money supply would increase by 90% of the change in deposits and reserves, and excess reserves would be whittled away by 10% of the change in total reserves. This process would continue until there were no excess reserves left. At that

point, the *banking system's* total reserves would be precisely equal to 10% of its total deposit liabilities.

Figure 8.19 shows that the total increase in loans would equal $3,000 million, which is the sum of the original loan, $300 million, plus continuously declining amounts equal to $270 + $243 + $218.70 + $196.83 + . . . and so on, until all excess reserves were eliminated and no more could be lent (see Column 5). Because the *total increase in loans (and checking deposits)* equals $3,000 million and the original amount of *excess reserves* was $300 million, the *checking-deposit multiplier* equals ten. In short, the checking deposit multiplier equals one divided by the reserve ratio (RR/D) (i.e., Checking deposit multiplier $\equiv \left(\frac{1}{Reserve\ ratio}\right) \equiv \left(\frac{1}{RR/D}\right) = \left(\frac{1}{0.10}\right) = 10$). See Figures 8.19 and 8.20).

(*Figures in Millions of Dollars*)

Column 1	*Column* 2	*Column* 3	*Column* 4	*Column* 5	*Column* 6
Bank	**Depositor**	**Checking Deposits**	**Required Reserves** 10%	**Amount Lent**	**Borrower**
First National				+$300.00	Alice Atwood
Second National	Bart Brewster	+$300.00	+$30.00	+$270.00	Carol Carter
Third National	Douglas Durrant	+$270.00	+$27.00	+$243.00	Evelyn Eaton
Fourth National	Fred Farnside	+$243.00	+$24.30	+$218.70	Greta Giro
Fifth National	Howard Huston	+$218.70	+$21.87	+$196.83	Irene Inman
...	...				...
...	...	Declines to zero	Declines to zero	Drops to zero	...
...	...				...
		Sum = $3,000	0	**Sum = $3,000**	

Figure 8.19: Checking Deposit Multiplier: Power of the Banking System to Create Money.

For now, it is best to think of a checking-deposit multiplier, which is equal to one divided by the reserve ratio (i.e., $\frac{1}{\left(\frac{RR}{D}\right)}$), as the *maximum possible* increase in checking accounts the banking system is capable of creating with a dollar of excess reserves. The next section explains what happens to the checking deposit multiplier when real-world constraints are considered.

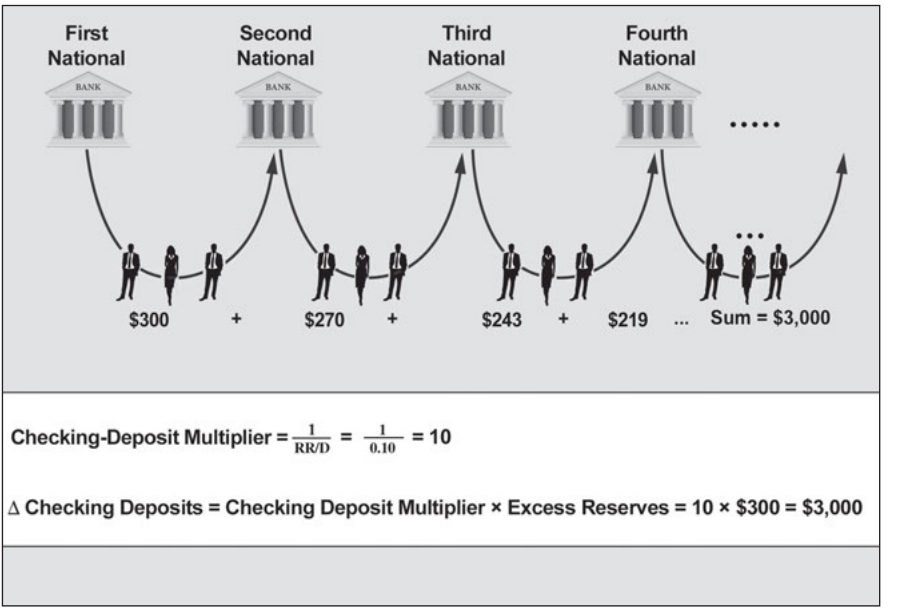

Figure 8.20: Lend-Spend-Deposit Cycle. (Imagery used: © Sarah Maher, liravega258/123rf)

A More Realistic Look at Money Multipliers

A few of the assumptions in our previous example were unrealistic. Let's highlight them and explain the effect that relaxing each assumption has on the checking-deposit multiplier. In the process, we will develop an understanding of the factors influencing the real-life M1 and M2 money multipliers, which affect the M1 and M2 money supplies.

In our checking-deposit-multiplier example, we assumed that:

- After each loan was spent, all the funds were redeposited in another bank. No funds were withdrawn and used as currency in circulation.
- Banks lent all their excess reserves, keeping nothing as a safety net or as a liquidity buffer for any other reasons. In short, we assumed that banks had no incentive to hold excess reserves.
- After each loan was spent, redeposits were always placed into checking accounts. None of the redeposited funds was put in near-money accounts, such as savings deposits or time deposits.

Relaxing these assumptions breathes life into our money multiplier example and helps explain why the banking systems' power to create money is considerably less than one divided by the reserve ratio on checking accounts. To explore

these effects, a small bit of pivoting is needed in terms of how we define the M1 and M2 money supplies.

M1 Money Multiplier

There are two equally valid ways to define the M1 money supply. M1 equals currency in circulation (CC) plus checking deposits (D). It also equals a nation's monetary base (B) times the M1 money multiplier (mm_1) (see Figure 8.21 – top).[2]

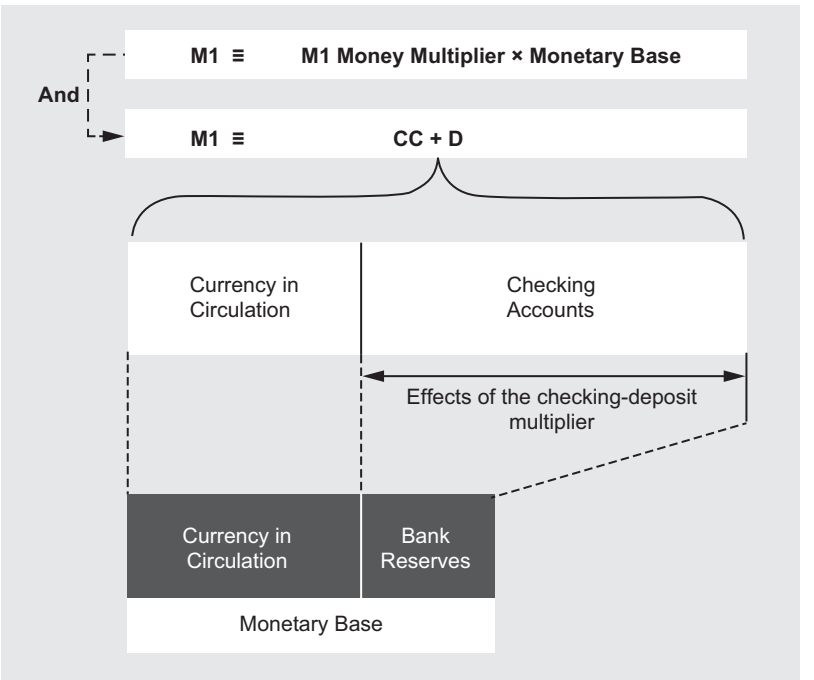

Figure 8.21: Relation among M1, Monetary Base, and the Checking-Deposit Multiplier.

The monetary base is composed of currency in circulation (CC) and reserves of financial institutions (TR), such as banks and thrift institutions. It can be thought of as the raw material from which a nation's money supply is created. As Figure 8.21 shows, a nation's monetary base and M1 differ only because of the amplification effects of the checking-deposit multiplier.

2 Seen another way, the M1 money multiplier is M1 divided by the monetary base.

M2 Money Multiplier

As is the case with M1, there are two equally valid ways to define the M2 money supply. M2 equals currency in circulation (CC) plus checking deposits (D) plus near money (N). It also equals the nation's M2 money multiplier (mm_2) times the monetary base (B). (see Figure 8.22 – top). Therefore, a nation's monetary base and M2 differ only by the amplification effects of the checking-deposit-and-near-money-deposit multiplier (see Figure 8.22 – bottom).[3]

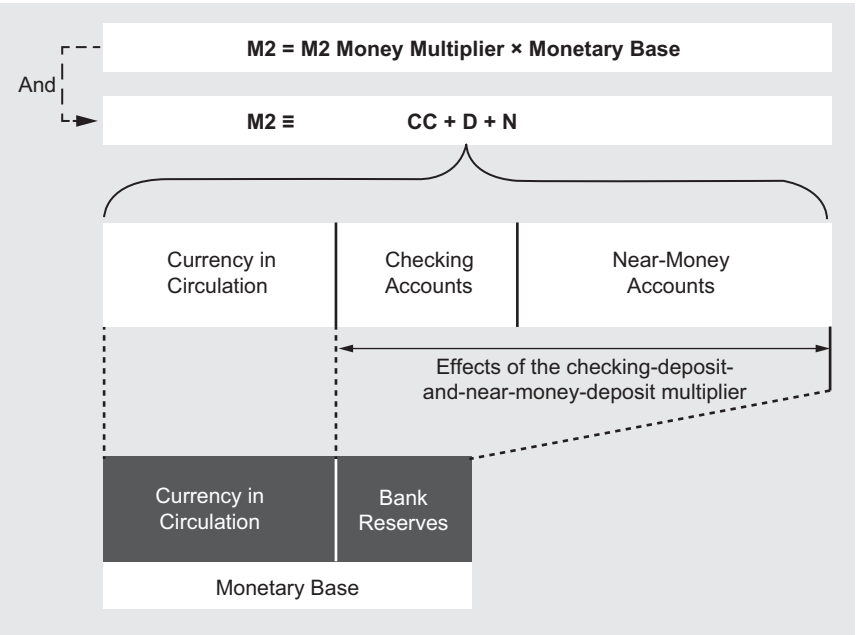

Figure 8.22: M2: Relation between Monetary Base and Checking-Deposit-and-Near-Money-Deposit Multiplier.

Breathing Life into the M1 and M2 Money Multipliers

Determining how each of the three assumptions in our checking-deposit-multiplier example affects the M1 and M2 money multipliers is relatively easy. All we need to do is answer a straightforward question, "By relaxing the assumptions, does the banking system's lending ability rise or fall?" In other words, what happens to the multiplier if people do not place all their funds in checking deposits and if banks

3 Seen another way, the M2 money multiplier is M2 divided by the monetary base.

do not lend all of their excess reserves? If the change empowers the banking system to lend more, then the money multiplier rises. If it decreases the banking system's ability to lend, the money multiplier falls.

Currency in circulation assumption: If people withdraw cash from banks during the lend-spend-deposit cycle, then the banking system has less to lend. Any change that diminishes the ability of the banking system to lend decreases the M1 and M2 money multipliers.

Excess reserves assumption: When bank managers hold more reserves than required, the M1 and M2 money multipliers fall because they reduce the ability of the banking system to lend. Bank managers hold excess reserves for several reasons—some planned and some not.

Planned holdings can be traced to the risk-return decisions that bank managers make daily. One alternative to lending excess reserves to customers or purchasing interest-earning securities is depositing excess reserves in the central bank. While the interest earned on these deposits may be relatively meager, the risk that a central bank will default or become illiquid is virtually zero. Therefore, choosing to hold added excess reserves may be a decision to protect a bank's equity position from erosion–especially in turbulent times. Excess reserves also serve as safety nets against unforeseen and abrupt changes in cash flows that might deplete a bank's reserves below the required level, such as an unexpectedly large withdrawal.

Other reasons for holding excess reserves can be traced to back-office inefficiencies and timing problems. For example, a large deposit that is made at the end of the day may not be processed in time for the bank's money manager to lend the funds in the interbank market. Therefore, they sit on the bank's balance sheet overnight, earning no interest.

Near-money deposits assumption: In the lend-spend-deposit cycle, funds that individuals place in near-money accounts cause the M1 money multiplier to *fall* and the M2 money multiplier to *rise*. The easiest way to understand this asymmetric conclusion is by remembering that near money deposits are not included in M1. Therefore, as people deposit funds in near-money deposits, the M2 money supply rises but M1 remains the same. Therefore, the M1 money multiplier falls from where it would have been if there were no near-money deposits. By contrast, the M2 money multiplier is higher than the old M1 money multiplier because the ability of the banking system to lend increases.

Preferred Asset Ratios

Preferred asset ratio is the term used throughout this text to describe the public's and banking system's preferences to hold currency in circulation (CC), near money (N), and excess reserves (ER). They are called "ratios" because these demands are

measured relative to checking deposits (D). Therefore, CC/D and N/D are the public's preferred asset ratios for currency in circulation and near money, respectively, and ER/D is the banking system's preferred asset ratio for excess reserves. Increases in CC/D and ER/D lower the M1 and M2 money multipliers. Increases in N/D lower the M1 money multiplier but raise the M2 money multiplier.

An important macroeconomic variable that influences all three preferred asset ratios is the real interest rate. If the real interest rate rises:

1. Individuals and businesses have an incentive to hold less cash and more interest-earning bank deposits. Accordingly, currency in circulation falls, and checking accounts and near money accounts rise. Therefore, CC/D falls as the real interest rate rises, causing the M1 and M2 money multipliers to rise.
2. Banks have an incentive to reduce their excess reserves, as the opportunity cost for holding them rises. Therefore, ER/D falls as the real interest rate rises, causing the M1 and M2 money multipliers to rise.
3. Individuals and businesses have an incentive to move funds from lower-earning checking accounts into higher-earning near money accounts. Therefore, N/D rises as the real interest rate rises. The increase in N/D causes the M1 money multiplier to *fall* because near money is not part of M1, and the increase in N/D causes the M2 money multiplier to *rise*, because the overall lending power of the banking system has increased.

Decreases in the real interest rate have the opposite effect.

The Rest of the Story

Preferred Asset Ratios and the M1 and M2 Money Multipliers

Let's take a closer look at the assumptions behind the checking-deposit-multiplier and see how relaxing them affects the M1 and M2 money multipliers. Digging a bit deeper is worth the effort because it helps to clarify the preferred asset ratios.

Effects of Currency in Circulation

It is unrealistic to assume that, during the lend-spend-deposit cycle, no one will withdraw cash from banks when they deposit checks. When they do, cash in the vault becomes currency in circulation. Cash withdrawals reduce the M1 and M2 money multipliers because there are fewer reserves for the banking system to lend.

The ratio of the public's desired holdings of currency in circulation (CC) relative to its checking accounts (D) is called the *preferred asset ratio for currency in circulation*. Consequently, the larger a nation's preferred asset ratio for currency in circulation (CC/D), the smaller the money multiplier.

In the extreme case, if Alice Atwood's entire $300 million loan were paid to Brad Brewster, and Brewster kept all the funds as currency in circulation, the checking-deposit multiplier would fall to one. In short, $300 million would be lent by First National Bank, but none of it would reach Second National Bank. Therefore, subsequent rounds of lending would never occur. Figure 8.23 shows the effects when 100% of a loan is held as currency in circulation.

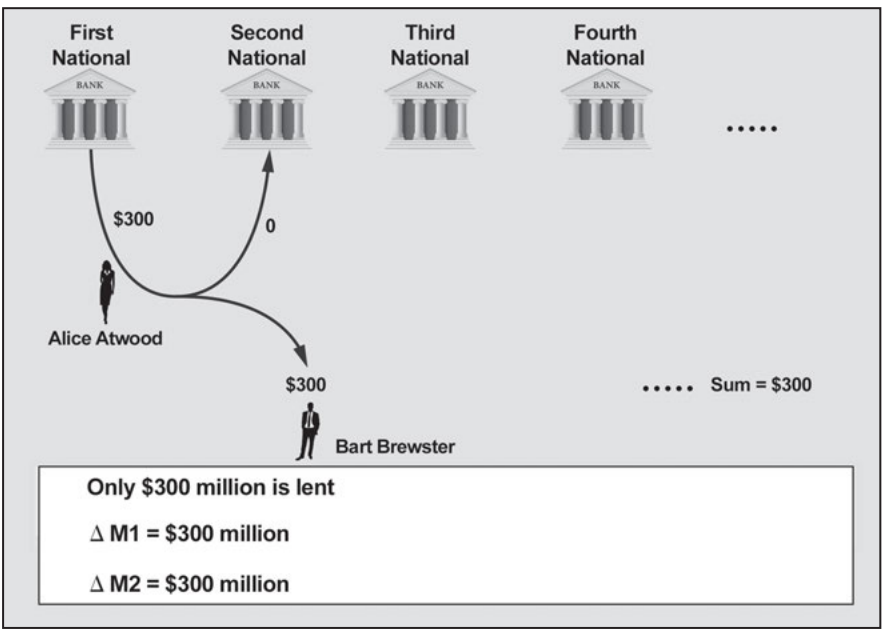

Figure 8.23: Money Multiplier Effects When 100% of a Loan is Held as Currency in Circulation. (Imagery used: © Sarah Maher, liravega258/123rf)

Effects of Excess Reserves

The ratio of the banking system's desired holdings of excess reserves (ER) relative to its checking accounts (D) is called the *preferred asset ratio for excess reserves* (i.e., ER/D). When excess reserves are held and not lent, they reduce both the M1 and M2 money multipliers. To illustrate, Table 8.1 assumes that

Table 8.1: Effects of Holding Excess Reserves on the Banking System's Lending Ability.

			(*Figures in Millions*)					
	Column 1	**Column 2**	**Column 3**	**Column 4**	**Column 5**	**Column 6**	**Column 7**	**Column 8**
	Bank	**Depositor**	**Change in Checking Deposits**	**Change in Reserves**	**Change in Required Reserves *10%***	**Change in Voluntarily Excess Reserves *15%***	**Change in Amount Lent**	**Borrower**
1	**First National**			Original excess reserves $300.00		$45.00	$255.00	**Alice Atwood**
2	**Second National**	Bart Brewster	$255.00	$255.00	$25.50	$38.25	$91.25	**Carol Carter**
3	**Third National**	Douglas Durrant	$191.25	$191.25	$19.13	$28.69	$143.44	**Evelyn Eaton**
4	**Fourth National**	Fred Farnside	$143.44	$143.44	$14.34	$21.52	$107.58	**Greta Giro**
5	**Fifth National**	Howard Huston	$107.58	$107.58	$10.76	$16.14	$80.68	**Irene Inman**
	. . .	. . .						. . .
	. . .	. . .	Declines to zero	Declines to zero	Declines to zero	Declines to zero	Declines to zero	. . .
	. . .	. . .						. . .
			Sum = $1,020				**Sum = $1,020**	

banks voluntarily hold 15% of their deposits as excess reserves and 10% of their deposits as required reserves.

1. **Row 1**: First National Bank starts with excess reserves of $300 million (Column 4), voluntarily holds 15%, which equals $45 million (Column 6), and lends $255 million to Alice Atwood (Columns 7 and 8). After that, Atwood pays Bart Brewster the $255 million.
2. **Row 2:** Brewster deposits $255 million in a checking account at Second National Bank (Columns 1, 2 and 3), which causes the bank's reserves to rise by $255 million (Column 4). As a result, Second National Bank:
   a. Holds $25.50 million (i.e., 10%) of the new deposits as required reserves (Column 5),
   b. Voluntarily holds $38.25 million (i.e., 15%) of the new deposits as excess reserves (Column 6), and
   c. Lends the remainder, $191.25 million, to Carol Carter (Columns 7 and 8). After that, Carter pays the funds to Douglas Durrant.
3. **Row 3:** Durrant deposits $191.25 million in his checking account at Third National Bank (Columns 1, 2 and 3), which causes the bank's reserves to rise by $191.25 million (Column 4). As a result, Third National Bank:
   a. Holds $19.13 million (i.e., 10%) of the new deposits as required reserves (Column 5),
   b. Voluntarily holds $28.69 million (i.e., 15%) of the new deposits as excess reserves (Column 6), and
   c. Lends the remainder, $143.44 million, to Evelyn Eaton (Columns 7 and 8). Thereafter, Eaton pays the funds to Fred Farnside.

From here, the process repeats in a continuous lend-spend-deposit cycle, until all excess reserves are eliminated from the system and nothing more can be lent.

The total increase in checking accounts and loans equals $1,020 million (see Columns 3 and 7 – Bottom), which is the sum of the original loan of $255 million plus the continuously declining amounts equal to $191.25 million + $143.44 million + $107.58 million + $80.68 million and so on. Because the total increase in loans (and checking deposits) equals $1,020 million and the original amount of lendable excess reserves was $255, the money multiplier equals 4.0 (i.e., $1,020 million /$255 million = 4.0).[4] Therefore, as banks' preferred asset ratio for holding excess reserves rises (i.e., as ER/D increases), the money multiplier falls because the banking system's ability to lend decreases.

4 Whereas the checking deposit multiplier is $\frac{1}{(\frac{RR}{D})}$, the money multiplier that includes checking deposits and excess reserves equals $\frac{1}{(\frac{RR}{D}+\frac{ER}{D})} = \frac{1}{(0.10+0.15)} = 4.0$.

The United States provides a good case study. In 2006, the U.S. Congress authorized the Federal Reserve to pay interest on reserve balances held by depository financial institutions at the Fed, and the Fed subsequently enacted it in 2008. Due to the Great Recession, which lasted from December 2007 to June 2009, and slow economic growth thereafter, the Fed pumped monetary base worth trillions of dollars into the U.S. banking system. As Figure 8.24 shows, much of it was not lent. Between January 2008 and August 2014, excess reserves in the U.S. banking system grew from a relatively paltry level (i.e., $1.6 billion) to a mountainous size ($2,700 billion). As a result, the U.S. M2 money multiplier fell from a high of 9.1 to a low of 2.8.

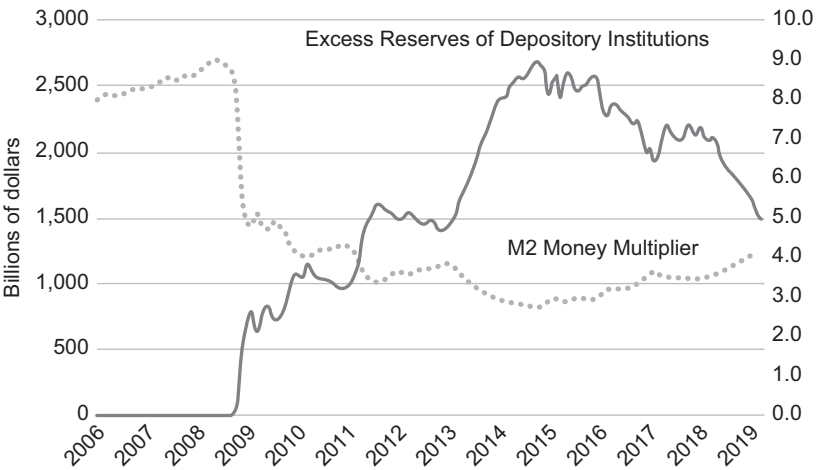

Figure 8.24: U.S. Banking System's Excess Reserves: 2006–2019.

Effects of Near-Money Deposits

Our first example assumed that all the funds borrowed from one bank were eventually redeposited in checking accounts at other banks. Ordinarily, people make deposits in other accounts, such as savings deposits, which are a part of near money. The ratio of the public's desired holdings of near money (N) relative to its checking accounts (D) is called the *preferred asset ratio for near money*. We will find that near-money deposits have a different effect on M1 and M2.

Near-Money Deposits' Effects on the M1 Money Multiplier

An increase in the preferred asset ratio for near-money deposits (N/D) reduces the banking system's ability to create *checking accounts*, compared to a

situation without near-money deposits. As a result, (N/D) and the M1 money multiplier are inversely related. To see why, assume that the preferred asset ratio for near money is 1.0, which means people place $1 in near money for every dollar they put in checking accounts (i.e., N/D = 1/1 = 1.0). Assume further that the reserve ratio on near-money deposits is equal to 5%, and the reserve ratio on checking accounts remains at 10%. Figure 8.25 focuses on just the first round and potential second round effects of the lend-spend-deposit cycle. Table 8.2 extends the analysis to see how the M1 money multiplier is affected by near money deposits.

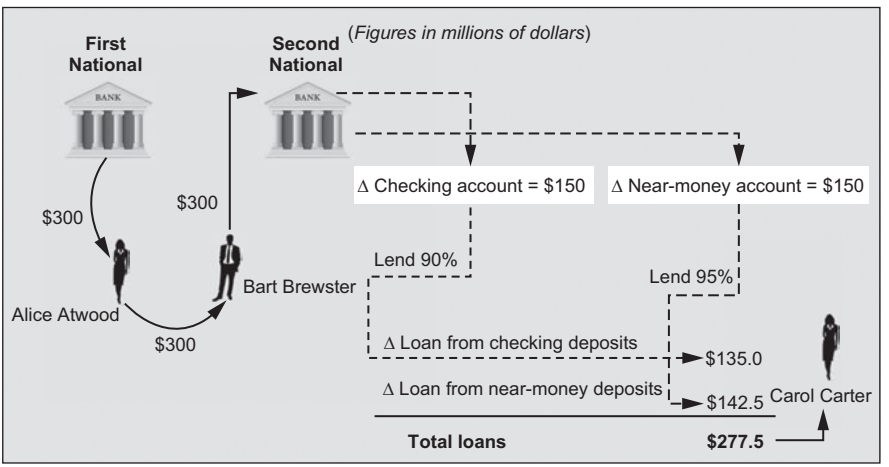

Figure 8.25: Near-Money Deposits and the M1 Money Multiplier: First- and Second-Round Effects. (Imagery used: © Sarah Maher, liravega258/123rf)

Of the $300 million received by Brewster from Atwood, $150 million would be placed in a checking account, and $150 million would be put into a near-money account. As a result, checking accounts would increase by half the amount compared to when all redeposits were put in checking accounts. The dampening effect that near-money deposits have on the M1 money multiplier is partially offset if near-money accounts have a lower reserve requirement ratio than checking accounts, which is usually the case and the assumption in this example. Because the reserve ratio on near-money deposits is only 5% and the reserve ratio on checking accounts is 10%, banks can lend more than they could if all deposits were placed in checking accounts.

Notice in Figure 8.25 and Table 8.2 how Second National Bank can lend $277.5 million when redeposits are split evenly between checking accounts and

Table 8.2: Near-Money Deposits and the M1 Money Multiplier: Multiple Rounds.

(*Figures in Millions*)								
Column 1	**Column 2**	**Column 3**	**Column 4**	**Column 5**	**Column 6**	**Column 7**	**Column 8**	**Column 9**
Bank	**Depositor**	**Change in Reserves**	**Change in Checking Deposits *50%***	**Change in Near Money Deposits *50%***	**Change in Checking Account Required Reserves *10%***	**Change in Near Money Required Reserves *5%***	**Change in Amount Lent**	**Borrower**
First National							$300.00	Alice Atwood
Second National	Bart Brewster	+$300.00	+$150.00	+$150.00	+$15.00	+$7.50	+$277.50	Carol Carter
Third National	Douglas Durrant	+$277.50	+$138.50	+$138.50	+$13.88	+$6.94	+$256.69	Evelyn Eaton
Fourth National	Fred Farnside	+$256.69	+$128.34	+$128.34	+$12.83	+$6.42	+$237.44	Greta Giro
Fifth National	Howard Huston	+$237.44	+$118.72	+$118.72	+$11.87	+$5.94	+$219.63	Irene Inman
. . .	. . .	Declines to zero	Declines to zero	Drops to zero	Decreases to zero	Declines to zero	Declines to zero	. . .
. . .	. . .							. . .
. . .	. . .							. . .
			Sum = $2,000	**Sum = $2,000**			**Sum = $4,000**	

near-money accounts. This is because the bank must hold as required reserves only \$7.5 million on its \$150 million of near-money deposits[5] and \$15 million on its \$150 million of checking accounts.[6] Had all the funds been deposited fully into checking accounts, Second National Bank could have lent only \$270 million (see Figures 8.16, 8.19, and 8.20).

Despite the positive effects that a lower reserve ratio has on the M1 money multiplier, it is not enough to offset the dampening impact of funds flowing into near-money deposits (rather than into checking accounts).[7] In the end, the total increase in checking accounts equals \$2,000 million, due to the money multiplier process, which includes allowances for reserve requirements against both checking accounts *and* near money. Because the increase in checking accounts equals \$2,000 million (see Table 8.2) and the original amount of excess reserves was \$300 million, the M1 multiplier equals 6.67, which is \$2,000 million/\$300 million.[8]

Effect of Near-Money Deposits on the M2 Money Multiplier

The effect that the preferred asset ratio for near-money deposits (N/D) has on the M2 money multiplier is different from the M1 money multiplier. An increase in the public's relative holdings of near-money deposits increases the overall ability of the banking system to lend. Therefore, the M2 money multiplier increases as N/D rises. New loans flow into checking accounts and near-money accounts, both of which are included in M2. Consequently, the M2 money multiplier has a direct relationship to N/D. In Table 8.2, the total increase in checking accounts plus near money equals \$4,000 million, due to the money multiplier process. Because the original amount of excess reserves was \$300 million, the M2 multiplier equals 13.3, which is \$4,000 million /\$300 million.[9]

Figure 8.26 summarizes the effects that all the preferred asset ratios have on the M1 and M2 money multipliers.

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5 5% × \$150 million savings deposit = \$7.5 million

6 10% × \$150 million savings deposit = \$15 million

7 Only under extreme and unrealistic conditions could the checking-deposit multiplier rise as (N/D) increases.

8 The M1 money multiplier that includes checking deposits and near-money deposits equals $\frac{1}{\left[\frac{RR}{D}+\left(\frac{N}{D}\times\frac{ER}{D}\right)\right]}=\frac{1}{[0.10+(1\times0.05)}=\frac{1}{0.15}=6.67$.

9 The M2 money multiplier, which includes checking deposits and near-money deposits equals $\frac{1+N/D}{\left[\frac{RR}{D}+\left(\frac{N}{D}\times\frac{ER}{D}\right)\right]}=\frac{1+1}{[0.10+(1\times0.05)}=\frac{2}{0.15}=13.33$.

Δ Reserve Ratios & Preferred Asset Ratios	Change	Δ M1 Money Multiplier	Δ M2 Money Multiplier
Reserve Ratio (RR/D & RR/N)	↑	mm_1 falls	mm_2 falls
CC/D	↑	mm_1 falls	mm_2 falls
N/D	↑	**mm_1 falls**	**mm_2 rises**
ER/D	↑	mm_1 falls	mm_2 falls

Figure 8.26: Preferred Asset Ratios and Their Effect on the M1 and M2 Money Multipliers.

In Chapter 10, "Real Credit Markets," we will focus our discussion on how short-term interest rates are determined by the forces of supply and demand. In that discussion, changes in *total supply* of real credit will be critical, and one of these sources of supply is the change in loans, which equals the change in M2. Therefore, our emphasis throughout the remainder of this book will be put on changes in the M2 money supply. Equation 1 summarizes the major factors that influence the M2 money supply.

$$M2 \equiv \underset{+}{mm_2}\left(\underset{-}{RR/D}, \underset{-}{RR/N}, \underset{-}{CC/D}, \underset{+}{N/D}, \underset{-}{ER/D}\right) \times \underset{+}{B} \qquad \textbf{Equation 1}$$

In particular, Equation 1 shows the impact that changes in the:

- M2 money multiplier (mm_2) have on M2
- Required reserve ratio for checking accounts (RR/D) and near money (RR/N) have on the M2 money multiplier (mm_2)
- Preferred asset ratios for currency in circulation (CC/D), near money (N/D), and excess reserves (ER/D) have on the M2 money multiplier (mm_2)
- Monetary base (B) have on the M2 money supply

The positive signs above mm_2, N/D, and B indicate that they have a direct positive impact on M2. When they rise, M2 rises, and vice versa. The negative signs above RR/D, RR/N, CC/D, and ER/D indicate that each of these factors is inversely related to the M2 money multiplier. When they rise, the M2 money multiplier falls, and vice versa.

Conclusion

Banks are financial institutions that take deposits and make loans. They have particular importance in macroeconomics because these intermediaries can create money by granting loans or purchasing securities. A nation's money supply increases regardless of whether a bank lends its excess reserves or purchases securities, and it also rises irrespective of whether the loan is made in cash or with checking accounts. A bank can always safely lend its excess reserves.

The banking system can lend a multiple of the amount lent by a single bank. Increases in the reserve ratios on bank deposits for checking deposits or near money reduce the M1 and M2 money multipliers. Similarly, increases in a nation's preferred asset ratios for currency in circulation and excess reserves reduce the M1 and M2 money multipliers. Finally, an increase in the preferred asset ratio for near money has an asymmetric effect on the M1 and M2 money multipliers. As it rises, the M1 money multiplier falls, but the M2 money multiplier increases. An important takeaway from this chapter is that movements in a nation's monetary base cause amplified changes in the domestic money supply.

Now that we have discussed monetary aggregates (Chapter 6, "Monetary Aggregates"), financial intermediaries (Chapter 7, "Financial Intermediation"), and the creation of money (this chapter), let's move on to Chapter 9, "Central Banks", where we will discuss how a nation's or currency area's money supply is controlled.

Key Points

- Banks create money by making loans or purchasing securities.
- Cash loans and loans in checking account form increase M1 and M2.
- Central banks determine the reserve ratio on deposit liabilities and the particular bank assets that qualify as bank reserves.
- Excess reserves equal total reserves minus required reserves, and a bank can always safely lend its excess reserves.
- After a loan is made, M1 and M2 remain elevated until the loan is repaid.
- The simple checking-deposit multiplier is equal to one divided by the reserve ratio on checking accounts, but it is not the focus of central banks' attention. They focus on more realistic money multipliers, which are better understood using preferred asset ratios.
  - Increases in (CC/D) cause the M1 and M2 money multipliers fall.
  - Increases in (ER/D) cause the M1 and M2 money multipliers fall.
  - Increases in (N/D) cause the M1 money multiplier to fall and M2 money multiplier to rise.

– From now until the end of this book, emphasis will be put on changes in M2, rather than M1. Doing so will facilitate our discussions on real interest rates and how they are determined.
– *The Rest of the Story* reinforces the logic and conclusions in *The Basics* portion of this chapter.

Review Questions

1. If the reserve requirement is 10%, and a depositor withdraws $500 from her checking account, by how much will the bank's excess reserves change? Explain.
2. If the reserve requirement is 10%, and you deposit $50,000 into your checking account, by how much will the bank's excess reserves change? Explain.
3. Suppose a bank has $2 million in excess reserves and $8 million in required reserves. A required reserve ratio of 10% is applicable to all deposits at the bank. What is the total amount of deposits at the bank? Explain.
4. Determine whether the following statements are true, false, or uncertain. Please correct the false statements.
   a. Having a high level of excess reserves is important to a banker because excess reserves reflect good bank management.
   b. Excess reserves are important to a banker because they indicate the profits that can be divided among the bank's owners.
   c. Excess reserves are important to a banker because, if they are not maintained, banking regulators may fine or shut down the bank.
5. If the required reserve ratio is 10% for checking accounts and 5% for savings accounts, calculate total reserves, required reserves, and excess reserves for Citibank.

Citibank
(Billions of Dollars)

Assets		Liabilities	
Cash in the vault	$40	Checking accounts	$50
Deposits at central bank	$30	Savings accounts	$400
Interbank loans made	$30	Interbank loans taken	$30
Consumer loans	$390	Loans from central bank	$20
Buildings & equipment	$20	Stockholders' equity (Bank capital)	$10

6. Assume the required reserve ratio on all deposit liabilities is 15%. Calculate the level of excess reserves for Sovereign Bank. How much can Sovereign Bank safely lend?

Sovereign Bank
(Billions of Dollars)

Assets		Liabilities & Equity	
Reserves	40,000	Deposits	200,000
Federal funds loans	20,000	Borrowing from the central bank	80,000
Loans	200,000	Federal funds borrowing	100,000
Securities	300,000	Other liabilities	150,000
Other	40,000	Stockholders' equity	70,000

7. Suppose the required reserve ratio for the banking system is 25%. Answer the following questions based on the balance sheet of Lafayette Bank:

Lafayette Bank
(Billions of Dollars)

Assets		Liabilities & Equity	
Cash in the vault	60,000	Deposits	500,000
Deposits at the central bank	100,000	Borrowing from the central bank	70,000
Loans	800,000	Borrowing from other banks	400,000
Securities	100,000	Other liabilities	100,000
Other	30,000	Stockholders' equity	20,000

   a. How much can Lafayette Bank safely lend?
   b. Show the changes in Lafayette Bank's balance sheet after the loan (in checking account form) has been made.
   c. Show the entire balance sheet after the loan has been spent and cleared.
8. Suppose the required reserve ratio is 15%, and a Japanese bank has the following assets, liabilities, and stockholders' equity: reserves = ¥85 million, checking accounts = ¥500 million, loans = ¥400 million, borrowings from the Bank of Japan = ¥80 million, stockholders' equity = ¥75 million, securities = ¥150 million, and other assets = ¥20 million. Given this information, calculate the amount of excess reserves or the reserve deficiency for this bank.
9. Suppose the banking system's only deposit liabilities are checking accounts, and the reserve requirement on them is 10%. If the banking system has excess reserves of $30 million and checking deposits of $500 million, calculate the banking system's total reserves.

10. Suppose you saw in *The Financial Times* the following information on England's monetary aggregates. Given this information, calculate the size of the English M1 money multiplier. Given this information, calculate the size of the English M2 money multiplier.

Monetary Aggregates	Amount
Reserves	£250 billion
Excess reserves	£70 billion
Required reserves	£180 billion
Currency in circulation	£50 billion
M1 money supply	£750 billion
M2 money supply	£1,800 billion

11. Fill-in the following table. If the factors in the first column change, as indicated, in which direction will the variables in the remaining columns change for the respective nations?

Impact	Monetary Base	M2 Money Multiplier	M2 Money Supply
Banks in Russia respond to a deterioration of economic conditions by holding more excess reserves (as a precaution against liquidity problems).			
Higher interest rates cause the public to keep less of their deposits in checking accounts and more in savings accounts and time deposits.			
Fear of a Greek exit from the European Monetary Union makes many Greek citizens withdraw their savings from banks and keep their cash in their homes instead.			

12. If interest rates fall, what, if anything, should happen to the M2 multiplier? Briefly explain.
13. Is it accurate to say that, as banks lend money in the form of checking accounts, the M1 and M2 money supplies rise when the loan is made and then fall when the loan is spent? Explain
14. Is it accurate to say that, as banks lend money in the form of checking accounts, that the M1 and M2 money supplies rise when the loan is made and then fall when the loan is paid back? Explain.

15. Can a banking system's excess reserves be negative? Explain. If they can be and are negative, explain three ways the banking system can eliminate the deficiency. If they cannot be negative, explain why.
16. What happens to the M2 money multiplier, if anything, after holidays, when people withdraw less cash from banks to pay for presents?
17. Is it possible for a country's money supply to grow at the same time as its monetary base is falling? If not, explain why not. If it is possible, explain how it is possible, and mention factors that might cause this result.
18. Suppose Argentina's total bank deposits equals Ps 100 billion (100 billion pesos), the banking system has zero excess reserves, and the reserve ratio was 10%. Calculate the effect on Argentina's monetary base, total reserves, and excess reserves, if the reserve ratio is reduced to 8%. What would be the qualitative change in Argentina's M2 money multiplier?
19. Suppose Argentine checking accounts at commercial banks fell by $3 billion, as people rushed to convert deposits into cash. Explain the effect this withdrawal of deposits from commercial banks by the public would have on Argentina's monetary base, M2 money multiplier, and excess reserves. Assume the reserve ratio is 10%.

Discussion Questions

20. If $1,000 is deposited in a bank with reserve requirements equal to 100%, explain how much the bank can lend. In general, how do banks with 100% reserve requirements increase their loans? Explain.
21. Japan suffered throughout the 1990s and into the 2000s from the after-effects of an asset price bubble that burst in 1990. The asset price bubble was caused by excessive money growth in the late 1980s, which drove up the price of real estate. Explain how plummeting real estate prices put severe pressure on Japan's domestic banking system.
22. It is the end of the banking day. You are the money trader at a bank that has $50 million of excess reserves, but there are no customers walking through the doors to borrow. What do you do?

Chapter 9
Central Banks

Changes in a nation's money supply can have significant effects on domestic inflation, interest rates, production, and employment. Often these effects spill over to other countries. Due to the potential impact that monetary policies have on macroeconomic variables that influence company performance, understanding and anticipating their effects can pay huge dividends. For this reason, business managers and analysts throughout the world monitor the actions and decisions of central bankers, paying special attention to the U.S. Federal Reserve System (the Fed), European Central Bank (ECB), People's Bank of China (PBOC), Bank of England, and Bank of Japan (BOJ), due to the size of their financial systems.

This chapter starts by discussing the difference between financial regulation and monetary policy. It then moves on to explain the tools that central banks use to control their domestic money supplies. We will find that these tools are generic, in the sense that the same basic set is used (or can be used) by any central bank.

In Chapter 8, "Money Creation," we learned that M2 equals the monetary base times the M2 money multiplier, which is insightful because a nation's money supply varies only if one or both of these variables changes.[1] This chapter explains the direct powers that central banks have over these two monetary variables and, therefore, the indirect ways in which they affect their nations' M2 money supplies and financial markets. The power to change a nation's monetary base is an important one, which is why a very helpful guideline is introduced which answers virtually any question concerning when and if a nation's monetary base has changed. The chapter ends with a brief discussion of timing issues and how they can complicate a central banker's job of effectively managing the money supply.

The Basics

Financial Regulation Versus Monetary Policy

When considering the monetary powers and role of central banks, it is important to distinguish between *financial regulation* and *monetary policy*. Financial regulation,

1 Remember that this book focuses on the M2 money supply because of its link to the total supply of real credit, which will be discussed in Chapter 10, "Real Credit Markets."

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often called *microprudential regulation*, is concerned with controlling and monitoring the conduct, performance, and condition of financial institutions to ensure that they are solvent, liquid, and carrying manageable risks. Most central banks are responsible for regulating their financial systems but, typically, they do so in conjunction with national treasuries/ministries and other authorities, such as state, provincial, or regional banking commissions.

To evaluate a financial intermediary's condition and performance, regulators often use the CAMELS rating system. CAMELS is an acronym for an intermediary's **C**apital adequacy, **A**sset quality, **M**anagement quality, **E**arnings, **L**iquidity, and **S**ensitivity to market risks, such as the impact of changing interest rates and exchange rates. Regulators also seek to ensure that financial intermediaries have sound corporate governance practices.

Examples of microprudential policies are limits on bank exposures to any one customer or business sector, controls on maturity and currency risks, caps on customer loan-to-value and debt-to-income ratios, and provisioning requirements for bad loans. Capital requirements specify the amount of equity that financial institutions must hold to back their risk-adjusted assets. The higher an asset's risk, the more capital the institution must hold. The Bank for International Settlements, which is an organization of international central banks, has taken a leading role in establishing worldwide guidelines for banks' risk-adjusted capital.

Effective financial regulation requires the implementation of proper rules and regulations, but it is equally vital for regulators to develop efficient and effective ways to ensure that these rules are followed. Well-timed audits and reviews of intermediaries' financial statements and corporate governance practices are essential. In cases where rules and regulations are not obeyed, there must be a strict, but fair, system of sanctions or penalties in place to deal with violators.

In contrast to financial regulation, monetary policy focuses on providing a nation (or currency area, such as the European Monetary Union) with the optimal amount of liquidity, which is a tricky job that central bankers do not always get right. When they err on the high side, inflation can occur; when they err on the low side, the result can be deflation and recession.

M2 ≡ M2 Money Multiplier × Monetary Base

In Chapter 8, "Money Creation," we learned that changes in a nation's money supply depend on two significant factors: the M2 money multiplier and the monetary base (see Figure 9.1).

Central banks have a great deal of control over the M2 money multiplier because they determine the reserve ratios on financial intermediaries' deposit

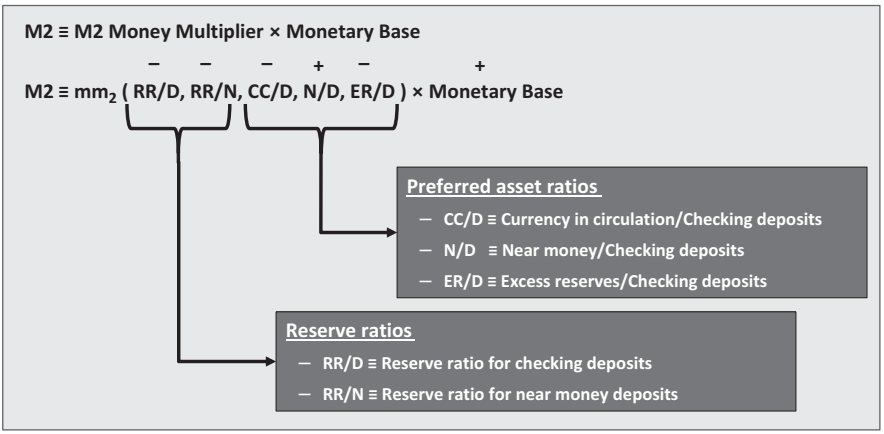

Figure 9.1: M2 and Factors Influencing the M2 Money Multiplier.

liabilities, such as checking accounts and near money. At the same time, their control is not complete because variations in the preferred asset ratios of households and banks also affect it. Therefore, central bank efforts to change the money multiplier can be, at times, a bit like trying to grab hold of a wet bar of soap.

Guideline #1: Above the Line/Below the Line

In contrast to the M2 money multiplier, central banks have almost complete control over their monetary bases. Therefore, virtually any question regarding the causes of monetary base fluctuations can be answered by remembering that central banks have this near-monopoly power. The problem is that appearances and first impressions can be deceptive. What seems to change the monetary base may not change it and vice versa. For this reason, let's introduce Guideline #1: Above the Line/Below the Line.

In Figure 9.2, a horizontal line is drawn across the page with *all* central banks (e.g., the BOE, BOJ, ECB, Fed, and PBOC) above the line. All other stakeholders are below the line. For example, below the line are individuals (like you and I), businesses, banks, other financial institutions, and governments (national, state, provincial, regional and local).[2]

2 In nations where the government and the central bank are not independent, the government should be placed above the line.

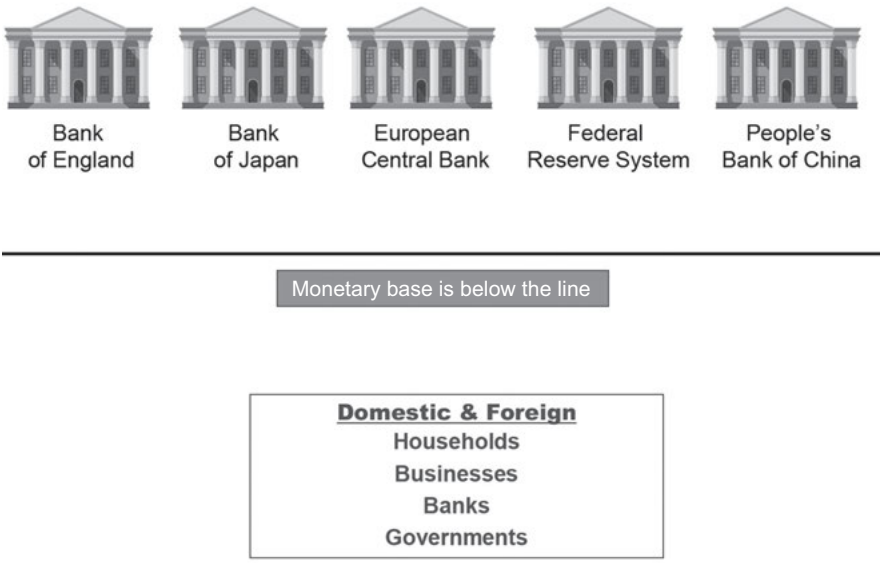

Figure 9.2: Central Banks are "Above-the-Line. (Imagery used: © MicroOne/Shutterstock)

Funds that are above our imaginary horizontal line are *not* a part of a nation's monetary base because the monetary base includes only currency *in circulation* and the reserves of financial intermediaries. Both of these components are below the line. Keeping in mind that a central bank is the ultimate source of a nation's monetary base makes it easier to understand that a large part of central bankers' jobs is determining how and when to move funds below or above our imaginary line.

- Central banks *increase* the monetary base by moving funds *below the line*, which means either *purchasing* items of value from individuals, businesses, or others, who are below the line, or *lending* to them. Both of these actions *increase the central bank's balance sheet*.
- Central banks *decrease* the monetary base by moving funds *above the line*, which means *selling* items of value to individuals, businesses, or others, who are *below the line*, or *reducing loans* them. Both actions *decrease the central bank's balance sheet*.

For this reason, Macroeconomic Guideline #1 is: *A nation's monetary base changes only when funds cross our imaginary horizontal line due to a change in the size of the central bank's balance sheet*[3] (see Figure 9.3).

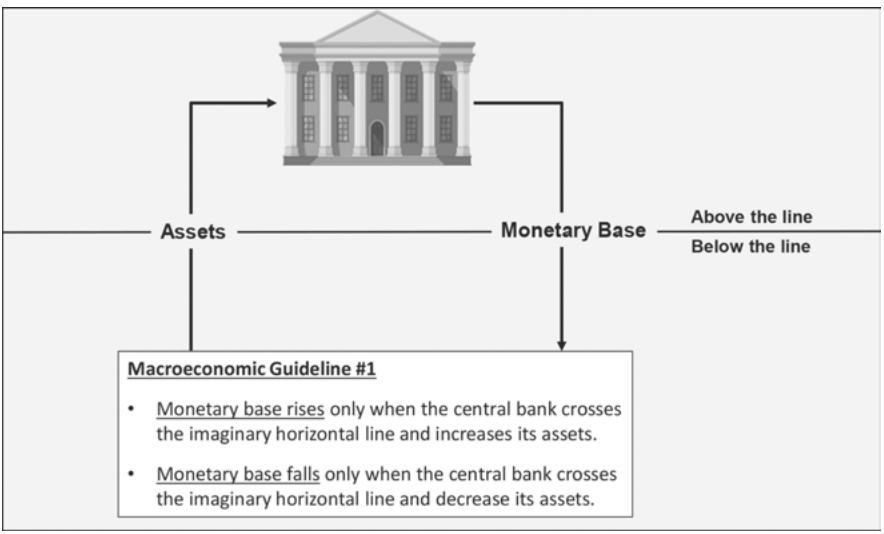

Figure 9.3: Guideline #1: Above-the-Line/Below-the-Line. (Imagery used: © MicroOne/Shutterstock)

So long as payments and receipts are made in the domestic currency, a nation's monetary base changes by the same amount regardless of what is purchased or sold by the central bank and regardless of the counterparty. In short, it makes no difference if the assets are goods (e.g., gold, silver, oil, snow blowers, or cars), interest-earning securities (e.g., government bonds, company shares, corporate bonds, municipal bonds, or mortgage-backed securities), stocks (e.g., Apple, Facebook, or Google), or *foreign* currencies (e.g., euros, pesos, Swiss francs, yen, or yuan). It also changes by the same amount regardless of whether the central bank deals with domestic or foreign businesses, financial institutions, governments, churches, universities, or individuals below the line.

Central banks try to be selective about what assets they acquire. For instance, they avoid transactions involving the purchase of goods, services, and

3 Guideline #1 covers about 99% of changes in the monetary base. There are a few minor exceptions to our guideline, but they are relatively unimportant. One of them will be discussed in Chapter 12, "Fiscal Policy."

private-sector securities and also avoid making loans to individuals or businesses. One reason for their caution is because these transactions could unfairly favor or penalize (or they could *appear* to favor or penalize unfairly) one company, individual, or asset over another.[4] In general, central banks prefer to purchase and sell government securities and convertible foreign currencies, and they favor loans to financial intermediaries. In times of crisis, exceptions can be (and are) made. For example, during the Great Recession of 2007–2009, when global financial markets went helter-skelter, central banks around the world (including the U.S. Federal Reserve) retreated from their preferences and best practices by purchasing more risky assets, such as private mortgage-backed securities and company shares.

To see if Guideline #1 is a helpful tool, let's use it to determine how each of the following transactions affects, if at all, the nation's monetary base.

1. Substantial capital outflows from the United States, in amounts estimated at $500 billion per week, occur as foreign speculators sell U.S. stocks for dollars and then sell their dollars for Japanese yen.
2. The U.S. government lowers personal income taxes by $1 trillion, increases its spending by $500 billion, and borrows $1.5 trillion to cover the deficiency.
3. Novartis, a Swiss company with headquarters in Basel, Switzerland, sells 100 million U.S. dollars (USD 100 million or $100 million) in the foreign exchange market and receives 98 million Swiss francs (i.e., CHF 98 million).
4. Mary Jones borrows $30,000 for a new car.
5. Heinz Meier, a German resident living in Berlin, borrows $200,000 from Bank of America in San Francisco.
6. The ECB and the U.S. Fed swap €18 million for $20 million.[5]

Guideline #1 shows us that, for all six example transactions, the U.S. monetary base does not change. For Transactions 1–5, there is no change in the monetary base because these transactions are between counterparties that are entirely

4 One way to avoid favoring one company over another is for the central bank to deal only in stock indexes.

5 Central bank swaps are short-term (usually 90 days) transactions between central banks that call for the immediate exchange of currencies and their re-exchange in the future at a fixed exchange rate (i.e., price). For example, if the ECB wanted to increase its U.S. dollar reserves temporarily, one way to get the needed dollars would be to swap euros for dollars with the U.S. Federal Reserve. Perhaps the ECB needed the dollars so that it could engage in foreign exchange market intervention to support the euro. Under a typical swap agreement, the funds would be exchanged now and then swapped back after 90 days.

below our imaginary horizontal line. In Transaction 6, there is also no change because the transactions are entirely above the line.

How Does a Central Bank Pay for Its Assets?

We know from Chapter 8, "Money Creation," that the assets of a bank (or any company) must equal the sum of its liabilities plus stockholders' equity. Accordingly, the assets side of a central bank's balance sheet cannot rise (or fall) without the other side, which includes liabilities plus stockholders' equity, doing the same. Central banks pay for their newly acquired assets by merely writing checks on themselves, which increases their liabilities. Doing so requires nothing more than a few taps on their computer keyboards. These newly created funds flow into the financial markets as monetary base and enter into the lend-spend-deposit cycles, which increases the nation's money supply by a multiplied amount. As long as the central bank transacts business with a counterparty below the line, the monetary base rises with each loan it makes to a bank or with each security, good, or service it buys.

Monetary Tools of the Central Bank

A central bank can change the nation's money supply by influencing the money multiplier or the monetary base. Five primary monetary tools are available to accomplish this task. They are: (1) open market operations, (2) foreign exchange market intervention, (3) the discount rate, (4) required reserve ratios (i.e., RR/D and RR/N), and (5) changes in the interest rate banks earn on their deposits (i.e., reserves) at the central bank. Changes in the first three influence the monetary base, and changes in the last two affect the money multiplier.

Figure 9.4 shows a typical central bank's balance sheet.

- Its principal assets are (1) securities, (2) international reserves, which are assets it can use to intervene in the foreign exchange markets, and (3) loans to banks, which are called discount loans.
- The central bank's major liabilities are (1) deposits of banks (below the line), which count as their reserves, (2) deposits of foreign central banks, (3) government deposits, and (4) currency in circulation.
- A central bank's shareholders (i.e., the owners) vary from country to country. For example, the Fed's shareholders are Federal Reserve member banks. The national Treasury Solicitor owns the Bank of England on behalf of the government. The respective governments of Argentina and Brazil own their central banks. Ownership of the National Bank of Belgium and the Bank of

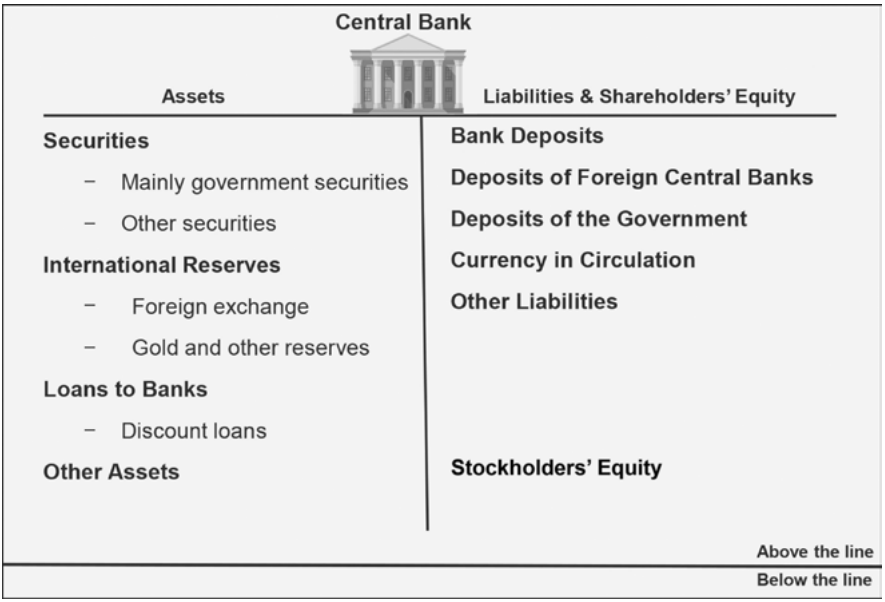

Figure 9.4: Central Bank Balance Sheet: Assets ≡ Liabilities + Stockholders' Equity. (Imagery used: © MicroOne/Shutterstock)

Japan is shared by their governments and private individuals. Finally, the Swiss National Bank's (SNB) shareholders are Swiss cantons, Swiss cantonal banks, as well as private individuals and businesses.

Open Market Operations

Open market operations are the buying and selling of securities (typically government securities) by the central bank. They are called "open market" operations because central banks purchase and sell securities that have already been issued, which means they deal only in the *open* secondary markets.

One reason for not purchasing securities directly from the government is to separate the government, which can be considered the *ultimate national spender*, from the central bank, which can be viewed as the *ultimate source of domestic liquidity*. There is a strong belief (supported by evidence) that a nation's chances of suffering from high inflation are reduced substantially if the central bank is independent from the treasury. If the national government had substantial influence, it could coerce the central bank into purchasing excessive amounts of government debt, thereby increasing the nation's monetary base, money supply, and, ultimately, the inflation rate. By separating the government (spenders) from

the central bank (money creators), fiscal and monetary authorities can act as checks and balances on each other.

To place a buy or sell order, central banks contact securities dealers, who are below our imaginary horizontal line, and the securities dealers find counterparties who are willing and able to take the buy side of a central bank's sell order or the sell side of a central bank's buy order. Typical counterparties are domestic and foreign individuals, financial institutions, and businesses.

Figure 9.5 shows an example of open market purchases of government bonds by the central bank. The central bank purchases government securities and pays for these interest-earning assets with newly created monetary base. Therefore, with a few taps on its computer keyboard, a central bank can create monetary base out of nothing. Because the amounts are so large, these newly created funds are not injected as currency (i.e., paper bills and coins) but rather by increasing or decreasing the checking accounts of counterparties below the imaginary horizontal line.

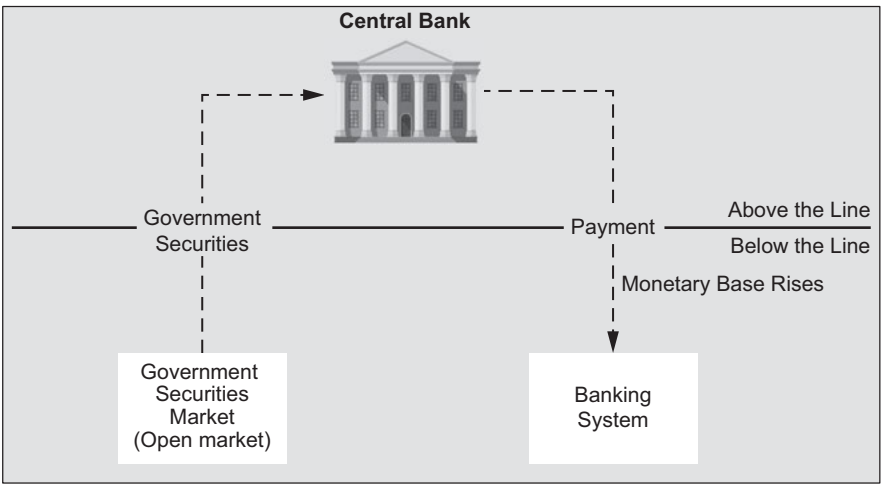

Figure 9.5: Monetary Effects of Open Market Operations. (Imagery used: © MicroOne/ Shutterstock)

Open Market Operations: When a Central Bank Trades with Banks

Figure 9.6 shows the effects of open market operations when a central bank purchases $10 million of government securities from banks. The banks might be selling these securities to gain liquidity needed to meet their reserve requirements, to make new loans, or as part of their routine portfolio adjustments. When a sale

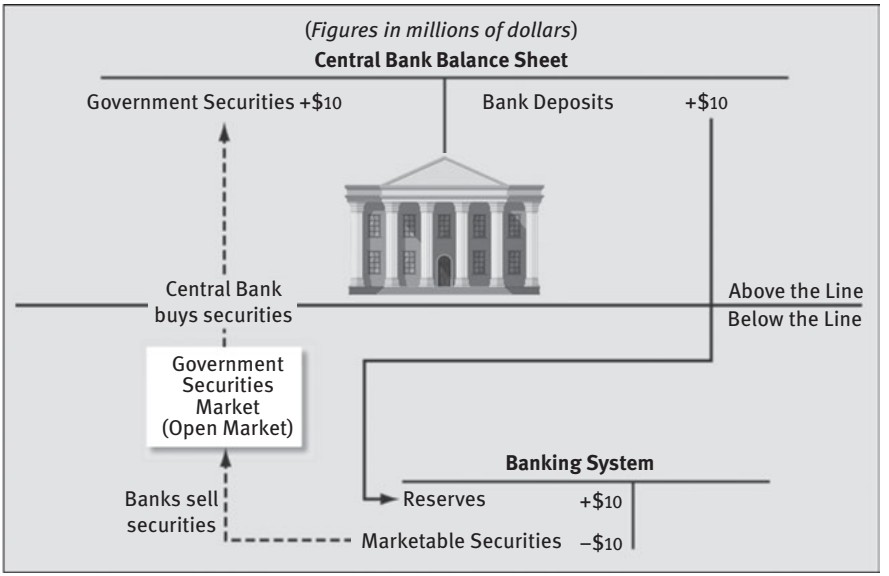

Figure 9.6: Open Market Operations: Central Bank Securities Purchases from Banks. (Imagery used: © MicroOne/Shutterstock)

is made, the banks' marketable securities fall by $10 million, and the central bank's holdings of government securities rise by the same amount.

The central bank pays for these securities by increasing the banks' deposits at the central bank, which causes bank reserves to increase by $10 million. Therefore, the nation's monetary base rises by $10 million.

Open Market Operations: When a Central Bank Trades with the Nonbank Public

What happens to the monetary base if the central bank purchases $10 million worth of government securities from an individual (like you or me) or a company? We will find that it makes no difference. The monetary base increases, again, by $10 million.

Figure 9.7 shows a case where the securities dealer is contacted by Suzanna Smith (or the Suzanna Smith Company), who wants to sell government securities worth $10 million. The central bank pays for them by writing Smith a check for $10 million. Smith deposits the check in her bank, which clears it with the central bank. After the check clears, the effects are as follows:

– Smith loses securities (assets) worth $10 million and gains a checking account (an asset) worth the same;

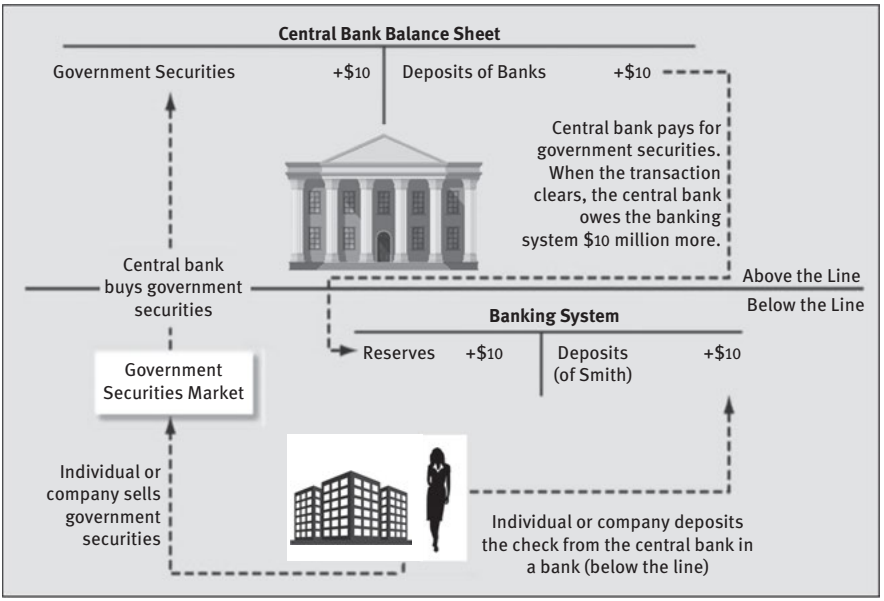

Figure 9.7: Open Market Operations: Central Bank Security Purchases from Individuals or Companies. (Imagery used: © MicroOne/Shutterstock; © Sompop U-kong, Liravega258/123rf)

- The central bank acquires securities (assets) worth $10 million and a new liability in the funds it owes to Smith's bank;
- Smith's bank gains a $10 million deposit at the central bank (a reserve asset) and a $10 million liability to Smith from the check she deposited.

Because of this transaction, bank reserves rise by $10 million, and therefore, the U.S. monetary base increases by $10 million—just as they rose when the central bank purchased the securities from banks.

Repurchase Agreements Versus Open Market Operations

Since the early 1990s, there has been a strong trend among central banks to conduct open market operations by using repurchase agreements and reverse repurchase agreements instead of outright securities purchases or sales. A *repurchase agreement (also called a "repo")* is a transaction between two parties in which Individual A sells a security to Individual B at a specific price and then simultaneously agrees to repurchase it later for a higher price. The difference between the sale and repurchase prices in a repo deal is, effectively, the

interest earned or paid. Therefore, repos are like secured loans, whose credit risks are based on the quality of the securities collateralizing the deal and not on the counterparties.[6]

The assets sold and repurchased in these deals are usually fixed-interest-earning securities. The term "repurchase agreement" is typically defined from the securities dealer's perspective. Therefore, in a repurchase agreement, a securities dealer is the borrower (i.e., the securities sellers) and its customer is the lender. Central banks transact repo business only with eligible counterparties (dealers), which are mainly commercial banks, securities houses, and money market dealers. When a central bank (above the line) enters into a repo transaction with a securities dealer (below the line), the central bank is lending and using the repurchase agreement securities as collateral. These transactions increase the nation's monetary base for the interval between when the central bank buys the securities and sells back to the dealer.

A *reverse repo* is just the opposite of the repo. In a reverse repo, a central bank (above the line) sells fixed-income securities to dealers (below the line) with a simultaneous agreement to repurchase them at a higher price in the future. Therefore, reverse repos reduce a nation's monetary base for the interval between when the securities are sold and repurchased.

The securities used for repo deals are usually domestic government securities or domestic, government-backed securities, but many central banks allow a broader range of financial assets to qualify for these deals than they would accept for outright purchases. *Eligible* securities can be denominated in the domestic currency or foreign currencies. Central banks try to be cautious in their repo transactions by requiring that these securities have minimal market-, liquidity-, and credit risks. As a result, most central bank repos have very short-term maturities (e.g., usually they mature within one or two weeks).[7] As the repo markets have become more liquid, their use by central banks has expanded. By using these markets, central banks have been better able to manage their liquidity and balance sheet risks.

6 Technically, the securities in a repo transaction remain the assets of the borrowers (i.e., sellers). Therefore, all the returns (e.g., dividends and partial redemptions) paid by the original issuer of these securities accrue to the owners, who have borrowed using these securities as the collateral.

7 When repo transactions may have maturities longer than one day, they are called *term repos*. Some central banks (e.g., the ECB) transact deals with maturities as long as three months, but they are the minority of repo transactions.

Foreign Exchange Market Intervention

Foreign exchange market intervention has the same influence on a nation's monetary base as open market operations. As Figure 9.8 shows, the only significant difference is when foreign currencies, rather than government securities, are purchased or sold. To increase a nation's monetary base and thus its money supply, the central bank purchases foreign currencies, and, in doing so, injects newly created reserves (i.e., monetary base) into the banking system. Once in the banking system, these funds can be lent and re-lent by financial intermediaries throughout the nation (i.e., they enter the lend-spend-deposit cycle).

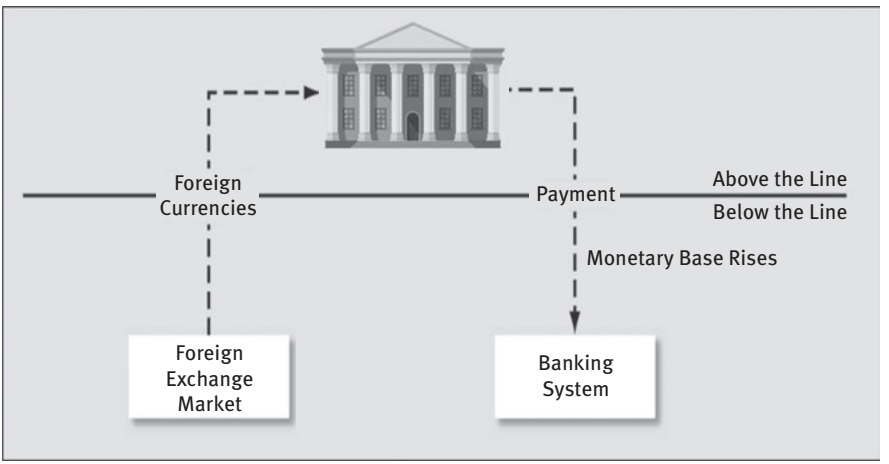

Figure 9.8: Monetary Effects of Foreign Exchange Market Intervention. (Imagery used: © MicroOne/Shutterstock)

To decrease these monetary aggregates, the central bank sells foreign currencies, thus taking bank reserves (i.e., monetary base) out of the system and forcing financial intermediaries to curtail their loans. Using foreign exchange market intervention to change a nation's monetary base is an especially important tool for countries with underdeveloped government securities markets in which it is difficult to buy or sell government securities in large quantities.[8]

8 In *The Rest of the Story* portion of this chapter, the section entitled "Monetary Effects of Central Bank Foreign Exchange Market Intervention" provides greater detail on the effects of central bank intervention.

Changing the Discount Rate

Financial institutions in need of reserves can borrow from two primary sources: other banks and the central bank. When they borrow from other banks, they pay the interbank interest rate, which is determined by the forces of supply and demand.[9] A central bank has significant influence over this market-determined rate, but it does not set or determine it. To change the interbank rate, a central bank usually varies the availability of excess reserves in the banking system.

By contrast, banks that borrow from the central bank pay the *discount rate*, which is set and changed at the discretion of the central bank. Because the discount rate is determined by decree, rather than the forces of supply and demand, a central bank can choose any level it wants and keep it there as long as it wants.

One big difference between borrowing in the interbank market and borrowing from the central bank is that discount loans increase the monetary base and, therefore, are a source of new liquidity for the entire banking system. For this reason, central banks are often called *lenders of last resort* because, if the banking system should run short of liquidity, financial institutions could turn, as a *last resort*, to the central bank for relief. By contrast, the interbank market redistributes an existing supply of monetary base. For every financial intermediary that borrows, there must be a financial intermediary with surplus funds that lends. Therefore, it is impossible for all banks to be net borrowers in the interbank market.

Central banks lower or raise the discount rate to stimulate or dampen banks' willingness and ability to borrow. Reducing the discount rate encourages banks to borrow from the central bank. These borrowed funds increase the nation's monetary base. Furthermore, they expand the money supply by an amplified amount because the new monetary base enters the lend-spend-deposit cycle, which increases the money supply by a multiplied amount. By contrast, increasing the discount rate makes loans from the central bank more expensive, which dampens borrowing incentives, thereby reducing the money supply or its growth rate.

Figure 9.9 shows how a central bank can use the discount rate tool to affect the monetary base. By making loans to financial institutions, a central bank increases its assets (i.e., discount loans) by the amount lent. It then pays the borrower institutions by creating more monetary base. Discount loans increase

9 In the United States, this interbank market is called the "federal funds market" because borrowed and lent funds are cleared through the *Federal* Reserve System. Clearing transactions through the Fed is quick and cost-efficient.

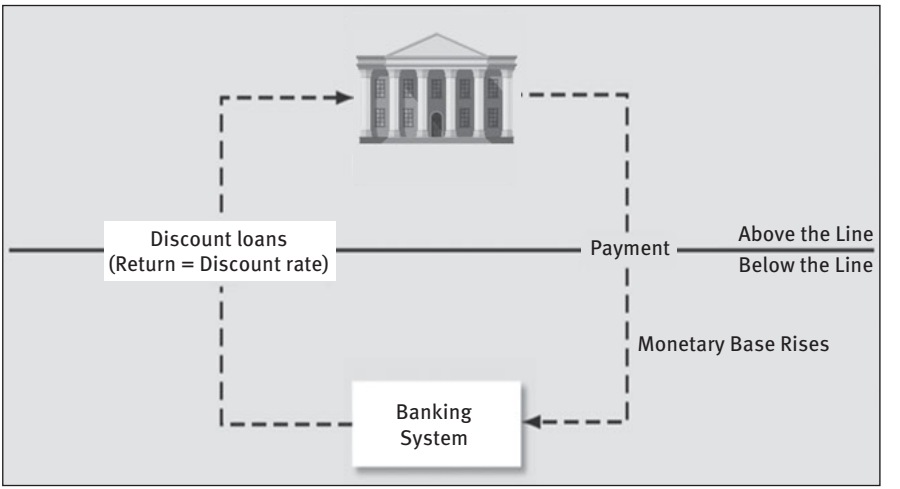

Figure 9.9: Monetary Effects of Discount Loans: Part I. (Imagery used: © MicroOne/ Shutterstock)

central bank profitability because they are interest-earning assets. In effect, the central bank makes the loan simply (and virtually without cost) by increasing banks' deposits at the central bank. Because these loans can be created (and financed) with the stroke of a pen or a few taps of a computer keyboard, it is easy to see how central banks could get carried away and lend too much to financial intermediaries, thereby over-inflating their money supplies.

Figure 9.10 shows an example where the Bank of England lends £10 billion to domestic banks. As a result, English banks' assets and liabilities rise by £10 billion. Their new liabilities are "borrowings from the Bank of England," which the banks are required to repay with interest (i.e., the discount rate). Their new assets are deposits at the central bank, worth £10 billion. With these new reserves, the nation's monetary base rises by £10 billion.

The Bank of England finances these discount loans by electronically increasing the English banks' deposits at the Bank of England. As a result, its liabilities in the form of "deposits of banks" rise by £10 billion, and its assets in the form of "discount loans" increase by the same amount.

The immediate effects of discount rate changes on economic activity depend on the extent to which they are anticipated. If they are fully anticipated, then their impact is likely to be modest. If they are unexpected, they could be accompanied by an initial "announcement effect," that alters market participants' behavior.

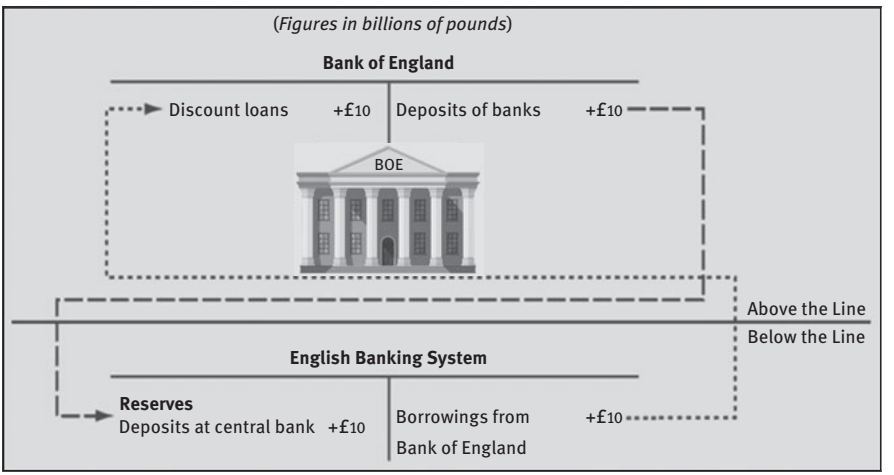

Figure 9.10: Monetary Effects of Discount Loans: Part II. (Imagery used: © MicroOne/ Shutterstock)

U.S. Discount Rate Policies

If there were unrestricted access to the discount window at rates below the interbank-market level, money dealers at banks could come to work each morning, borrow hundreds of millions of dollars from the central bank, invest the funds immediately in safe government securities or in the relatively safe interbank market, and be on the golf course before 10:00 a.m. Their business lives would be easy, and their profits would be secure. The problem is that these loans would also expand the nation's money supply substantially and could increase the inflation rate.

Before 2003, the U.S. Federal Reserve kept the discount rate below the interbank interest rate, and excessive borrowing from the Fed was controlled by making access to this funding a *privilege* and not a *right*. The Fed monitored banks to make sure they were not using discount loans to increase their portfolios and arbitraging financial markets. Banks that were caught or suspected of such behavior could have been refused discount loans or fined, had their charters revoked, or lost membership in the Federal Reserve System. Since 2003, the U.S. Federal Reserve has set the discount rate above the federal funds (interbank) rate, thereby penalizing banks that access this borrowing facility.[10] This decision made the Fed a *lender of last resort* in a different sense. Because discount loans

10 Federal Reserve Bank of San Francisco, Educational Resources, https://www.frbsf.org/education/publications/doctor-econ/2004/september/federal-funds-discount-rate/ (accessed July 22, 2019).

have been so costly, banks have turned to them only after exhausting other (cheaper) sources of funds.

Corridor/Collared Discount Rates

Some central banks control their domestic money supplies by setting two discount rates, one for deposits and one for loans.[11] When they do, these rates form a collar around the short-term interest rates facing financial institutions. The higher rate sets a ceiling for the interbank market because if short-term market interest rates rise above this level, financial intermediaries borrow from the central bank rather than from each other. The lower rate establishes a floor because, if interbank deposit rates fall below this level, banks deposit their funds with the central bank rather than with each other. In nations with collared rates, discount rate policy involves managing the spread between the central bank's deposit rate and lending rate.

Discount Rate Versus Open Market Operations Trends

In many countries, discount lending is called a *standing facility*. The active use of standing facilities as monetary tools has been eclipsed by central banks' increasing use of open market operations. In part, this trend is due to the rapid development of money markets, which have given central banks the flexibility and liquidity needed to conduct monetary policies. In short, central banks seem to prefer buying and selling securities in broad and deep government securities markets rather than relying on the discount rate tool, which requires banks to initiate borrowing transactions. Buying securities in the open market provides central banks with a guarantee that the monetary base will increase when they transact their business, and selling government securities guarantees them it will fall. By contrast, lowering the discount rate increases the monetary base only if the financial intermediaries desire to borrow from the central bank.

Required Reserve Ratio

The lending power of a financial institution is limited by the percent of its deposit liabilities that must be held as reserve assets, which earn little or no interest. For example, if $1,000 were deposited in a bank and the required reserve

11 Alan S. Blinder, "Quantitative Easing: Entrance and Exit Strategies," *Federal Reserve Bank of St. Louis Review*, November/December 2010. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.185.3495&rep=rep1&type=pdf (Accessed May 27, 2019).

ratio was 10%, the bank would need to hold $100 as required reserves and could lend the rest. Raising the reserve ratio to 20% would reduce the bank's ability to lend because it would need to hold $200 of the $1,000 deposit as reserves and could lend only $800 (see Figure 9.11).

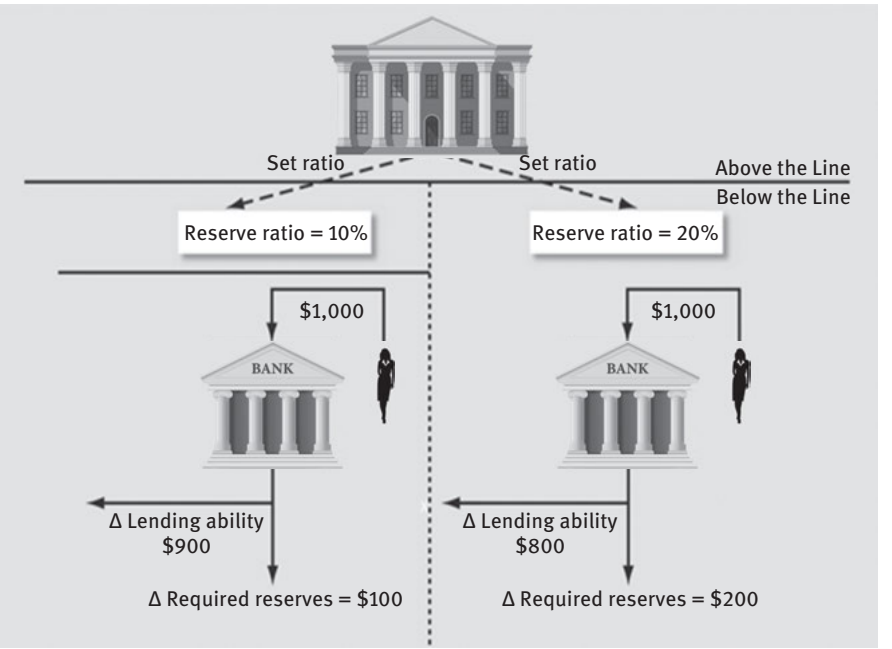

Figure 9.11: Monetary Effects of Different Reserve Requirements. (Imagery used: © MicroOne/Shutterstock; © Liravega258, Sarah Maher/123rf)

Central banks determine not only the size of the required reserve ratio but also the particular assets that qualify as reserves. For instance, in the United States, only the cash in the vaults of financial institutions and deposits they hold at the Federal Reserve qualify as reserves.

Changing the reserve ratio is one of the most potent instruments in a central bank's monetary toolbox. Unfortunately, its great strength is often a weakness in disguise because central bankers may be reluctant to use it or make substantial changes. Movements in the reserve ratio indiscriminately affect all banks, regardless of their reserve or financial positions. Banks that have excess reserves or very liquid positions feel little impact when the reserve ratio is raised, but those with deficiencies or impending deficiencies could be significantly affected. Because of its broad and sweeping effects, the

required reserve ratio is changed relatively infrequently, and when it is, the change is usually by small amounts and with a considerable warning to the banking system.

Many nations have voluntarily abandoned the reserve ratio as a monetary tool because they believe other monetary tools are sufficient for their needs. Among the industrialized countries that impose no reserve requirements on banks are Australia, Canada, Denmark, New Zealand, Norway, and Sweden.

Do Reserve Requirements Protect Banks and Depositors?

Reserve requirements are imposed to control the ability of financial intermediaries to create money. They do not protect banks or depositors from massive withdrawals (i.e., runs) or ensure that funds will be available if substantial customer withdrawals occur. To understand why, suppose the reserve ratio was 10%, and a bank held precisely $100 million in reserves to back its $1,000 million of deposit liabilities. The bank would be just meeting its reserve requirements with nothing to spare. Do these reserves protect depositors? They would not be sufficient if customers tried to withdraw, all at once, (say) $150 million of the $1,000 million they deposited because the bank would have only $100 million on hand in reserves. The rest would already have been invested in loans and securities.

Suppose depositors' demands were much smaller. For instance, suppose withdrawals were only $10 million of the $1,000 million deposits. Would the bank have enough funds on hand to cover even this relatively small demand and still meet its reserve requirements? Figure 9.12 shows that a withdrawal of $10 million would cause both the bank's cash reserves and deposit liabilities to fall by $10 million. A $10 million cash withdrawal would reduce the bank's reserves by $10 million, but its required reserves would fall only by $1 million. As a result, the bank would hold reserves of $90 million, but its required reserves would equal $99 million.[12] Therefore, the bank would be $9 million below the reserves required.

The takeaway from this discussion is that the reserve ratio is a monetary tool that allows central banks to control the ability of financial intermediaries to create money. It does not protect banks and depositors from bank runs or provide banks with extra funds to meet extraordinary customer withdrawals.

12 Before the withdrawal, the reserve requirement was 10% of deposits worth $1,000 million, which equaled $100 million. Afterward, they are 10% of deposits worth $990 million, which equals $99 million. Therefore, required reserves fall by only $1 million.

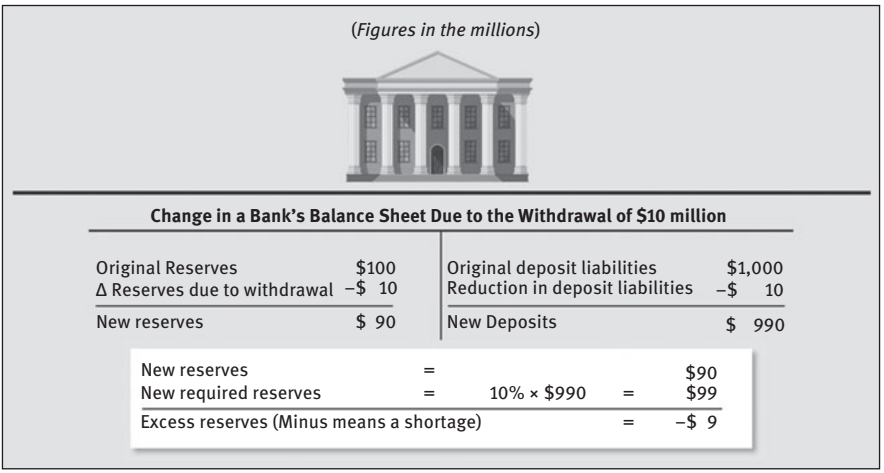

Figure 9.12: Monetary Effects of Cash Withdrawals. (Imagery used: © MicroOne/Shutterstock)

Interest Return on Bank Deposits (Reserves) at the Central Bank

Central banks determine not only the size of the reserve ratio and the particular assets that qualify as reserves but also the interest rate (if any) they give on deposited bank reserves. Cash that banks hold in their vaults earns no interest, but bank deposits at the central bank may earn a small return. For most of the U.S. Federal Reserve's history, bank deposits at the Fed received no interest, but in 2008, the Fed changed its policy and began paying banks interest on their deposited reserves.[13]

Depositing funds at the central bank has one significant advantage, which is the near absence of counterparty risk. Central banks should always be able to repay their obligations—mainly because they can create enough funds to extinguish their liabilities. Therefore, when a central bank raises the interest it gives on deposited bank reserves, the banking system responds by holding more excess reserves (i.e., they increase the preferred asset ratio, ER/D) and, thereby decrease the money multiplier.

13 See Board of Governors of the Federal Reserve System, Press Release, Release Date: October 6, 2008, www.federalreserve.gov/monetarypolicy/20081006a.htm (accessed May 27, 2019).

Monetary Tools in Action

Let's see how the monetary tools of central banks are used. Suppose a nation had a low unemployment rate, but prices were beginning to rise at an unhealthy rate. To remove the inflationary pressures from the economy, the central bank could contract the money supply or reduce its rate of growth by: (1) selling government securities in the open market, (2) selling foreign currencies in the foreign exchange market, (3) raising the discount rate, (4) increasing the reserve ratio, or (5) raising the interest rate given on banks' deposited reserves.

All of these monetary actions have one thing in common: they decrease the banking system's willingness or ability to lend. Central bank sales of government securities and foreign exchange assets reduce the banking system's reserves and force financial intermediaries to cut back loans. A higher discount rate increases the cost that financial intermediaries must pay for borrowed reserves, which reduces their incentive to borrow and lend. A higher reserve ratio directly reduces banks' excess reserves by forcing them to hold a more significant percentage of their deposits as idle required reserves, which earn little or (in some countries) no interest, and cause the nation's M2 money multiplier to fall. Finally, a higher interest rate on bank reserves increases banks' incentive to hold reserves, rather than lend them to customers who might default.

Financial intermediaries react to the curtailed availability of liquidity by raising the real interest rates they charge customers, which discourages customers from taking new loans. For example, these rate hikes might be enough to dissuade some consumers from financing new cars, televisions, appliances, vacations, and furniture. Similarly, they might discourage some businesses from funding marginal investment projects, such as new machinery, renovations, larger inventories, or plant expansions.

If consumer loans fall, so will the demand for goods and services, causing business inventories to rise. To reduce swelling and unwanted inventories, businesses might decelerate production by running their factories for fewer hours, cutting back labor hours, or laying off workers. By slowing production lines, the demand for factory inputs (i.e., labor and materials) would fall, putting pressure on suppliers to cut employment, production, and prices. A chain reaction of cause-and-effect events would follow and cascade their way through the economy, resulting (usually) in lower price levels (or lower inflation rates) and higher unemployment. As workers' incomes fall, they reduce their demands for goods and services, which feeds back, once again, to businesses that face even weaker sales. Ultimately, these effects are repeated in ever-widening cycles of reduced spending. This self-reinforcing cycle is a characteristic feature of economic

downturns. When the economic slump is small or moderate, it is called a *recession*. When it is severe, it is called a *depression*.

Lags in Monetary Policy

Monetary policies lose their effectiveness if there are significant delays caused by (1) a failure to recognize fundamental economic changes, (2) sluggishness in implementing new monetary policies, or (3) having to wait extended periods until these policies take effect. At best, these lags are irritants that cause impatience and frustration. At worst, they are destabilizing and harmful to domestic and international markets. The longer the delay, the less likely it is that a pressing economic problem will be matched with the best monetary cure. Three significant lags are associated with monetary policies, namely, the recognition lag, implementation lag, and impact lag (see Figure 9.13).[14]

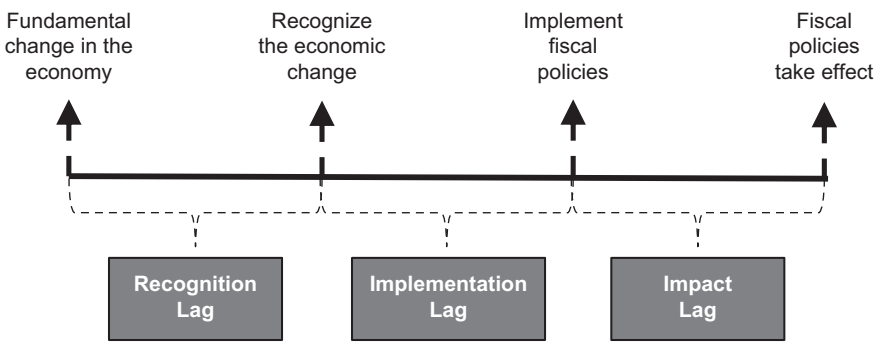

Figure 9.13: Lags in Monetary Policy.

The *recognition lag* is the time between when a fundamental economic change occurs and policymakers recognize its potential implications. It is a problematic lag to reduce because virtually all of the economic variables that track business cycles are reported either monthly or quarterly. When these statistics become available, monetary authorities may not react to them immediately because initial estimates are frequently inaccurate, incomplete, and revised. Therefore, time is needed to correct, refine, and interpret this information. One method economists and government officials have used to shorten the recognition lag

14 Milton Friedman, "The Lag in Effect of Monetary Policy," *Journal of Political Economy*, pp. 447–466 (1961), http://www.jstor.org/stable/1828534 (accessed May 27, 2019).

is improving their economic forecasts. Sophisticated econometric models have been designed for this purpose, and nations report leading economic indicators to signal future changes in economic activity. The problem with both of these forecasting methods is unevenness in their effectiveness.

The *implementation lag* is the time it takes a central bank to react to the new economic information. Fortunately, central banks can change their policies almost instantaneously because they meet regularly (e.g., the Fed meets every four to six weeks). In emergencies, they could respond immediately—even if the meetings were nothing more than telephone conference calls.

Finally, the *impact lag* is the period between when a policy is changed and when it takes full effect. For monetary policy, this lag is potentially the most extended and variable of all.

The lags in monetary policy can cause significant delays lasting many months or even years. By that time, the nation could be in a completely different economic condition. Such long lags could cause policies, meant to dampen a hyperactive economy, to take effect when it is entering a recession. Similarly, policies intended to stimulate a sluggish economy might take effect after it has already recovered on its own and is facing rising inflationary pressures.

Summary of "The Basics"

Central banks regulate their nations' money supplies by using five major tools: open market operations, foreign exchange market intervention, the discount rate, reserve requirements, and the interest on deposited bank reserves. To adjust the money supply, they must change the monetary base or the money multiplier. The nation's monetary base changes with open market operations, foreign exchange market intervention, and discount loans. Its money multiplier changes with adjustments to the reserve requirement ratio and the return on deposited bank reserves. The money multiplier also changes when a nation's real interest rate fluctuates, causing individuals and financial intermediaries to alter their preferred asset ratios (see Figure 9.14).

Only transactions between central banks (above the line) and counterparties (below the line) change a nation's monetary base. Examples of transactions that do not affect the monetary base are (1) fiscal policies connected to taxing, spending, and borrowing, which are entirely below the line; (2) foreign exchange transactions among individuals, companies, and banks, which are entirely below the line; and (3) central bank swaps, which are entirely above the line.

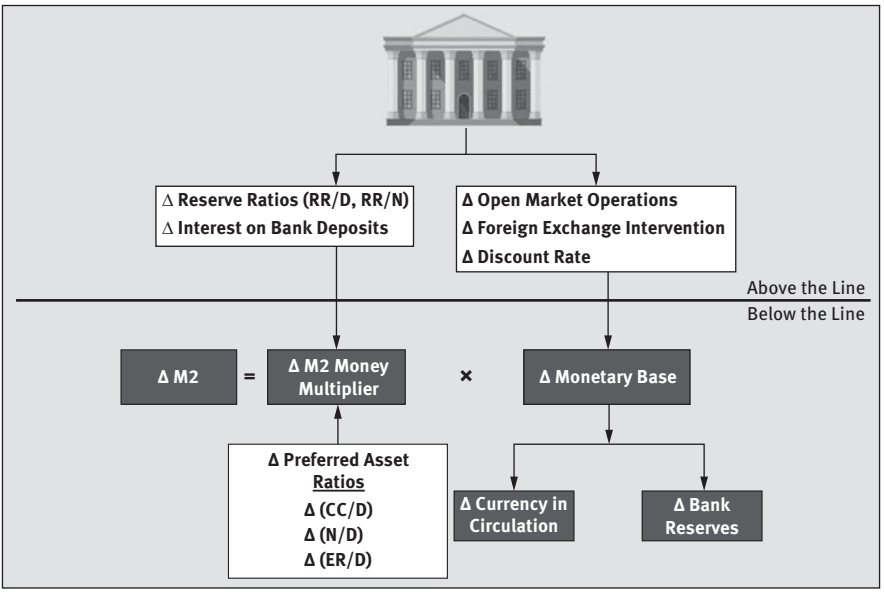

Figure 9.14: Major Monetary Tools of Central Banks. (Imagery used: © MicroOne/ Shutterstock)

The Rest of the Story

Central Banking: A Balance Sheet View

Variations in a nation's monetary base are dependent on changes in its central bank's balance sheet. If the balance sheet increases, the nation's monetary base rises, and if it decreases, the monetary base falls. Figure 9.15 shows the generic assets and liabilities that most central banks use to influence their nations' monetary bases. Their composition can vary considerably from nation to nation. Let's briefly review these assets and liabilities.

Major Central Bank Assets

Central banks have many assets, such as buildings, land, computers, cars, trucks, and planes, but the assets that are most important for conducting monetary policy are government securities, international reserves (mainly convertible foreign currencies), and discount loans. These assets were the focus of our attention in *The Basics* portion of this chapter.

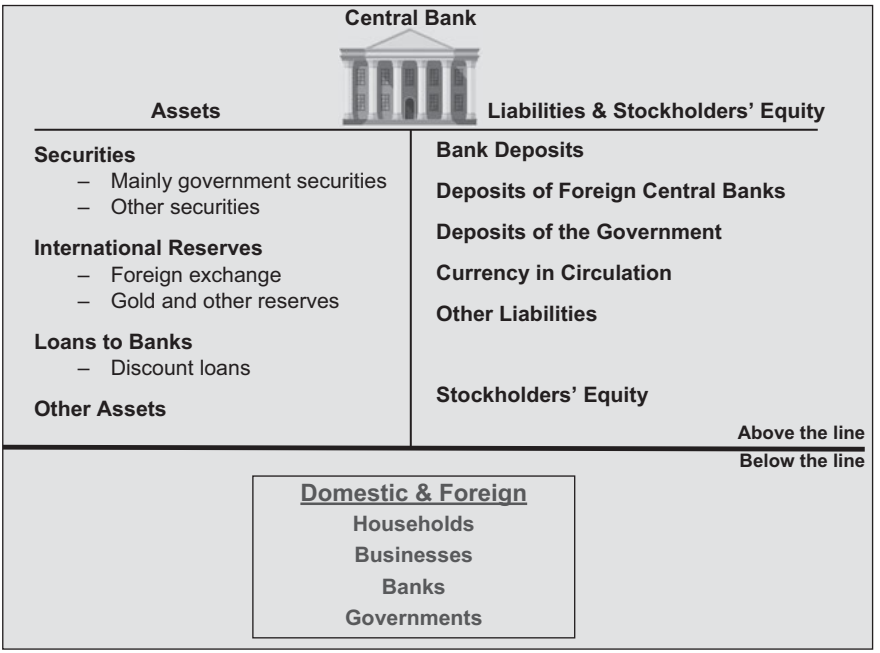

Figure 9.15: Major Accounts in a Central Bank Balance Sheet. (Imagery used: © MicroOne/ Shutterstock)

Government Securities and Other Eligible Financial Instruments

Central banks purchase government securities and other eligible financial instruments from individuals, financial intermediaries, businesses, and other institutions below our imaginary horizontal line. While it might be legal or otherwise permitted for them to purchase these securities directly from their national governments, few central banks do so because of inflationary fears that arise when central banks are viewed as the ultimate financiers of big government spending programs. Instead, they purchase them in the *open market*, which means buy securities in secondary markets, after they have been issued, bought, and are available for resale.

International Reserves

A central bank acquires foreign currencies by purchasing them in private foreign exchange markets, which are below our imaginary horizontal line. To buy foreign currency, the central bank must simultaneously sell its own. When the supply of a nation's money increases in the foreign exchange market, its international value falls (i.e., depreciates) relative to the currency bought. An

alternative way of saying the same thing is increasing the demand for a foreign currency causes its value to appreciate.

For example, suppose the Federal Reserve wanted to stimulate exports by lowering the dollar's value from €0.80/$ to €0.70/$. To lower the dollar's value, the Fed would sell sufficient quantities of dollars (i.e., purchase adequate amounts of euros) to reduce the dollar's value from €0.80/$ to €0.70/$. These euros would end up as assets on the Federal Reserve's balance sheet. In particular, the Fed's new asset could be (1) a deposit at the ECB (i.e., above our imaginary horizontal line), (2) a deposit at a financial institution (below the line), or (3) an interest-earning security or stock issued by a government or company (below the line).

Discount Loans

When central banks lend to domestic banks and other financial intermediaries, the interest rate they charge is called the *discount rate*. These loans are collateralized, which means that the borrower (bank) must back them with securities that are acceptable to the central bank. Among the securities that typically qualify as "eligible paper" are government bonds, bills, and notes; government-guaranteed securities; and other high-quality assets. Usually, discount loans have short-term maturities (e.g., one day to two weeks) and are not meant to be a continuing source of liquidity for any particular bank. Central bank rules can be (and have been) modified or changed in times of crisis. For example, relatively recent turmoil surrounding the debts of some members of the European Monetary Union has caused the ECB (and other central banks) to expand the list of assets that qualify as eligible paper.

Major Central Bank Liabilities

Central bank liabilities are tied directly to the money creation process and services it performs for the banking system, government, and foreign central banks. Let's take a look at the most important central bank liabilities.

Deposits of Banks

It is important to remember that the deposits that financial intermediaries hold at the central bank are part of a nation's monetary base. To the central bank, they are liabilities, but they are assets to the financial intermediaries that deposited them.

Financial intermediaries deposit funds in the central bank for two significant reasons. First, they qualify as reserves for meeting their reserve requirements.

Second, they facilitate check clearing. Because an efficient check-clearing system is vital to any economy, central banks usually play prominent roles as major clearinghouses.[15]

In its role as a clearinghouse, a central bank sorts checks, routes them to and from banks, and increases or decreases members' accounts by the net amount of deposits or withdrawals. Clearinghouses do not exist because central banks created them. They existed long before central banks arrived on the scene and have survived because they perform needed financial services efficiently, effectively, and relatively inexpensively.

Deposits of Foreign Central Banks

Central banks that acquire international reserves often hold them on deposit in foreign central banks. For example, the ECB holds U.S. dollar-denominated international reserves at the Fed. For the Fed, these deposits are liabilities and are listed in its balance sheet as *deposits of foreign central banks*.

Perhaps an example is the easiest way to understand changes in this account. Suppose the ECB wanted to lower the euro's value below \$1.20/€. To do so, it purchased \$120 million, sold €100 million, and transferred \$120 million to its account at the Fed. As a result, the Fed's liabilities to the ECB would rise by \$120 million.

Deposits of the Government

A central bank is the financial (i.e., fiscal) agent of the national government, which means it helps the national treasury (or finance ministry) administer several important financial services. Among these services are the collection of taxes, issuance and redemption of debt, and payment of interest on outstanding debt. National governments also write checks on their balances at central banks.

Many governments hold most of their deposits in commercial banks (below the line) but write checks on their central bank accounts (above the line). This system may seem a bit convoluted, but it is done to minimize the impact government taxes and expenditures might have on a nation's monetary base. For example, suppose a government held all its deposits in the central bank, and residents paid taxes equal to \$100 billion. If the funds

15 Many banks also clear their checks through private financial intermediaries, such as large commercial banks, rather than through the central bank. They do this mainly when the private financial intermediaries are more convenient or less costly than the central bank.

flowed above our imaginary horizontal line, they would reduce the nation's monetary base by $100 billion. Then these same funds would flow back into the economy and inflate the monetary base when the government spent them.

It is for this reason that a government holds most of its funds in *tax and loan accounts* at financial institutions (below the line) and transfers funds to the central bank only when it is going to make payments. The funds are then spent quickly, so the duration of any change in monetary base is very short. Moreover, such transfers are communicated to the central bank so that unwanted, temporary changes in the monetary base can be offset. For our purposes in this book, we will assume that all government deposits remain in financial intermediaries below the line. Therefore, government payments and tax receipts do not affect the monetary base.

Currency in Circulation

If you open your wallet and take a close look at the paper currency (i.e., cash) inside, you will find that the funds (regardless of whether it is dollars, pounds, euros, ringgits, pesos, or yen) are a liability of the central bank that issued it. In the United States, these bills have "FEDERAL RESERVE NOTE" printed across the top, which indicates that they are liabilities of the U.S. Federal Reserve System.

Have you ever wondered how a central bank gets paper currency into or out of circulation (i.e., below or above the line)? Spending it would be impractical because open market operations and discount loans are too large for cash transactions, and the settlement process would be too slow. Instead, central banks stand by, passively, and wait for banks to demand cash. The process goes something like this:

Suppose it is the December holiday season when people tend to use more cash than usual for shopping and gift giving. If a bank found the cash in its vault is running low by $50,000, the bank manager would contact the central bank and ask for cash to be transferred as soon as possible. The central bank would respond to this request by reducing the bank's deposit account at the central bank by $50,000 and increasing by the same amount its liability called *currency in circulation*. The $50,000 of cash would then be delivered immediately to the bank by armored car.

Figure 9.16 shows the balance sheet changes that would result from the central bank sending $50,000 cash (i.e., bills with various denominations, such as $1, $5, $10, $20, and $100) to the bank. For the central bank, the transaction merely exchanges one liability, deposits of banks, for another, currency

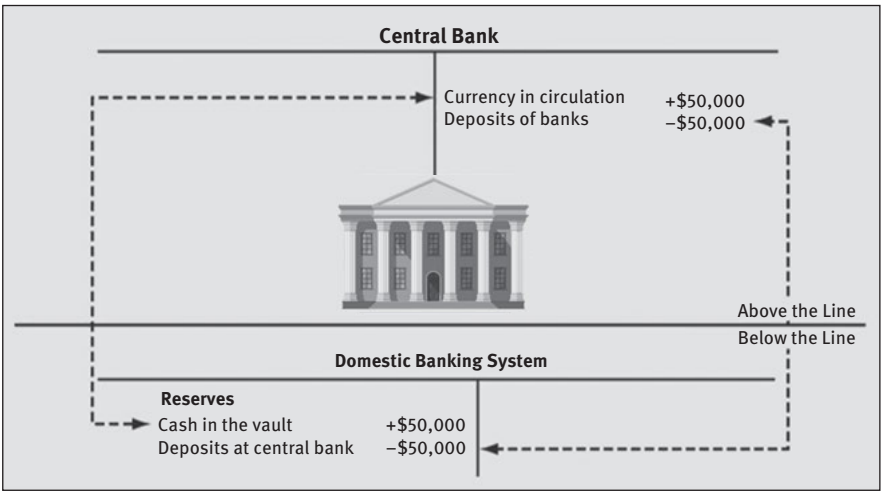

Figure 9.16: How Paper Currency Enters the Economy. (Imagery used: © MicroOne/ Shutterstock)

in circulation. For the bank (below the line), it exchanges one asset, deposits at the central bank, for another, cash in the vault.

Injecting paper currency into the economy does not affect a nation's monetary base because the sum of currency in circulation and reserves of financial intermediaries remains unchanged. Due to the injection of cash, financial intermediaries' vault cash increases by the same amount as their deposits at the central bank fall (see Figure 9.17).

Δ Monetary Base	**=**	**Δ Currency in Circulation**	**+**	**Δ Bank Reserves**		
Δ Monetary base	=	Δ Currency in circulation	+	Δ Cash in the vault	+	Δ Bank deposits at the central bank
0	=	0	+	$50,000	–	$50,000

Figure 9.17: Cash Injections into the Economy Do Not Change the Monetary Base.

Central banks remove currency from circulation by using precisely the opposite steps. For example, during the course of the business day, paper currency is deposited in and withdrawn from banks. At the end of the day, they take their

excess cash, along with any bills that are worn or damaged, and send the currency back to the central bank. When the central bank receives the bills, it increases the deposit accounts of these banks by the amount sent back and reduces its currency in circulation liability. If the bills are still in good shape, the central bank just temporarily takes them out of circulation. If they are worn or damaged, it destroys them (usually by shredding the bills).

Central Banks' Stockholders' Equity

Like any business entity, a central bank is solvent only if it has positive equity (i.e., the value of its assets exceeds the value of its liabilities). This is usually the case because central banks earn profits on the assets they purchase, and they buy interest-earning assets with money *they* create. Nevertheless, sharp reductions in the value of these assets can cause a significant deterioration in asset and equity values, which can raise difficult questions about solvency and sustainability.

Can a Central Bank Become Insolvent?

Is it possible for a central bank to become insolvent? The answer is, "Yes!" The SNB (Swiss National Bank) provides an excellent example of the possible dilemmas and concerns a central bank can face if its assets fall significantly in value.[16] Due to the Swiss franc's relative strength throughout the twentieth and twenty-first centuries, it has become a "safe-haven currency" that is in high demand in times of financial turmoil. The Swiss franc strengthened between 2007 and 2012, due to a mixture of financial, economic, natural, and human-made disasters, such as the Great Recession (2007–2009), European debt crisis (2009–2013), earthquakes, tsunamis, and the Fukushima nuclear accident in Japan (2011). As a result, strong and rapid short-term capital flowed to Switzerland in search of safety. The SNB faced a cruel dilemma. Either let the appreciating Swiss franc reduce domestic exports and risk recession or intervene in the foreign exchange market (mainly for euros) and risk inflation by over-expanding the nation's monetary base.

The SNB decided to intervene, causing the nation's monetary base to soar. Between 2007 and the third quarter of 2011, SNB's foreign currency assets more

16 See Henri B. Meier, John E. Marthinsen, and Pascal A. Gantenbein, *Swiss Finance: Capital Markets, Banking, and the Swiss Value Chain* (Hoboken, NJ: John Wiley & Sons, 2013).

than quintupled, rising from CHF 51 billion to CHF 262 billion.[17] As these acquired foreign currencies continued to depreciate, SNB's losses on these assets rose, amounting to CHF 26 billion in 2011 alone. The central bank's equity fell from 52% of assets in 2007 to 16% in 2010, and to 15% by the end of the third quarter of 2011. Nevertheless, SNB announced in September 2011 its intention to cap the Swiss franc's value at €0.83/CHF, which resulted in further accumulations of international currency reserves.

Questions and concerns arose immediately about the consequences of SNB's declining equity. Would the central bank be able to conduct monetary policy freely? Was recapitalization necessary? Was it possible for a central bank to become insolvent? In a speech responding to these concerns, Thomas Jordan, SNB's Vice Chairman at that time, stated: "[t]he short answer to these questions is 'No' because the SNB cannot be compared with commercial banks or other private enterprises. For one thing, a central bank cannot become *illiquid*. This means that a central bank's capacity to act is not constrained if its equity turns negative."[18] Thomas focused on the immunity that central banks gain from their income-generating powers connected to money creation. At the same time, he confirmed that persistent negative equity could "undermine the bank's credibility and its independence."[19] If for no other reason, a pint-sized equity-to-asset ratio would put the central bank in the tenuous position of trying to regulate private financial institutions with standards that are significantly different from the ones it used internally. This was also a vital issue for Switzerland because a diminutive central bank equity base could threaten the confidence global financial markets had in the Swiss franc and the SNB.

Macroprudential Regulations

Macroprudential regulations focus on ensuring the systemic soundness and stability of a nation's or currency area's financial system. One of its major focuses is on reducing or eliminating the negative spillover effects that can occur when failing financial institutions affect others. Macroprudential policies work to

17 Swiss National Bank 104th Annual Report 2011, SNB Balance Sheet Items, pp. 125–166, https://www.snb.ch/en/mmr/reference/annrep_2011_komplett/source/annrep_2011_komplett.en.pd (accessed May 27, 2019).

18 Thomas Jordan, Vice Chairman of the SNB, "Does the Swiss National Bank Need Equity?" http://www.snb.ch/en/mmr/speeches/id/ref_20110928_tjn (accessed May 27, 2019).

19 Ibid.

ensure that financial institutions have sufficient liquidity and equity levels to meet stressful financial conditions. Among the many macroprudential tools, two have drawn special interest: countercyclical capital requirements and forward guidance.

Countercyclical Capital Requirements

Countercyclical capital requirements are risk-based equity rules that vary inversely with business cycles. During economic expansions, they require financial institutions to build their equity positions, thereby, reducing the rate of credit expansion and lessening the chances of asset bubbles. During contractions, the reverse happens. Capital requirements on financial institutions are reduced, thereby enabling banks to lend to creditworthy customers by freeing the equity that was accumulated during the business cycle expansions.

Forward Guidance

Forward guidance uses transparency, public trust, and credibility to enhance central banks' monetary powers. By clearly communicating to the public its views on the state of the economy, economic outlook, and future monetary targets, a central bank can beneficially influence market expectations, thereby helping households, businesses, and investors make more rational and predicable financial and economic decisions. For example, a central bank may announce its intention to keep nominal interest rates low or within a range for an extended period. To some, these communications may seem ambiguous, such as when a central bank announces that it is likely to keep interbank interest rates between 0.00% and 0.25% "for some time," "for an extended time period," "at least through next year," "for the rest of this year," or "for as long as the unemployment rate remains above some stated amount, such as 6.0%" In the United States, the Federal Open Market Committee of the Federal Reserve has been using forward guidance since the early 2000s.

Monetary Policy Targets

To enact monetary policies, central banks often set targets for variables that have strong links to domestic living conditions and over which they have considerable control. Five of the most popular targets have been (1) inflation rates, (2) interest rates, (3) money supply growth rates, (4) GDP growth rates, and (5) exchange rates. Consistently hitting a chosen target is essential for the direct and powerful impact that success has on a central bank's credibility

and the trust that domestic households and businesses, as well as the international community, place in it. Credibility can stabilize consumer and business expectations, which enhances long-term planning for capital budgeting projects, wage negotiations, and household spending plans. The combination of trust, credibility, and stable expectations makes it easier for central banks to hit future targets and to build public support for greater central bank independence.

Targeting Inflation

During the past three decades, about 30 central banks in developed, developing, and transitional economies,[20] have used inflation targeting as their monetary strategies. In its purest form, inflation targeting requires a central bank to publicly identify an inflation goal and the period for achieving it. This target could be (1) a specific inflation rate, (2) an upper-limit rate, or (3) an inflation rate that remains within a range. If inflation targets are exceeded, central banks reduce their money supply growth rates, increase real interest rates, and slow spending. For inflation rates below the targets, they implement expansionary monetary policies.

Inflation targeting is strongly consistent with the belief that central banks can influence prices more than real GDP. It focuses central bank attention on *domestic* shocks and conditions. By choosing a low, positive inflation goal, rather than 0%, central banks reduce the chances of deflation, with which most nations have little or no experience.

In the past, *properly designed* inflation-targeting strategies have not severely compromised other vital measures of economic health, such as output growth, and they have been most successful when:[21]

1. Controlling inflation was the central bank's primary, if not exclusive, goal,
2. The time frame was long enough for policies to be flexible, which means adaptable to changing economic conditions,[22]

20 The developed nations have included Canada, Israel, New Zealand, Sweden, Switzerland, and the United Kingdom. Developing countries using inflation targeting have included Brazil, Chile, Indonesia, Mexico, Norway, Republic of Korea, South Africa, and Thailand. The transition nations have included Albania, the Czech Republic, Hungary, Poland, Romania, and Serbia.

21 Frederic S. Mishkin, "Issues in Inflation Targeting," in *Price Stability and the Long-Run Target for Monetary Policy*, (Bank of Canada: Ottawa, Canada, 2001), pp. 203–222.

22 This period is often referred to as the "medium term," which is usually meant to be two to three years.

3. Inflation targets were relatively low,[23]
4. Recent inflation rates were tepid and stable, and
5. Accountability was placed squarely on the central bank's shoulders.

Despite its proven advantages, legitimate concerns surround inflation targeting due to fears that central banks might focus too intensely and myopically on this one specific goal. Critics ask if this strategy might inhibit central banks' ability to respond quickly, correctly, and effectively to:

1. Inflation that is caused by supply-side shocks, such as poor weather conditions, earthquakes, hurricanes, tsunamis, fires, and oil embargos,
2. Inflation that is caused by excessive fiscal stimulation,
3. International forces that threaten the domestic economy,
4. Asset-price bubbles (e.g., housing and stocks) that burst and threaten nations' financial systems,
5. Financial-market innovations that alter borrower, lender, and spender habits, and
6. The long and variable lags that accompany monetary policies (i.e., recognition, implementation, and impact lags).

Targeting Interest Rates

Nominal interest rates are affected by both real interest rates and expected inflation rates. Real interest rates fluctuate with movements in the supply and demand for real credit per period. Central banks influence real interest rates via their ability to change the supply of money and real credit. Targeted rates tend to be short-term nominal ones, such as interbank rates and repurchase agreement rates, but some central banks, such as the Fed, have tried to influence longer-term interest rates, which have a considerable influence on housing, construction, and business investment decisions.

Targeting Money Supply Growth

A nation's money supply is equal to its monetary base times the money multiplier. While central banks have virtually complete control over their nations' monetary bases, their power over the money multipliers is only partial, thereby complicating attempts to hit specific targets. Money supply targets were popular in the 1980s, but their use has waned since then. One reason has been a

23 "Relatively low" means between 1% and 3%. The central banks of most developed nations have used 2%.

surge in financial innovations, which have changed the way households and businesses use and hold money, thereby rendering the historical relationships between money supply changes and economic activity less reliable. Another reason has been the significant and erratic lags between when the money supply has changed and when economic variables have reacted to these changes

Targeting Nominal GDP

Nominal GDP is the market value of all final goods produced in an economy during a given period. In short, it equals the GDP Price Index times the real GDP (see Chapter 4, "Inflation and Real GDP").[24] Targeting nominal GDP means increasing inflation when real GDP growth rates fall and reducing it when they rise. This strategy has been proposed as an alternative to others explained in this section but, as yet it has not been enthusiastically embraced by central banks.

Targeting Exchange Rates

In Chapter 20, "Shocks to Nations with Fixed Exchange Rates," we will thoroughly discuss the economic implications of central banks that fix their exchange rates to a foreign currency or baskets of foreign currencies. We will learn how a fixed-exchange-rate strategy can restrain a central bank's ability to respond effectively and quickly to changes in their domestic economic situations and how it hinders a central bank's ability to conduct independent monetary policies.

Margin Requirements: A Selective Monetary Control Some central banks, such as the Fed, have been given the power to determine margin requirements, which are rules that do not directly affect a nation's monetary base or money multiplier but can have a powerful impact on the types of loans banks make. A *margin requirement* is the percentage down payment an individual must make to purchase a security, such as a stock or bond. The rest of the security's purchase price can be borrowed. For example, if the margin requirement on a share purchase were 90%, then 90% of the stocks' value would have to be paid outright, and only 10% could be borrowed to purchase the share.

Margin requirements are like *good-faith performance deposits* because they protect brokers from customers whose stocks fall in value and then are unable to repay their loans. If the value of a security falls and an investor is unable to

24 Nominal GDP $\equiv$ (P $\times$ RGDP)

maintain the required margin amount, the broker could sell the security and use the proceeds to pay off the loan.

Margin requirements also regulate the level of risk that individuals can take when they purchase stocks and bonds. An example helps to explain why. If the margin requirement were 100%, then to buy shares worth $100,000, you would have to pay the full $100,000. If these stocks rose in value by 20%, they could be sold for $120,000 and earn a 20% return. In other words, if the margin requirement were 100%, the percentage return on invested capital would be equal to the percentage return on the shares purchased.

By contrast, suppose stocks worth $100,000 were purchased with 50% margin. To buy the shares, you would have to ante up $50,000 and could borrow the remaining $50,000 from a bank or broker. If share prices rose by 20%, the investment would be worth $120,000. With the $120,000, you could pay off the $50,000 loan and have $70,000 remaining. Earning a $20,000 return on the original $50,000 of personal funds invested translates into a return equal to 40%.[25]

Reducing the margin requirement from 100% to 50% doubled the investment return from 20% to 40%.[26] This amplification effect is caused by *leverage*, which means utilizing borrowed money to increase the size of an investment. With a 50% margin requirement, for every $2 of investment assets, an investor needs to use only $1 of his/her own funds. Here, the leverage factor is equal to two.[27] When leverage equals two, any gain (or loss) made on personally invested funds is doubled.

If leverage sounds almost too good to be true, it is, because we have only considered the rewards from leverage and not the possible losses. Stock prices can fall, and, when they do, the unpleasant side effects of leverage become immediately apparent because leverage magnifies losses. To see why, suppose stocks worth $100,000 were purchased with a 100% margin requirement, and their prices fell by 20%. When they were sold, the shares would be worth only $80,000, which would be a 20% loss on the original position.

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25 ($20,000 ÷ $50,000) = 0.40 × 100% = 40%

26 Of course, buying shares on margin would also mean paying interest costs on the borrowed funds, and these interest expenses would reduce the return. For instance, in the previous example, suppose the annual interest cost was 5%, the investor held the shares for one year, and at the end of the year, share prices rose by 20%. The investment return would fall from 40% to 35% because borrowing costs of $2,500 (i.e., 5% × $50,000 of borrowed funds) would reduce the annual return to $17,500 (i.e., $20,000 – $2,500 = $17,500).

27 Leverage = Total amount of invested funds ÷ Own funds invested

By contrast, suppose the stocks were purchased with a 50% margin, and their prices fell 20%. Selling them for $80,000 would allow the investor to repay his/her $50,000 margin loan, but he/she would be left with only $30,000. Because the investor started with $50,000 and ended with only $30,000, the percentage loss would be 40%.[28] Notice how the percentage gains and losses are symmetric when prices rise and fall, which is the case with every leverage level.

These examples show how margin requirements can influence the level of stock market speculation. Low margin requirements allow investors to leverage their investments with borrowed funds, which raises financial risk levels in the nation. High margin requirements reduce investors' and speculators' ability to leverage their returns.

A real-world example may help cement the role and effects of margin requirements. During most of the 1920s, stock prices in the United States rose almost continuously. As a result, many Americans expected prices to continue their ascent and invested heavily in the stock market. After all, why be left behind when everyone else is getting rich! With this in mind, consider the financial devastation that occurred when stock prices fell during the Great Depression. Margin requirements during the 1920s were as low as 10%, which added fuel to the stock-buying craze. Investors and speculators, who leveraged their positions to the maximum, faced potential gains and losses of 100% for every 10% change in the average stock price.

The U.S. stock market crashed in 1929 and continued to plummet in the following years. Individuals who had borrowed on 10% margin and got out of the market when stock prices fell by 10% were lucky. They only lost 100% of their invested funds, but they didn't lose more than they had invested. Investors who borrowed on 10% margin and got out when prices fell by 20% were less fortunate because they lost everything they invested and 100% more. In retrospect, they also could have considered themselves lucky.

When the market finally hit bottom, many families had lost their entire life's savings and were so hopelessly in debt that they needed more than a lifetime to repay their losses. For virtually anyone who invested during these years, the decline in prices left deep scars. To give a sense of their despair, Figure 9.18 shows the change in U.S. stock prices from 1929 to 1933 for seven of the highest-quality (i.e., "blue chip") U.S. stocks. Prices of these shares fell between 77% and 98%.

28 $-\$20{,}000 \div \$50{,}000 = -0.40 \times 100\% = -40\%$

STOCK NAME	PRICE ON SEPTEMBER 3, 1929	LOWEST PRICE DURING 1932	PERCENTAGE CHANGE
American Telephone & Telegraph	$304.00	$70.25	−76.9%
Bethlehem Steel	$138.75	$7.25	−94.8%
General Electric	$396.25	$8.50	−97.9%
General Motors	$71.75	$7.38	−89.7%
Gillette	$138.00	$10.38	−92.5%
Procter & Gamble	$92.13	$19.50	−78.8%
Radio Corporation of America	$99.88	$2.50	−97.5%

Figure 9.18: Stock Market Prices of Seven Blue Chip U.S. Companies, 1929 and 1932.
Sources: AT&T Historic Strock Data, http://www.att.com/ir/ (accessed June 5, 2006); *The Wall Street Journal,* "New York Stock Exchange Transactions," September 4, 1929, 32 (accessed through ProQuest, June 5, 2006); *The Wall Street Journal,* "New York Stock Exchange Transactions," December 31, 1932, 32 (accessed through ProQuest, June 5, 2006)

Monetary Effects of Central Bank Foreign Exchange Market Intervention

When a central bank intervenes in the foreign exchange market, does it make a difference, in its effect on the monetary base, if the counterparty is a domestic or foreign financial institution, individual, company, or government? We will find that it does not matter.

Central Bank Trades with Domestic Banks

When a central bank intervenes in the foreign exchange market, it contacts the foreign exchange desk of a financial institution, such as a bank (below the line), to execute the deal. It is the financial institution's job to find a counterparty willing and able to buy when the central bank wants to sell and sell when the central bank wants to buy.

Suppose the exchange rate is ¥110/€, and the ECB wants to lower the value of the euro relative to the Japanese yen to ¥100/€. To do so, the ECB would supply enough euros to the market to drive the exchange rate down to ¥100 billion. Therefore, suppose the ECB exchanges €1 billion for ¥100 billion and transfers its newly purchased yen from Japanese banks (below the line), where they were previously held by euro-area banks, to the BOJ (above the line). Figure 9.19 shows the results of these transactions on the ECB, euro-area banks, Japanese banks, and the BOJ.

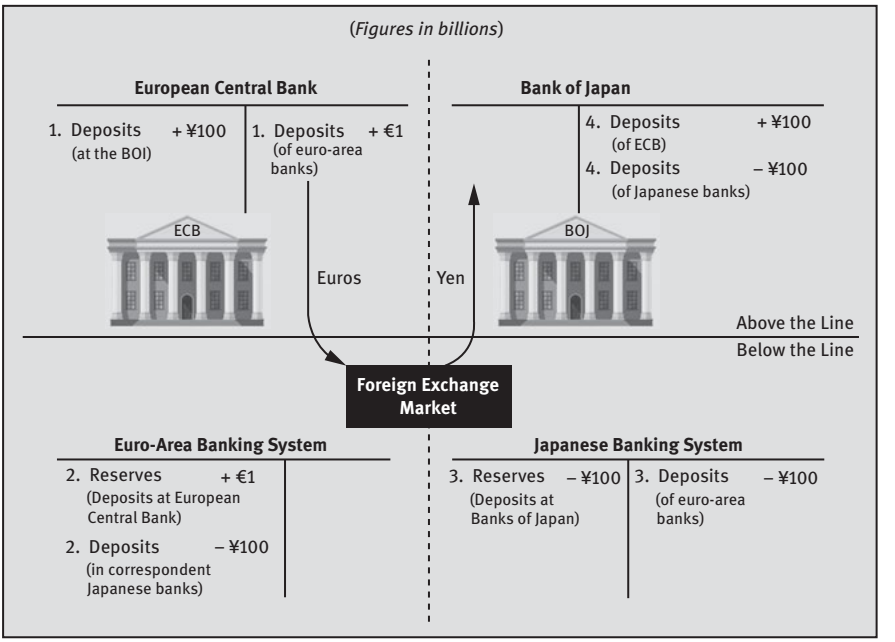

Figure 9.19: Effects When the ECB Buys Yen from European Banks. (Imagery used: © MicroOne/Shutterstock)

- *ECB*: Suppose the ECB holds its newly acquired yen in the BOJ. The ECB's yen assets rise by ¥100 billion, and its liabilities to euro-area banks increase by €1 billion. The yen assets are the ECB's new deposits at the BOJ. These transactions are labeled #1 in Figure 9.19.
- *Euro-area banks*: After the funds are cleared and the transactions settled, the euro-area banks (below the line) lose assets worth ¥100 billion, which were on deposit at their Japanese correspondent banks. At the same time, they gain a €1 billion deposit at the ECB, causing the euro area's monetary base to rise by €1 billion. These transactions are labeled #2 in Figure 9.19.
- *Japanese banks*: Japanese banks (below the line) lose ¥100 billion of their liabilities to the euro-area banks. After the ECB transfers its newly purchased ¥100 billion to the BOJ, the Japanese banks also lose ¥100 billion of their deposits at the BOJ. This decrease in Japanese banks' deposits at the BOJ causes the nation's monetary base to fall ¥100 billion. These transactions are labeled #3 in Figure 9.19.

– *BOJ*: Finally, the BOJ gains a new ¥100 billion liability to the ECB, and it loses a ¥100 billion liability to the Japanese banks. These transactions are labeled #4 in Figure 9.19.

Central Bank Trades with Foreign Banks

As in the previous example, suppose the ECB intervenes in the foreign exchange market to lower the euro's value in terms of the yen from ¥110/€ to ¥100/€, but this time its counterparties are Japanese banks. Figure 9.20 shows the consequences.

– *ECB*: As in the previous example, the ECB's yen deposits at the BOJ rise by ¥100 billion, and its liabilities to euro-area banks rise by €1 billion. These transactions are labeled #1 in Figure 9.20.
– *Japanese banks*: This example is a bit more complicated than the previous one when euro-area banks were the counterparties. To ease the discussion, picture the ECB sending the Japanese banks checks for €1 billion. The Japanese banks collect the funds by sending the euro-denominated checks to their euro-area correspondent banks and clearing them through

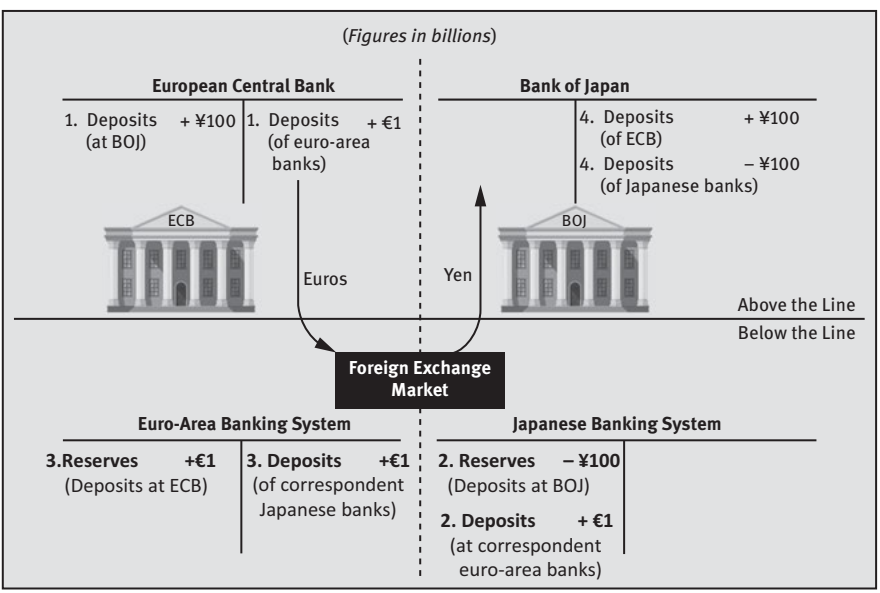

Figure 9.20: Effects When the ECB Buys Yen from Japanese Banks. (Imagery used: © MicroOne/Shutterstock)

the euro-area banking system. After the checks clear, the Japanese banks have €1 billion more on deposit in their euro-area correspondent banks. At the same time, these Japanese banks lose ¥100 billion of their reserves at the BOJ. The new owner of these yen deposits is the ECB. These transactions are labeled #2 in Figure 9.20.

- *Euro-area banks*: The liabilities of euro-area banks rise by €1 billion from the new deposits of their Japanese correspondent banks. On the asset side of their balance sheets, deposits at the ECB rise by €1 billion, which reflects the newly created monetary base from the central bank's intervention. These transactions are labeled #3 in Figure 9.20.
- *BOJ*: Finally, the BOJ merely exchanges liabilities. It now owes ¥100 billion more to the ECB and ¥100 billion less to Japanese banks. As a result, Japan's monetary base falls as domestic banks' deposits at the BOJ fall. These transactions are labeled #4 in Figure 9.20.

Central Bank Trades with the Nonbank Public or Government

How would our results change if a central bank's counterparties were individuals, financial institutions, businesses, or governments, instead of domestic or foreign banks? As was the case in the previous example, the effect on the monetary base would be the same. Figure 9.21 shows the results.

- *ECB*: The ECB's yen deposits at the BOJ rise by ¥100 billion, and its liabilities to euro-area banks rise by €1 billion. These transactions are labeled #1 in Figure 9.21.
- *Euro-area banks*: The individuals who receive checks from the ECB clear them through the euro-area banking system. After the checks clear, these individuals have €1 billion more on deposit at their euro-area banks, and the ECB owes the euro-area banks €1 billion more. The liabilities of euro-area banks rise by €1 billion from the new deposits of their nonbank customers. On the asset side of their balance sheets, deposits at the ECB rise €1 billion, which reflects the newly created monetary base from the central bank's intervention. These transactions are labeled #2 in Figure 9.21.
- *Japanese banks*: Japanese banks lose liabilities worth ¥100 billion, which previously were owed to nonbank customers. After the ECB transfers its newly purchased ¥100 billion to the BOJ, these Japanese banks also lose ¥100 billion of their deposits at the BOJ. As a result, Japanese banks' reserves and Japan's monetary base fall by ¥100 billion. These transactions are labeled #3 in Figure 9.21.

– *BOJ*: Finally, the BOJ merely exchanges liabilities. It now owes ¥100 billion more to the ECB and ¥100 billion less to Japanese banks. As a result, Japan's monetary base falls as domestic banks' deposits at the BOJ fall. These transactions are labeled #4 in Figure 9.21.

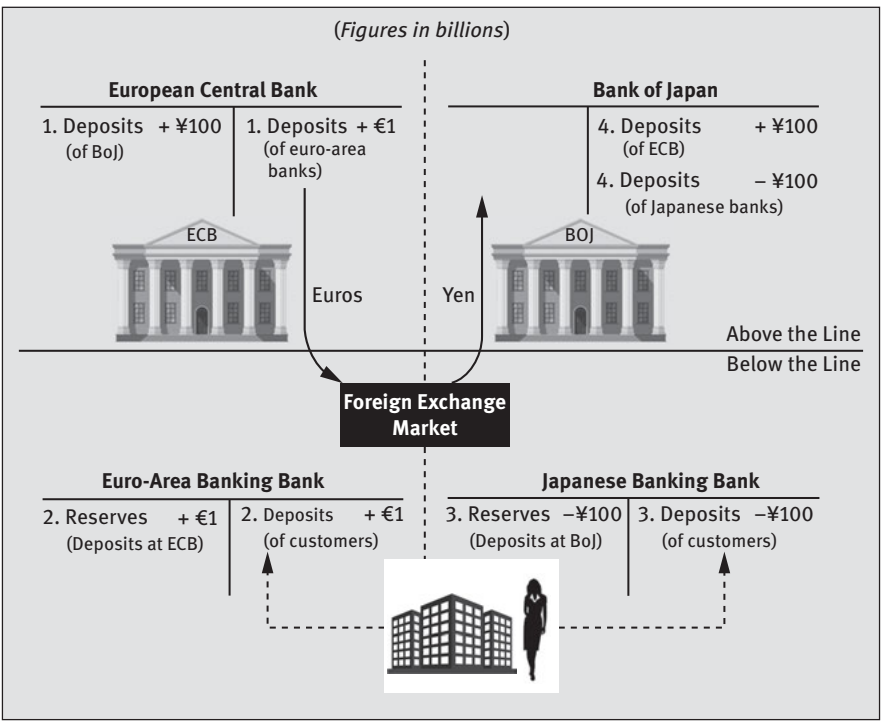

Figure 9.21: Effects When the ECB Buys Yen from the Nonbank Public or Governments. (Imagery used: © MicroOne/Shutterstock; © Sompop U-kong, liravega258/123rf)

Central Banks Around the World

It is a fair generalization to say that all cases of hyperinflation experienced over the past 2,000 years have been caused by excessive money growth. For this reason, most nations (including the United States) have had strong interests in protecting their central banks from external pressures (e.g., political, media, and vested interests), while at the same time ensuring that there are checks and balances on their central banks' powers. Academic research has provided

strong evidence that independent central banks are best able to control their nations' inflation rates.[29]

With some exceptions, there has been a clear global trend toward increasing central banks' independence from governments and ensuring that their operations and decisions are as transparent as possible. The EBC, Fed, and SNB are among the most independent central banks in the world. In some countries, such as England,[30] Japan,[31] and the United States, this independence is due to government legislation, but in other countries, such as Canada,[32] the movement toward greater central bank independence has been more informal and evolutionary in nature.

The U.S. Federal Reserve System is independent from politicians, media, and vested interests. The same is true for many other developed nations. For instance, the ECB, which began operations (along with the European System of Central Banks) in January 1999, is among the most independent central banks in the world. The ECB is considered by many to be more independent than the Fed because its monetary authority cannot be abolished or its mandate changed by legislation. For changes of this nature to take place, all EMU member nations must agree to amend the 1992 Maastricht Treaty.

The SNB is another example of a highly independent central bank. Established in 1907, the Swiss National Banking Act mandates SNB attention to price stability while taking into consideration the condition and development of the Swiss economy.[33] Despite this legislation, the SNB has felt intense external

29 Among the studies are: Jeroen Klomp and Jakob de Haan, "Inflation and Central Bank Independence: A Meta-Regression Analysis," *Journal of Economic Surveys*, Volume 24, Number 4, 2010, pp. 593–621; Philip Keefer and David Stasavage, "The Limits of Delegation: Veto Players, Central Bank Independence, and the Credibility of Monetary Policy," *American Political Science Review*, Volume 97, Number 3, 2003, pp. 407–423; Charles T. Carlstrom and Timothy S. Fuerst, "Central Bank Independence and Inflation: A Note," *Economic Inquiry*, Volume 47, Number 1, 2009, pp. 182–186; Alberto Alesina and Lawrence H. Summers, "Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence," *Journal of Money, Credit and Banking*, Volume 25, Number 2, 1993, pp. 151–162, and Federal Reserve Bank of St. Louis, "Central Bank Independence and Inflation," *Annual Report 2009*, http://www.stlouisfed.org/publications/ar/2009/pages/ar09_3b.cfm (accessed May 27, 2019).

30 In 1997, the Chancellor of the Exchequer gave the Bank of England the power to change domestic interest rates. The government retained the authority to overrule the Bank of England's actions in extreme economic circumstances, but for all practical purposes exerting such authority is unlikely to occur.

31 In 1998, the BOJ was granted more independence from the Ministry of Finance.

32 In Canada, the government still has ultimate authority over monetary policy, but in practice, this responsibility has been given to the Bank of Canada.

33 See Swiss National Bank, National Bank Act, http://www.snb.ch/en/iabout/snb/legal/id/snb_legal_law/3 (accessed May 27, 2019).

pressures from media and political arenas. For example, from 2010 to 2012 substantial exchange rate movements and strong Swiss franc appreciation forced SNB to intervene in the foreign exchange markets in response to complaints from exporters and politicians, as well as a rising tide of unemployed. External pressures are also evident in the selection and appointment process of central bank members and have also played an essential role in central banker resignations.

Table 9.1 lists the websites of 31 central banks around the world. Accessing them opens doors to a wealth of information about the history and structure of these central banks, their goals and functions, and their methods of implementing monetary policies and controls.

Table 9.1: Central Banks around the World.

	COUNTRY	CENTRAL BANK	WEBSITE
1	Algeria	Bank of Algeria	http://www.bank-of-algeria.dz/
2	Argentina	Central Bank of the Republic of Argentina	http://www.bcra.gov.ar/index_i.htm
3	Australia	Reserve Bank of Australia	http://www.rba.gov.au/
4	Brazil	Central Bank of Brazil	http://www.bcb.gov.br/?english
5	Canada	Bank of Canada	http://www.bankofcanada.ca
6	China	People's Bank of China	http://www.pbc.gov.cn/en/3688006/index.html
7	Colombia	Bank of the Republic of Colombia	http://www.banrep.gov.co/
8	European Monetary Union	European Central Bank	http://www.ecb.int/home/
9	India	Reserve Bank of India	http://www.rbi.org.in/
10	Indonesia	Bank of Indonesia	https://www.bi.go.id/en/Default.aspx
11	Iran	Central Bank of the Islamic Republic of Iran	http://www.cbi.ir/default_en.aspx
12	Iraq	Central Bank of Iraq	http://www.cbi.iq/index.php?pid=TheCbi
13	Israel	Bank of Israel	http://www.boi.org.il/en/
14	Japan	Bank of Japan	http://www.boj.or.jp/en/
15	Malaysia	Bank Negara Malaysia	http://www.bnm.gov.my/

Table 9.1 (continued)

	COUNTRY	CENTRAL BANK	WEBSITE
16	Mexico	Bank of Mexico	http://www.banxico.org.mx/
17	New Zealand	Reserve Bank of New Zealand	http://www.rbnz.govt.nz/
18	Nigeria	Central Bank of Nigeria	http://www.cbn.gov.ng/
19	Norway	Norges Bank	http://www.norges-bank.no/en/
20	Pakistan	State Bank of Pakistan	http://www.sbp.org.pk/
21	Peru	Central Reserve Bank of Peru	http://www.bcrp.gob.pe/home.html
22	Russia	Central Bank of the Russian Federation	http://www.cbr.ru/eng/
23	Saudi Arabia	Saudi Arabian Monetary Authority	http://www.sama.gov.sa/sites/SAMAEN/
24	South Africa	South African Reserve Bank	http://www.reservebank.co.za/
25	Switzerland	Swiss National Bank	http://www.snb.ch/en
26	Taiwan	Central Bank of the Republic of China (Taiwan)	https://www.cbc.gov.tw/mp.asp?mp=1
27	Thailand	Bank of Thailand	https://www.bot.or.th/English/Pages/default.aspx
28	Turkey	Central Bank of the Republic of Turkey	https://www.tcmb.gov.tr/wps/wcm/connect/en/tcmb±en
29	United Kingdom	Bank of England	http://www.bankofengland.co.uk
30	United States	Federal Reserve System	http://www.federalreserve.gov
31	Venezuela	Central Bank of Venezuela	http://www.bcv.org.ve/

Conclusion

A nation's monetary base changes only if our imaginary horizontal line is crossed and the size of the central bank's balance sheet changes. This chapter deepened our understanding of the tools that central banks use to control their nations' (or currency areas') money supplies and credit conditions. This understanding provides an appreciation for how a central bank can influence a nation's money supply via changes in the monetary base or money multiplier.

Knowledge is power—without it, discussions of monetary policies and their potential effects on financial and real markets are far less rich and productive.

In addition to the arsenal of monetary tools that central banks have to influence their nations' money supplies are levers that affect other important aspects of the financial markets, such as the composition of bank loans and level of stock and bond market speculation. One of the most important powers is setting margin requirements, which are the good-faith down payments one must make upfront when purchasing a security. Even though this tool has no direct effect on a nation's monetary base or money multiplier, central banks use it to moderate the flow of borrowed funds into the stock and bond markets. The higher the margin requirement, the lower the potential degree of stock and bond market speculation.

Key Points

- Bank regulation focuses on controlling and monitoring the conduct, performance, and condition of financial institutions.
- Monetary policy focuses on providing a nation with an optimal amount of liquidity.
- Central banks
  - Central banks around the world use the same basic set of monetary tools.
  - Central banks have virtually complete control over their nations' monetary bases.
  - Central banks do not have complete control of their money supplies because they do not fully control the money multiplier.
  - Central banks are the fiscal agents of national governments.
- Monetary Guideline #1: Above the Line/Below the Line
  - A nation's monetary base changes only when funds cross our imaginary horizontal line, due to changes in the size of the central bank's balance sheet.
  - Central banks create monetary base either by purchasing assets that are below the line or by lending to banks that are below the line. They pay for these assets and fund these loans by writing checks on themselves, which increases the nation's monetary base.
- Monetary controls
  - The primary monetary controls of central banks are the required reserve ratio, open market operations, foreign exchange market intervention, discount rate, and interest paid on bank deposits at the central bank.
  - Reserve requirements
    - Reserve requirements are imposed to control bank lending and not to ensure liquidity or solvency.
    - The reserve ratio is a rather blunt monetary tool because changes indiscriminately affect all banks regardless of their reserve or financial positions.
  - Open market operations
    - Open market operations are central bank purchases and sales of financial securities (usually, government-issued securities) in open (secondary) markets.

  - Central bank security purchases increase a nation's monetary base, and sales decrease it.
  - To increase their independence, many central banks do not purchase securities directly from the government.
  - When a central bank enters into a "repurchase agreement," it buys securities from a dealer with a simultaneous agreement to sell them back at a higher price in the future. Central bank repos increase a nation's monetary base. Reverse repos reduce the monetary base.
- Foreign exchange market intervention
  - Foreign exchange market intervention affects a nation's monetary base in the same way purchases and sales of government securities do.
- Discount rate
  - Discount loans increase a nation's monetary base. The interbank market merely redistributes the existing monetary base.
  - Reducing the discount rate encourages banks to borrow from the central bank, which increases the monetary base. Increasing the discount rate discourages bank borrowing from the central bank and decreases the monetary base.

- Monetary policy
  - Contractionary monetary policy reduces a nation's monetary base or money multiplier, which reduces the money supply. Expansionary monetary policy increases them.
  - By reducing the money supply or its growth rate, a central bank hopes to increase the nation's real interest rate, which reduces consumers' and businesses' borrowing and spending.
- Monetary policy lags
  - Three significant lags can distort the effectiveness of monetary policies. They are the recognition lag, implementation lag, and impact lag.
  - The recognition lag is how long it takes the central bank to recognize that a fundamental economic change has occurred.
  - The implementation lag is how long it takes the central bank to change its policies.
  - The impact lag is how long it takes the new central bank policies to work.
- A central bank increases the nation's currency in circulation by responding to banks' requests for cash, and customers' demands stimulate bank requests for money.
- Central bank intervention
  - Central banks hold deposits in foreign central banks.
  - The monetary effects of central bank intervention are the same irrespective of the counterparty with which it does the transaction.
- Central banks can become insolvent but not illiquid.
- Open market operations are becoming the preferred monetary tool of many central banks around the world.
- Central bank targets include inflation rates, interest rates, money supply growth rates, nominal GDP, and exchange rates.
- Margin requirements
  - Margin requirements are the good-faith deposits that investors are required to make when they purchase a security. The remainder of the security's purchase price can be borrowed.
  - Margin requirements regulate the risks investors can take when they purchase securities.

Review Questions

1. To combat inflation, suppose China's central bank raises the reserve requirement on private deposits held at banks. Explain how this reserve requirement change affects China's monetary base, money multiplier, and M2 money supply.
2. Fill in the following table. If the factors in the first column change, as indicated, in which direction will the variables in the remaining columns change for the respective nations? Consider only the immediate and direct impacts of these changes.

Impact	Monetary Base	Excess Reserves	Total Reserves
Euro-Area banks increase their borrowing from the European Central Bank.			
U.S. banks increase borrowing in the federal funds (i.e., interbank) market.			
The People's Bank of China, China's central bank, responds to slowing growth by reducing its required reserve ratio.			
France uses its budget surplus to reduce its debt level.			
The Swiss government raises income taxes.			
The Bank of Japan (BOJ), which is Japan's central bank, buys U.S. dollars (i.e., sells yen) to decrease the value of the yen.			
Japan's Finance Ministry borrows ¥10 billion by issuing long-term bonds.			
The BOJ engages in open market sales of Japanese government securities.			

3. Since 2008, many central banks, including the U.S. Federal Reserve, have broken with tradition and purchased relatively risky assets, such as private company stocks and mortgage-backed securities, from faltering banks and investment banks. Explain the effects these purchases have had on the respective countries' monetary bases, money supplies, and M2 money multipliers.
4. How does each of the following transactions (by itself) affect Japan's M2 money supply, monetary base, and M2 money multiplier? *(Do not consider the effects that changes in real interest rates might have on the M2 money multiplier. Consider only the direct impacts.)*

a. Lower real interest rates cause the public to keep more of their deposits in checking accounts and less in savings accounts and time deposits.
b. Japanese residents increase their holdings of currency relative to checking accounts.
c. The Bank of Japan (BOJ) engages in open market sales of Japanese government securities.
d. The BOJ increases the required reserve ratio on checking accounts.
e. The BOJ lowers the discount rate, and banks respond enthusiastically by borrowing more.
f. Japanese banks increase their borrowing in the interbank market.

5. Explain the lags in monetary policy. Is there a way to reduce any of these lags? Explain.

Discussion Questions

6. In 2012, Cristina Fernández de Kirchner, President of Argentina, sent a bill to Congress that would allow the government to extract central bank reserves to help pay the nation's foreign debts. Suppose you were a CEO of a multinational company thinking of building a manufacturing presence in Argentina. What are the financial risks (if any) for your potential investments in Argentina if the central bank loses its independence from the government?
7. Since 2002, the Bank of Japan (BOJ) has conducted open market operations by purchasing stocks of private companies on the Tokyo stock exchange. Explain the effect, if any, this policy has had on Japan's excess reserves, monetary base, and money multiplier. Then discuss the potential political economy problems a central bank could encounter by conducting open market operations in this manner.
8. Is it possible for a central bank to become insolvent (i.e., the value of its assets to be less than the value of its liabilities)? Is it possible for a central bank to become illiquid?
9. Is it correct to say that central banks have absolute control over their nations' money supplies? If so, how do central banks control the money supply? If not, explain why not.

Chapter 10
Real Credit Markets

The *real credit markets* are where funds are borrowed, lent, and invested. The price of these funds is called the "cost of credit," "interest rate," or "interest yield." Borrowers finance projects by demanding credit; lenders and investors earn returns by supplying it. Each currency has its own credit market, but all of them are closely linked by profit-minded participants looking to maximize risk-adjusted returns, minimize risk-adjusted costs, and arbitrage market imperfections to earn risk-free returns. This chapter begins by clarifying some basic differences between debt and equity markets, money and capital markets, and, finally, primary and secondary markets. It goes on to reinforce the important distinction between real and nominal interest rates and then finishes by explaining how the forces of supply and demand determine the cost of real credit.

The Basics

Clarifying Financial Markets

What are the differences between debt and equity markets, money and capital markets, and primary and secondary markets?

Debt Versus Equity Markets

Debt markets are where interest-earning securities are bought and sold. Issuers of these securities are borrowers, and buyers are lenders. Interest rates on debt securities can be fixed until maturity or variable, which means they can rise or fall with evolving market conditions.

Borrowers have legal obligations to pay both their interest and principal liabilities promptly. If they fail to do so and default, lenders have first rights to the borrowers' liquidated assets. Lenders have no voting rights in debtor companies. The most they can earn is the interest rate stated on their securities, which means their compensation is not tied to borrowers' performance (e.g., profitability).

Equity markets are where stocks (shares) are bought and sold. These shareholdings provide owners with partial ownership rights in the issuing companies.

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The more they own, the more significant shareholders' voting power and control. The financial rewards accruing to equity owners are in the form of dividends and capital gains. Therefore, they sacrifice a more secure return—in the form of interest compensation—for returns based on company performance. There is no legal obligation to repay shareholders. If the companies in which they invest default, stockholders are residual claimants on cash flows, profits, and assets, which means they are last in line to be paid.

Money Versus Capital Markets

Financial markets can also be separated by the maturity of financial instruments issued and traded. Money market instruments have maturities less than or equal to one year, and capital market instruments have maturities longer than one year.[1] Examples of money market instruments are checking accounts, savings accounts, certificates of deposit, short-term time deposits, Treasury bills, commercial paper,[2] and Eurodollar deposits.[3] Examples of capital market instruments are government and corporate bonds and notes, 20-year residential mortgages, and stocks (equities) such as those issued by Apple, Alphabet, Microsoft, and Novartis.

Primary Versus Secondary Markets

The primary market is where debt and equity securities are first issued. It is the original and direct source of funding for companies issuing either debt or equity instruments. Similarly, the primary market is the original and direct source of funding for governments issuing debt, in the form of bills, notes, or bonds.[4]

Securities that have already been issued on primary markets can be bought and sold on secondary markets. These markets are not sources of funding for the original borrowers but serve two very valuable purposes. First, they provide

1 Money market securities also include financial assets that were issued originally with maturities longer than one year but have only a year or less remaining until they mature. The market for buying and selling foreign currencies is called the *foreign exchange market* (i.e., *not* the money market).

2 Commercial paper is a short-term debt instrument issued by companies that borrow directly from the money markets, rather than going through financial intermediaries, such as banks. It usually finances companies' working capital needs, which is the difference between current assets, such as cash, accounts receivable, and inventories, and current liabilities, such as accounts payable. Commercial paper is sold at a discount and redeemed at its full face value.

3 Eurodollar deposits are U.S. dollar deposits in banks located outside the United States.

4 Governments do not issue equity.

existing securities holders with a way to convert their illiquid securities into cash, and second, they provide a means for interested investors to purchase debt or equity instruments in companies that are not making new issues.

Inverse Relationship Between Debt Prices and Interest Yield

Suppose a company promises to repay $100 in one year, and its securities are purchased for $95. In one year, investors (i.e., buyers of these debt securities) earn $5 on their $95 investments, which is a yield of 5.26% (see Figure 10.1). If these securities were sold for $90, investors would earn $10 on an initial payment of $90, for a yield of 11.11%. Finally, at an $80 purchase price, the yield would be 25%. So, as the price of these debt securities falls from $95 to $90 to $80, their yields rise from 5.26% to 11.11% to 25%, which means: *the lower a debt instrument's price, the higher its yield, or, conversely, the higher its yield, the lower the debt instrument's price*.

Now	Next Year	
Debt Instrument's Price	**Repayment Amount**	**Interest Yield** *(Also Called "Cost of Credit")*
$95	$100	$\frac{\$5}{\$95} \times 100 = 5.26\%$
$90	$100	$\frac{\$10}{\$90} \times 100 = 11.11\%$
$80	$100	$\frac{\$20}{\$80} \times 100 = 25.00\%$

Figure 10.1: Relationship between a Debt Instrument's Price and Interest Yield.

Cost of Real Credit

From Chapter 5, "Inflation: Who Wins, and Who Loses?" we learned that the nominal interest rate equals the real interest rate plus expected inflation (see Figure 10.2 – left side).

The remainder of this chapter focuses on the cost of real credit, which is also called the real interest rate or real cost of credit. It is important to keep in mind that "real" means "inflation-adjusted." Hence, the amount of *real* credit increases only if the quantity of nominal credit grows at a faster rate than prices. For example, if the amount of credit offered to the U.S. credit market rose

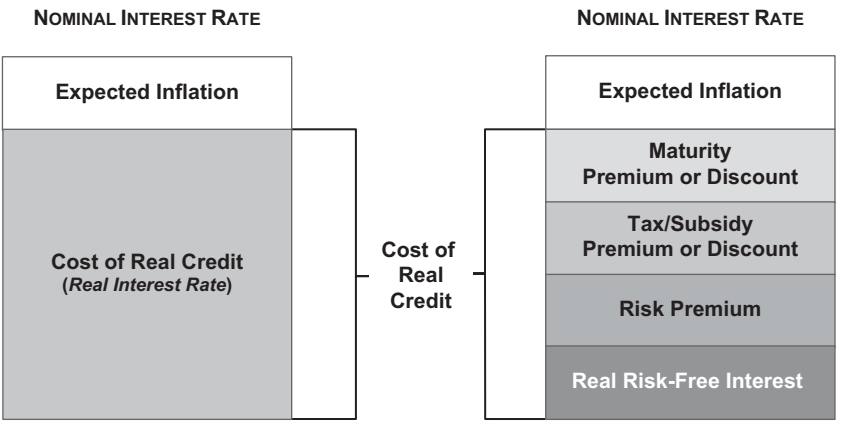

Figure 10.2: Major Factors Determining Nominal Interest Rates.

by 5% and U.S. prices also rose by 5%, the amount of real credit would not change. Only if the rate of increase was higher than inflation would real (inflation-adjusted) credit rise.

As the right side of Figure 10.2 shows, the cost of real credit has four major components, the (1) real risk-free interest, (2) risk premium, (3) premium or discount that accounts for tax and subsidy differences, and (4) a maturity discount or premium. Imagine these four factors as stacked building blocks that, placed on top of each other, equal the real interest rate. An increase in any of them adds to the height of the stack, and discounts subtract from it. Let's briefly discuss each of these major components.

Real Risk-Free Cost of Credit

The real risk-free cost of credit, also called the real risk-free interest rate (RRFIR), is the foundation on which nominal interest rates are built. It assumes away "all other factors" that might influence the real interest rate, but these "other factors" are essential. For example, the real risk-free interest rate assumes that all risks have been hedged or otherwise eliminated. It assumes there are no taxes or subsidy differences that hinder or favor the free flow of financial capital, and it ignores preferences borrowers and lenders might have for securities with different maturities. Any change in these "other factors" cause simultaneous changes in the real interest rate. Let's discuss each of them and their influence on the real interest rate.

Risk Premium

To compensate investors for uncertainty in their returns, the credit market incorporates four risk premiums into the real interest rate: (1) credit risk (also called default risk), (2) market risk, (3) industry risk, and (4) country risk.

Credit Risk (aka Default Risk)

Credit risk is the likelihood that a borrower will default on a loan by failing to make required principal and interest payments. Therefore, the credit risk premium reflects market perceptions about a borrower's willingness and ability to repay its debts, which depends on the borrower's solvency and access to liquidity.

Solvency Risk

A solvent company has assets with values greater than its liabilities, which means the company has a positive stockholders' equity. The real credit market attaches a *solvency risk* premium to each debt instrument, which reflects perceptions of the borrower's future balance sheet health. Expectations of underperforming assets, problematic liabilities, weak operating profits, rising exposures (e.g., unhedged exchange rate, interest rate, and commodity positions), and low capitalization rates[5] increase the credit risk premium that a borrower must pay.

Liquidity Risk

Liquidity risk is the likelihood that a borrower will not have funds available to repay its debts or service its other expenses and cash obligations. This lack of funds might be caused by unexpectedly low cash flows from operations, failure to refinance outstanding loans, or an inability to sell financial (or other) assets quickly and without substantial loss of value.

It is important to separate solvency risk from liquidity risk because many solvent and well-capitalized companies have failed because they did not have sufficient cash on hand to pay their obligations. Banks illustrate this point. Most bank liabilities, such as checking accounts and savings deposits, have short-term maturities, while their assets, such as auto loans, mortgages, and business loans, have considerably longer-term maturities. A bank that lends only to the highest-quality borrowers can still fail if it experiences massive depositor withdrawals, forcing the bank to finance depositor demands by exhausting its limited cash-on-hand and selling its assets at substantially reduced (fire-sale) prices.

5 A company's capitalization rate measures the value of its stockholders' equity relative to assets.

Market Risk

The market risk premium reflects the expected volatility of a debt instrument's price. It is directly related to significant macroeconomic variables, such as interest rates, exchange rates, real GDP growth rates, inflation rates, credit availability, and commodity prices. The higher the volatility, the greater the cost to hedge these risks, and, therefore, the higher the market risk premium. For example, if interest rates rise, the prices of securities with fixed interest rates fall. Investors who need to sell these securities experience capital losses on their investments, and those that need to report their balance sheets at current prices post them with lower-valued assets.

Consider Turkey. From 2000 to 2019, its inflation rate averaged approximately 17% but varied from a high of 56.4% in 2000 to a low of 6.3% in 2009. With such a broad band of fluctuation, the chances for borrowers or lenders to be harmed by unanticipated inflation rate changes were significant. To compensate for this risk, the financial markets incorporated an inflation risk premium into Turkey's cost of real credit. The greater the risk, the higher this premium. If Turkey's inflation rate had been stable at 16.8% during these 18 years and the market had expected it to remain at that level, then no significant inflation risk premium would have been incorporated into Turkey's real interest rate.

Beware: "Expected Inflation" Premium ≠ "Inflation Risk" Premium

As Figure 10.2 shows, the *expected inflation* premium is a separate component added to the cost of real credit to get the nominal interest rate. The *inflation risk* premium is a component of the block labeled "Risk Premium." Distinguishing between the two is made easier by remembering that "Expected Inflation," at the top of Figure 10.2 reflects the *average* of future inflation expectations. The volatility of expected inflation is its variance, and this variance influences risk. Therefore, high expected inflation would independently increase a borrower's nominal interest rate, but if these expectations did not change from year-to-year, the added risk premium would be zero.

Industry Risk

Cash flows in some industries are inherently riskier than they are in others. The market adjusts for these differences by incorporating an industry risk premium into the real interest rate. High-risk sectors, such as nuclear power, volatile chemicals, biotechnology, offshore drilling, and shipping, often have complex and hazardous supply chains and production processes. By contrast, examples of relatively low-risk industries are ones connected to personal consumption

expenditures, such as food distribution, vitamins, flavor ingredients, and consumer health care products.

Under normal conditions, industry risk premiums are slow to move, but rapid changes are possible. For example, quick and discrete adjustments can be caused by changes in consumer tastes; product warnings; turmoil in geographic areas of strategic importance; and government legislation, such as local-content requirements, protectionist barriers to trade, sanctions, and costly regulations.

Country Risk

A country risk premium reflects the economic, political, and social conditions of the nation or nations in which a borrower operates. Small companies that rely solely on domestic capital markets have no option but to bear this premium. Therefore, it is possible for a small, first-class borrower in an unstable nation to pay a higher cost of credit than a lower-rated company in a stable country. By contrast, large, multinational companies can choose from a variety of global markets, which reduces their vulnerability and exposures to the risks of any one nation.

The country risk premium reflects current and expected changes in a nation' (or region's) political and social conditions. Businesses look for fair and equal treatment under the law, and the credit markets penalize nations where such treatment is not present or when it is threatened. The country risk premium also takes into consideration the relative competence and stability of governments, frequency and evenhandedness of elections, fairness of the political process, and a government's willingness and ability to deal with social problems.

Perceived levels of corruption and bureaucracy in a nation are also significant, as are fears of government intervention, confiscation, or expropriation. Finally, this premium is affected by ethnic, cultural, and religious turmoil, as well as the chances of social unrest or conflicts (e.g., riots, terrorism, strikes, and demonstrations).

Is Government Debt "Risk-Free?"

Debt issued by national governments is often considered to be "risk-free," but is this true? A close look reveals it is not. Consider governments that issue securities denominated in their domestic currencies, such as the United States issuing dollar-denominated Treasury bills or England issuing pound-denominated bonds. *Credit risk* is insignificant if a nation has the power to tax or create sufficient amounts of money to repay its debts, but credit risk is only one of the four risks facing investors who purchase government securities. Creditors also face market, industry, and country risks.

Some governments, such as Argentina and Brazil, have issued debt instruments denominated in foreign currencies, such as the U.S. dollar. Others are part of currency areas and issue debt in the common currency, such as members of the European Monetary Union (EMU). This debt faces market, industry, country, *and* credit risk. Financial markets attach a credit risk premium to dollar-denominated debt issued by Argentina and Brazil because these nations need to earn dollars to repay their debts—they cannot just create them. Similarly, euro-denominated debt, issued by countries such as Greece, Italy, and Spain, carries a risk premium because the supply of euros is controlled externally by the European Central Bank.

Taxes

Tax rates can significantly affect supply and demand forces that determine the cost of real credit.[6] On the supply side, taxes reduce the return earned by lenders and savers. In doing so, they reduce the attractiveness of these investments. On the demand side, higher tax rates reduce after-tax investment returns and, therefore, reduce the demand for credit that might be spent for real investments, such as greenfield construction sites and the expansion of current plant facilities.

Tax incentives have the opposite effect by encouraging the flow of real credit toward tax-supported areas. They also lower the cost of credit to borrowers who are considering direct investments in specific industrial sectors or geographic regions. Examples of tax incentives are investment tax credits for businesses and homeowner tax deductions for mortgage interest payments. In the context of Figure 10.2, tax incentives should be viewed as reductions in the height of this risk building block.

Maturity

A maturity premium is added to the real interest rate if lenders and savers require compensation for the length of time their funds are committed. Usually, the longer the interval, the higher the maturity premium, but this correlation can vary.

The relationship between an asset's *nominal* yield and its maturity is called the *term structure of interest rates*, and the graphical representation of this relationship is called the *yield curve*. A discussion of the yield curve and why it may

6 Tax rate volatility also plays a role, but it is a part of the risk premium.

be upward-sloping, downward-sloping, or horizontal would divert us from our current goal of determining how the cost of real credit is determined, which is discussed in the next section of this chapter.

Determining Credit's Real Cost and Quantity Per Period

Let's turn our attention to the forces that determine the cost of real credit (also called the "real interest rate"). We will begin by covering some basics and then investigate the primary sources of real credit supply and demand.

Some Basics

Understanding a few basic principles will significantly facilitate our discussion of real credit markets. First, the supply and demand forces in these markets are flow variables—not stock variables. Therefore, our analysis will always be framed during a period—instead of a point in time. For this reason, we must be careful when graphing the real credit supply and demand to put the cost of real credit on the vertical axis and the quantity of real credit *per period* (a flow variable) on the horizontal axis (see Figure 10.3).

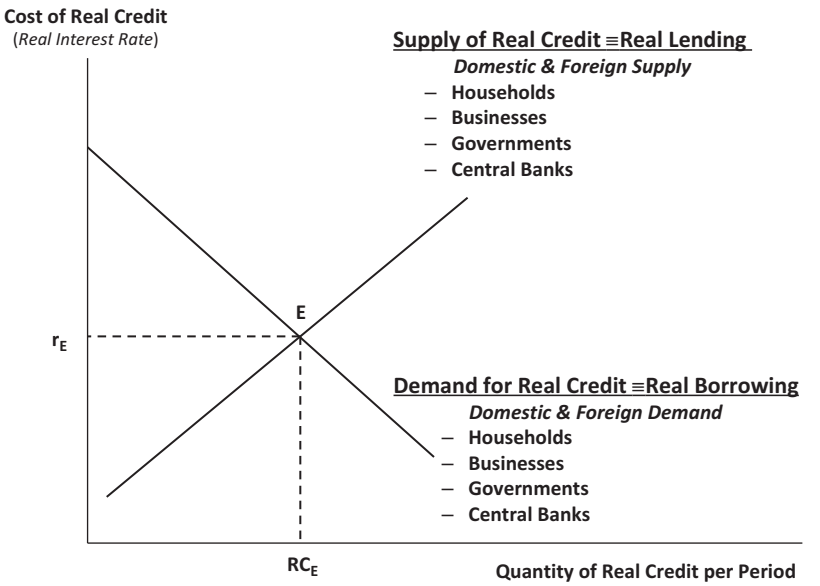

Figure 10.3: Real Credit Supply and Demand.

Second, the sources of real credit supply and demand are familiar. They include households, businesses, governments, and central banks (see Figure 10.3).

- Households supply real credit by saving portions of their incomes,
- Businesses supply real credit by retaining profits and investing in debt or equity securities,
- Governments supply real credit when they run budget surpluses, and
- Central banks supply real credit by increasing a nation's money supply.

On the demand side, households, businesses, governments, and central banks demand credit whenever they borrow.

Finally, only simultaneous changes in the cost of real credit and quantity of real credit per period cause *movements along* the supply and demand curves in real credit markets. These variables are called *endogenous* because they are determined *within* the real credit market. A movement along the supply curve is called a change in the *quantity supplied* of real credit per period, and a movement along the demand curve is called a change in the *quantity demanded* of real credit per period. Any other variables that affect the real credit market are called *exogenous* and shift the entire supply or demand curves to the right or left. A shift of the entire supply curve is called a *change in supply*, and a shift of the entire demand curve is called a *change in demand*. Distinguishing between exogenous and endogenous variables is essential. Luckily, it is easy to do because endogenous variables are the only ones visible on the two axes of the supply and demand curves. Exogenous variables are not visible on either axis, which means they are determined *outside* the real credit market.

Movements Along the Supply and Demand Curves for Real Credit

Let's begin by investigating the logic behind why the supply and demand curves in the real credit market are upward-sloping and downward-sloping, respectively. Then we will discuss equilibrium in the real credit market and finish by considering how equilibrium rates and quantities change.

Movements Along the Real Credit Supply Curve

The supply of real credit is upward sloping, which means there is a positive relationship between the real interest rate and the quantity of real credit supplied per period (see Figure 10.4). Let's see if this upward slope is logical and consistent with our intuition. We will do so by examining how domestic and foreign households, businesses (including financial institutions, like banks), and governments react to the changing cost of real credit. Notice that central banks are not included in this discussion because they control and regulate a nation's or currency area's

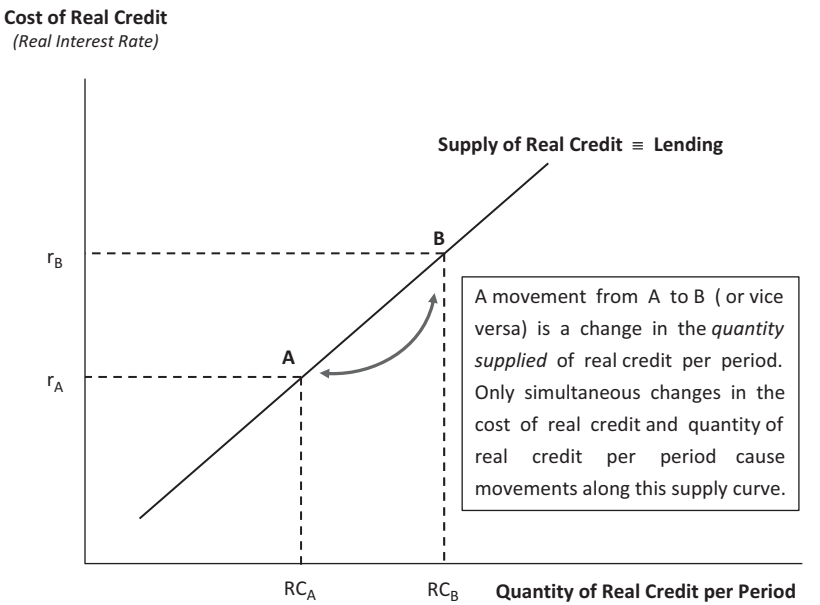

Figure 10.4: Movements Along the Real Credit Supply Curve.

credit supply, rather than being influenced automatically by changes in real interest rates. Central banks will play critical roles in our discussion of why the supply of real credit shifts.

Households

Changes in the real interest rate have two significant effects on the amount of credit supplied by households. The first is via changes in saving, and the second is by redistributing their investment portfolios.

– *Saving*: When the cost of real credit rises, it encourages saving because individuals have the opportunity to enjoy more consumption opportunities in the future for the sacrifices made today.[7]

7 An increase in the cost of real credit could cause some individuals, especially those with set retirement goals, to save less because the higher return would allow them to reach their financial goals with less saving. For an entire nation or currency area, the number of individuals in this group is usually not large enough to offset those who save more as the cost of real credit rises. Therefore, the net relationship between saving and the cost of real credit is positive.

– *Portfolio Adjustments*: As the cost of real credit rises, it encourages individuals to adjust assets in their portfolios. Relatively lower-yielding investments, such as collectibles, precious metals, and real estate, are sold, and the proceeds are supplied to the real credit market where relatively higher returns can be earned.

Businesses and Government

Changes in the cost of real credit affect the cash management practices of companies and governments—especially state and local governments. Higher real interest rates encourage businesses to adjust the asset composition of their non-operating portfolios (e.g., investments in securities) to profit from the higher returns.

For businesses, the cost to design and implement national and international cash management systems can be expensive. Therefore, rising interest rates can be the incentive needed to upgrade them. For governments, rising interest rates and the associated revenue losses on idle funds provide incentives to improve tax collections and expenditure management systems. When private and government cash flows are more efficiently handled, the amount of credit supplied to the real credit market increases. As a result, there is an increase in the quantity of credit supplied to the real credit market per period when the cost of real credit rises.

Financial Institutions: Banks

When the real interest rate rises, banks have incentives to reduce excess reserves, which increases the money multiplier. Similarly, households and businesses have incentives to deposit cash in banks and to move funds from checking accounts into near money accounts, such as savings and time deposits, where they earn higher returns. These adjustments increase the nation's money multiplier and, thereby, increase the quantity of real credit funds supplied to the market each period.[8]

8 Remember from Chapter 8, "Money Creation" that these changes refer to the preferred asset ratios. As the real interest rate rises, the preferred asset ratio for: (1) currency in circulation (CC/D) falls, (2) excess reserves (ER/D) falls, and (3) near money (N/D) rises. All of these changes increase the M2 money multiplier.

Movements Along the Real Credit Demand Curve

Real credit is demanded by domestic and foreign households, businesses, and governments whenever they borrow. The lower the cost, the more they borrow, and vice versa (see Figure 10.5).[9]

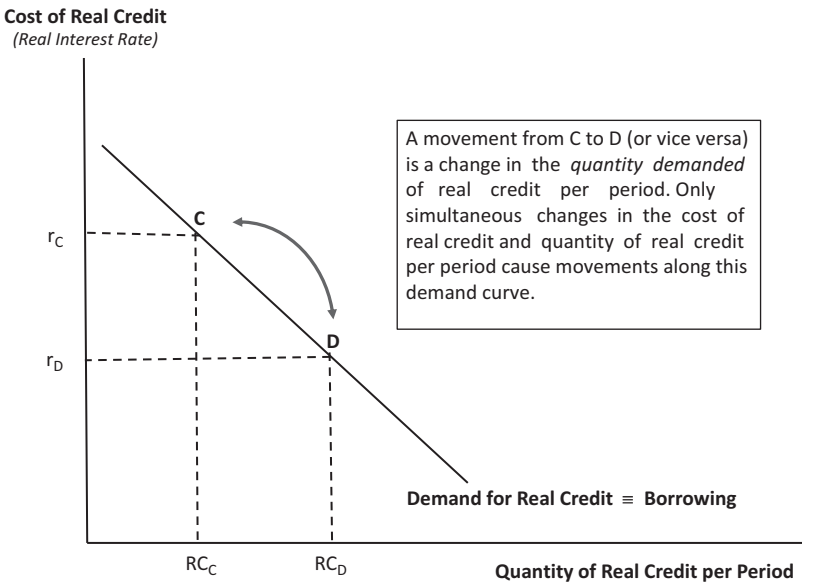

Figure 10.5: Movements Along the Real Credit Demand Curve.

Households

As a nation's cost of real credit falls, households borrow more to purchase goods and services, such as appliances, vacations, automobiles, houses, and educational opportunities.

Businesses

Lower real credit costs encourage businesses to approve more capital budgeting projects, carry larger inventories, and repair or improve existing plant and

9 Central banks' activities do not move nations along their real credit demand curves because they are not influenced automatically by changes in real interest rates. Some central banks can borrow by issuing securities, which reduces their nations' monetary bases, but this shifts the entire demand for real credit. In this book, central banks' activities are restricted to increasing or decreasing (i.e., shifting) the supply of real credit.

equipment. Chief financial officers (CFOs) around the world act quickly to borrow at favorable rates.

Governments

The same incentives apply to governments—especially state and local governments—that are sensitive to changes in the cost of real credit. When interest rates fall, the cost of borrowing declines, which makes financing budget deficits less costly in terms of both interest costs and the repercussions of angry taxpayers.

Equilibrium Cost of Real Credit

The equilibrium cost of real credit is where the quantity of real credit supplied and demanded per period are equal. In Figure 10.6, this occurs at Point E, where the equilibrium cost of real credit equals r_E, and the equilibrium quantity of real credit per period equals RC_E. At r_A, the cost of real credit is above equilibrium, causing a surplus of real credit and generating natural market forces that drive down the rate toward r_E. At r_B, the cost of real credit is below equilibrium, causing a shortage of these funds and generating natural market forces that drive up the real interest rate toward r_E.

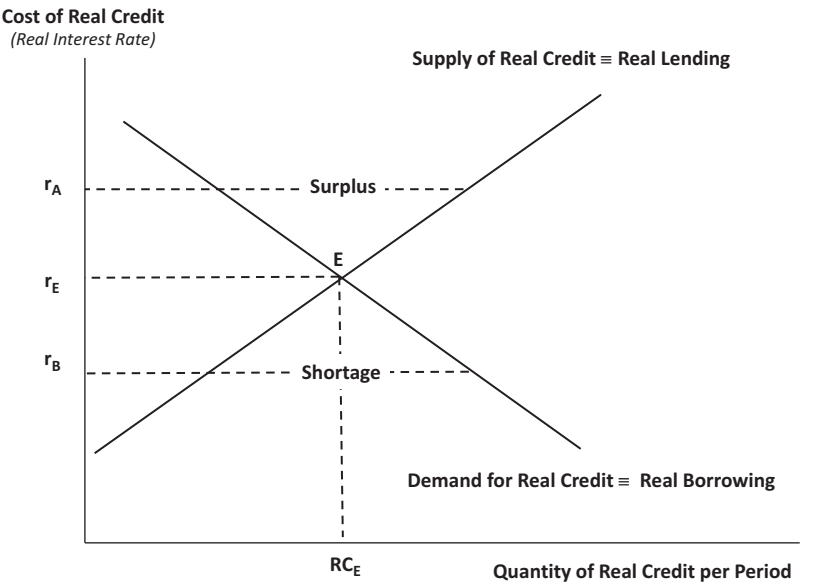

Figure 10.6: Equilibrium in the Real Credit Market.

Shifts in the Supply and Demand for Real Credit

In the previous section, we learned how simultaneous changes in both the real credit cost and quantity per period move a nation along the supply and demand curves for real credit. In this section, we will examine how changes in other relevant variables shift supply or demand curves to the right or left.

Shifts in the Supply of Real Credit

Let's investigate the main factors that shift the supply of real credit. Remember that an increase in supply is a shift to the right of the entire real credit supply curve, and a decrease is a shift to the left (see Figure 10.7).

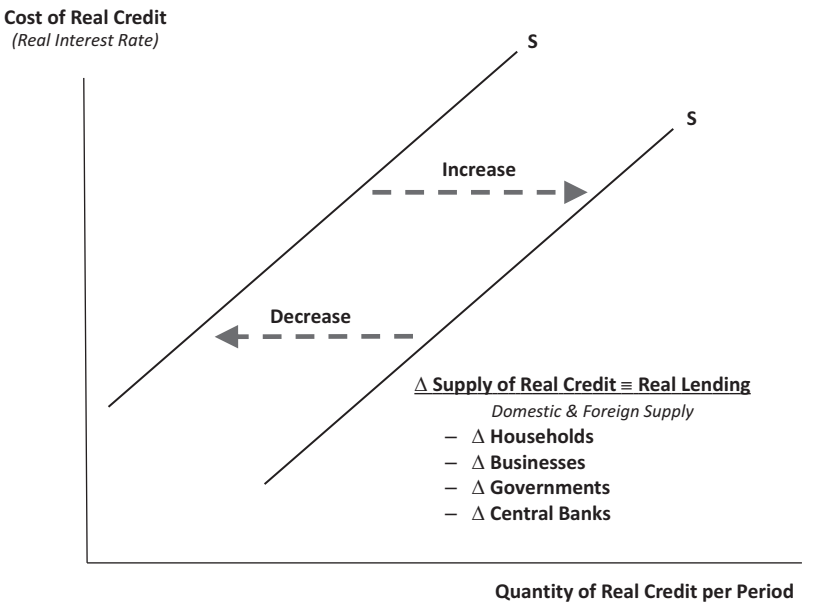

Figure 10.7: Increases and Decreases in the Supply of Real Credit.

Price Level

The supply of real credit includes the real supply of money. The real M2 money supply equals the nominal M2 money supply divided by the price index (M2/P). Therefore, increases in the price index cause the real money supply to fall. Similarly, reductions in the price index cause the real money supply to rise.

Real GDP

Changes in real GDP (RGDP) affect multiple sectors of the economy, all of which increase the supply of real credit as real GDP rises. In the household sector, as a nation's real GDP increases, a portion of the newly generated income is consumed, a part is paid in taxes, and the rest is saved. Therefore, increases in real GDP (i.e., real income) cause saving to rise, which increases the supply of real credit.

Increases in real GDP also improve businesses' operating profits. If these profits are retained and put into financial investments, they increase the supply of real credit. Therefore, there is a direct relationship between changes in real GDP and changes in real business saving.

Increases in real GDP affect governments in two ways. First, they collect more tax revenues, and second, growth in real GDP lowers the unemployment rate, thereby reducing government transfer payments for social welfare programs. If these two forces result in a government surplus, then the supply of real credit increases.

Finally, as a nation's real GDP increases, residents' incomes rise, which causes them to import more goods and services. As imports rise, the country's *net* exports fall. How this change affects the real credit market depends on if the country's net exports are in deficit or surplus. If Nation A has a net export *deficit*, then it is financing the deficit by borrowing from foreign creditors, which means foreign creditors are supplying funds to Nation A.[10] Increases in Nation A's real GDP raise its net export deficit, thereby increasing the *supply* of funds to Nation A's real credit market. If Nation A has a net export *surplus*, then foreign nations have net export deficits. To finance them, these foreign nations must borrow from Nation A, which increases the *demand* for Nation A's real credit. As Nation A's real GDP rises, its net export surplus falls, decreasing the foreign *demand* for real credit in Nation A.

Household Wealth

The *wealth* of a household is synonymous with its net worth, which is the difference between the market values of its assets and liabilities. Increases in household wealth tend to reduce saving rates and decreases tend to increase it. To understand why, suppose you earned a yearly income of $100,000 and saved 10% of it for retirement and precautionary purposes. What would happen to your *saving rate* if the stock market crashed and housing prices plummeted, threatening your employment and causing the value of your financial assets and home

10 These relationships will be discussed fully in Chapter 17, "Balance of Payments."

equity to plunge by 30%? With such a dramatic reduction in wealth and job security, would you save more or less of your yearly income? Alternatively stated, would you consume more or less of your annual income?

Such a decline in wealth would provide most people with an incentive to increase their saving rates (i.e., reduce their consumption rates) so they could retire as planned or have a buffer of precautionary savings. By increasing their saving rates, they could try to make up for losses in the financial and housing markets. Therefore, there is an inverse relationship between changes in wealth and changes in saving out of yearly incomes.

Does this relationship make sense in the other direction? In other words, what would happen to household saving if real wealth rose? Suppose you inherited $10 million, your portfolio increased by an extraordinarily large amount due to a stock market boom, or you became a cryptocurrency millionaire. Would you save more or less of your current income? Many people would save less (i.e., consume more) of their current incomes because they would have sufficient funds set aside for retirement and also for precautionary purposes, like meeting unexpected expenses and emergencies. Greater wealth might encourage you to save 5% or less of your income instead of 10%. It is for this reason that wealth and saving are inversely related.

Expectations

Changing expectations can have significant effects on a nation's supply of real credit. For example, favorable expectations about the economic, political, or social environment encourage individuals to consume more (i.e., save less) now because they feel assured that they will have jobs in the future, be able to repay their debts, and, if necessary, make up later for the reductions made now in their saving plans. Therefore, improved expectations cause a nation's real saving rate to fall, thereby reducing the supply of real credit. The same is true for businesses. Expectations about favorable future conditions encourage firms to invest funds in operating assets and new marketing strategies rather than supply these funds to the real credit market.

Indebtedness

Indebtedness levels are often measured relative to an individual's income, assets, or equity. Changes in indebtedness can have a significant influence on household and business saving rates. When real indebtedness rises relative to threshold levels of income, credit availability diminishes due to lender concerns about debtors' ability to pay their liabilities. Likewise, borrowers often react to rising indebtedness levels by curtailing the amounts and rate at which

they borrow. For the household sector, this means reducing consumption and increasing saving. For businesses, it means cutting capital budgeting expenditures, and for governments, it means curtailing the rate of spending or raising taxes. As a result, there is a direct relationship between indebtedness levels and the supply of real credit. As indebtedness rises, saving rises.

Discretionary Tax Rates

Changes in tax rates affect the supply of credit by households and businesses—on which the taxes are imposed. They also affect governments, which collect tax revenues, but the combined effects of consumer, business, and government supply are not equal and opposite. An example explains why:

To make our explanation easier, assume the government starts with a budget surplus of $100 billion (i.e., government taxes exceed spending by $100 billion), which means it is supplying $100 billion to the real credit market. To eliminate this surplus, suppose the government reduces household and business taxes by exactly $100 billion. This tax break would have two significant effects.

First, it would reduce the government's surplus, causing its supply of real credit to fall by $100 billion. Second, it would increase the after-tax income of individuals and businesses. As individuals' after-tax (i.e., disposable) incomes rise, a portion will be spent on consumption, and a part will be saved. Similarly, lower taxes will increase businesses' after-tax profits, allowing them to raise dividends and increase investments.

Suppose households spend 90% of their disposable incomes and save the remaining 10%. Similarly, suppose further that businesses pay out 90% of their after-tax profits as dividends and investments, and they keep the remaining 10% as additions to their nonoperating assets. Under these circumstances, a decrease in taxes by $100 billion would raise disposable incomes and profits by $100 billion. This increase would raise household saving and business purchases of marketable securities by only $10 billion. Therefore, the $100 billion decrease in the government sector's supply of real credit would be stronger than the $10 billion increase in supply by the household and business sectors. The net effect would be a decrease in the supply of real credit by $90 billion (see Figure 10.8).[11]

11 Note that a reduction of taxes could be stimulatory, as households and businesses spend more, thereby increasing GDP, causing government tax revenues to increase, and partially offsetting the deficit passively. Regardless, our qualitative conclusion remains the same, namely, lower taxes cause a net decrease in the supply of funds to the real credit market, given reasonable, single-digit estimates for the spending multiplier, which we will discuss in Chapter 12, "Real Goods and Services Market."

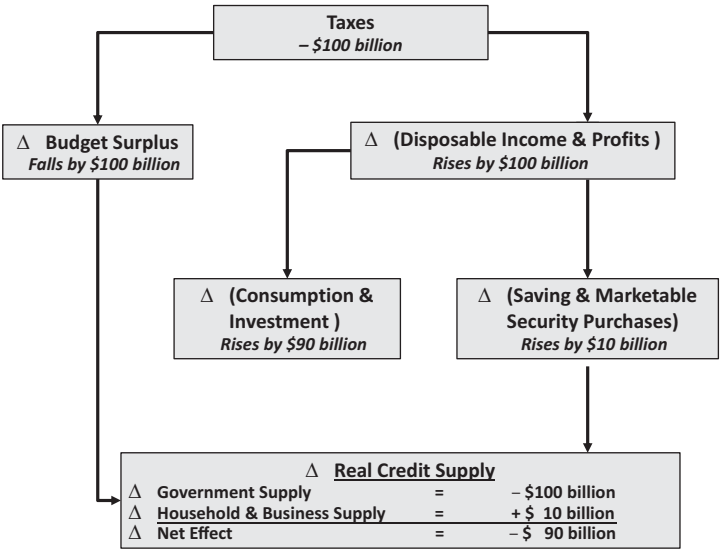

Figure 10.8: Net Effect of a $100 Billion Tax Reduction on the Supply of Real Credit.

Central Bank Policies

The supply of real credit changes with increases and decreases in the nation's real money supply. Recall from Chapter 8, "Money Creation," and Chapter 9, "Central Banks," that M2 money supply movements are caused by changes in a nation's monetary base and M2 money multiplier. Central banks influence the monetary base by enacting open market operations, foreign exchange market interventions, or discount rate policies (see Figure 10.9). They affect the M2 money multiplier by changing reserve ratios and the interest banks earn on their deposits at the central bank.

Risks

An increase in risk heightens the chances that borrowers will default or the market value of debt securities will lose value. Consequently, a higher risk premium has an inverse relationship with the supply of real credit. In short, as risks rise, the supply of real credit falls, and as risks fall, the supply of real credit increases.

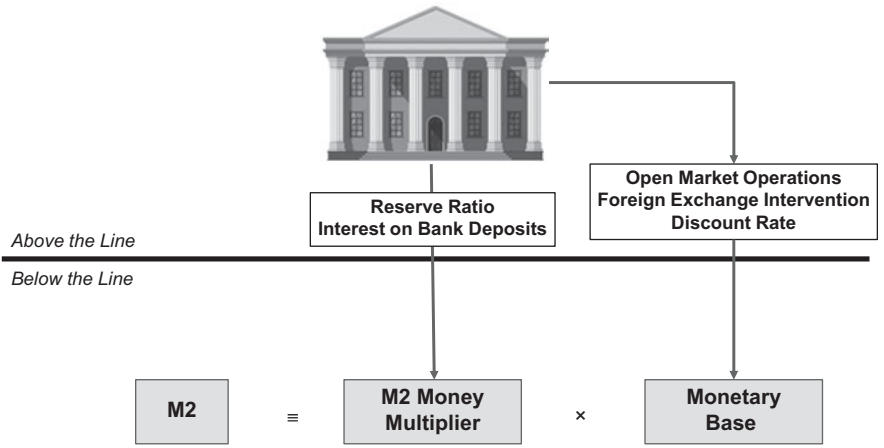

Figure 10.9: Central Banks Can Shift the Supply of Real Credit by Changing the Real Money Supply. (Imagery used: © MicroOne/Shutterstock)

Shifts in the Demand for Real Credit

In this section, we will investigate the major factors that influence the demand for real credit. Remember that an increase in demand is a movement to the right, and a decrease is a movement to the left (see Figure 10.10).

Real GDP

When a nation's real GDP (i.e., real income) increases, economic conditions improve, production increases, and businesses have incentives to expand capacity and ensure that their assets are well maintained. If internal cash flows are insufficient to support these investments, companies borrow. Therefore, there is a direct relationship between the business sector's demand for real credit and the level of economic activity.

Increasing real GDP could also increase consumer borrowing. While higher real incomes reduce the need for consumers to borrow, they also increase consumers' borrowing capacity because their credit risks fall. A rising real GDP has just the opposite effect on governments. As economic conditions improve and incomes rise, government tax revenues increase, and transfer payments for social welfare programs and unemployment compensation fall as people find jobs. Consequently, the government's demand for real credit tends to fall automatically during economic expansions and to rise during economic contractions.

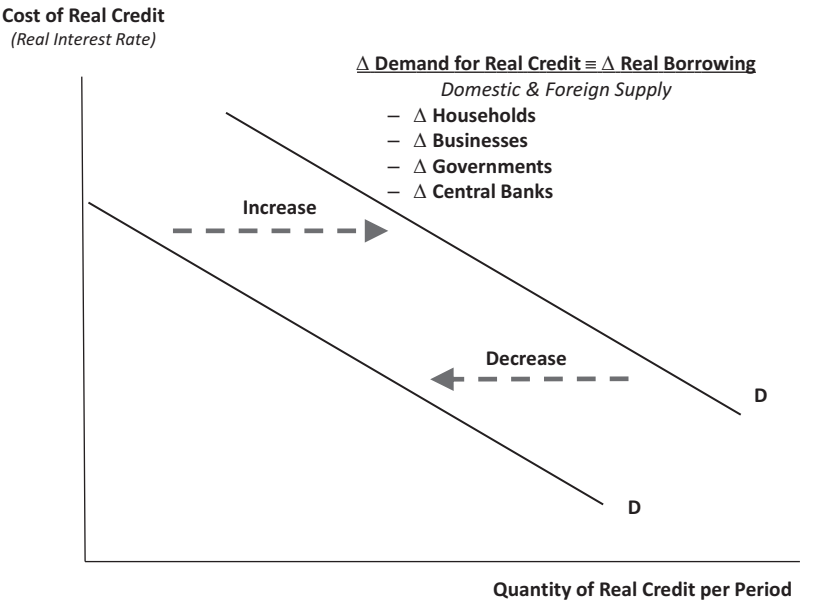

Figure 10.10: Increases and Decreases in Demand for Real Credit.

Recall from our discussion of real credit supply that increases in a nation's real GDP cause imports to rise and *net* exports to fall. Any nation with a net export *deficit* finances it by borrowing from foreign creditors, which means foreign creditors are supplying funds to Nation A.[12] As Nation A's real GDP rises, its net export deficit gets larger, causing the foreign *supply* of funds to Nation A's real credit market to increase. By contrast, if Nation A has a net export *surplus*, then foreign nations have net export deficits relative to Nation A. To finance these deficits, foreign nations must borrow from Nation A, which increases the *demand* for Nation A's real credit. Therefore, as Nation A's real GDP rises, its net export surplus falls, decreasing the foreign *demand* for real credit in Nation A.

Notice that changes in real GDP have conflicting influences on the demand for real credit. Rising real GDP: (1) increases the business sector's demand, (2) decreases government and foreign demand and (3) has an uncertain net effect on the household sector's demand for real credit. On one hand, rising real GDP alleviates the need for some families to borrow but gives the green light to

12 These relationships will be discussed fully in Chapter 17, "Balance of Payments."

others. Therefore, the net effect that changing real GDP rates have on the cost of real credit is indeterminate until we know the relative strength of each force. The section of this chapter, entitled "Real Credit Market Examples," will bring together these forces.

Expectations

Expectations can affect credit demand in different ways. The reaction depends on which specific expectation changes. For example, an increase in expected interest rates causes households and businesses to raise their current borrowing demand. Borrowing now rather than later allows them to lock in the relatively low current financing rates. Similarly, expectations of higher incomes (i.e., real GDP) stimulate current household demand for credit because consumers feel more confident that they will have jobs and be able to repay their debts in the future. For businesses, expectations of higher real GDP imply healthier future sales revenues and greater profits, which stimulate current business demand for real credit.

Notice that expected inflation was not mentioned in this section. The reason is that it is not part of the cost of *real* credit. Instead, it influences the nominal interest rate independently (see Figure 10.2). To better understand why, remember that on the vertical axis of the real credit supply and demand curves is the real interest rate, which equals the nominal interest rate minus the expected inflation rate (i.e., $r = i - \%\Delta PE$). If expected inflation rises, the real interest rate falls, causing the quantity demanded to rise and quantity supplied to fall. It does not shift either curve. As a result, the market reacts to the excess demand by raising the real interest rate back to where it was before the change in expected inflation. In short, the real interest rate returns to its original position, and the market adds the higher expected inflation onto it. In Figure 10.11, an increase in expected inflation causes the quantity of real credit supplied to move from RC_E to RC_X and the quantity demanded to rise from RC_E to RC_Y, creating an excess demand for real credit equal to $RC_X - RC_Y$. After that, market forces return the real interest rate to its original position (i.e., r_E).

Tax Rates

Changes in taxes can strongly influence the demand for real credit. For example, if tax rules change so that households are allowed to deduct all interest expenses from the income taxes they pay, then the demand for real credit should rise. Similarly, if the government provides tax incentives for particular types of consumer loans (e.g., as it does with educational loans), the household demand for credit should rise.

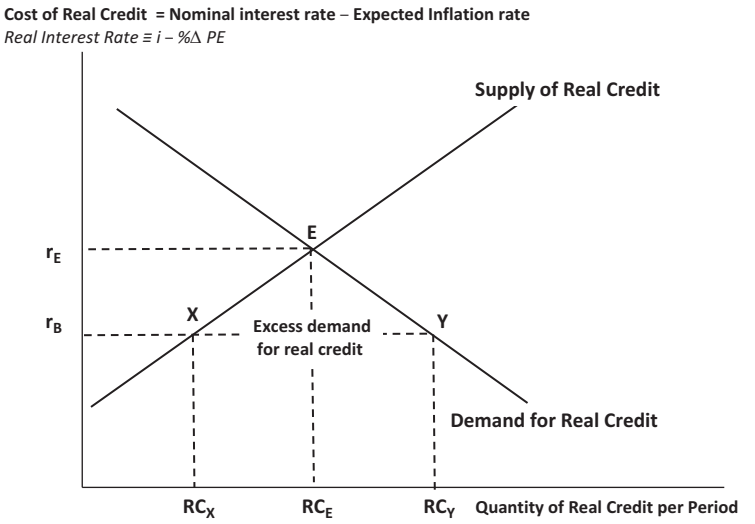

Figure 10.11: Effect of Increased Inflation Expectations on the Real Interest Rate.

Governments also give tax breaks to businesses (domestic and foreign) to stimulate economic activity and encourage investments that will make their nations more competitive internationally or environmentally sustainable. Therefore, lower taxes or greater tax incentives tend to increase business demand for real credit.

Investment tax credits are perfect examples. An investment tax credit allows companies to claim as an expense a percentage of what they pay for new tangible assets, such as factories and machines. By claiming a more significant portion of these expenditures as tax-deductible expenses, businesses can lower their reported profits, which reduces their income tax payments and increases their cash flows.

By lowering tax rates, governments tend to increase their deficits, which means the primary effects of tax *rate* reductions are stronger than the secondary effects of rising tax *revenues*, caused by stronger economic growth. The dominance of primary macroeconomic effects over secondary effects is one of the major takeaways from this book, but it is also one you will find hotly debated in the news and on legislative floors. Let's see why.

Suppose a political leader argued that tax *rate* reductions were win-win policies because they stimulated economic growth *and* reduced budget deficits. For example, a nation with a $1,000 billion GDP and average tax rate of 20% would draw $200 billion, annually, in tax revenues. If taxes were lowered to 15% and GDP increased above $1,333 billion (i.e., the breakeven point), tax revenues would rise. For instance, if GDP rose to $1,500 billion, a 15% tax rate would

generate tax revenues equal to $225 billion, which is higher than the original $200 billion in tax revenues. Is this possible? The answer is, "yes." Is it realistic? You be the judge. In the example above, a five percentage point tax-rate reduction would have required a 33% increase in GDP, just to break even. For this to happen—especially in the short-run—would be a tall order for any economy to fill. In short, believing that tax rates will reduce budget deficits is easy. Proving and explaining how it is possible would require significant clarification.

Indebtedness

As household and business indebtedness levels rise, their willingness and ability to borrow decreases. For the household sector, indebtedness is frequently measured relative to annual incomes and net equity positions. For businesses, it is often measured relative to the value of assets, stockholders' equity, profits, or cash flows.[13] A borrower's ability to tap the real credit market is monitored and restricted by banks and capital markets that set limits (or guidelines) on indebtedness. For example, suppose that internal bank policies required borrowers to have debt-service-to-income levels that were 40% or lower. A family earning $10,000 per month would need to keep its monthly interest and principal payments below $4,000, if it wanted to borrow more. As its debt-service-to-income level approached this threshold level, the family's ability to borrow additional amounts would fall. The same is true for businesses as they approach threshold levels of indebtedness or suffer reductions in their credit ratings.

Regulations

Regulations can play impactful roles in determining businesses' demand for credit. Usually, government regulations that reduce business profitability cause reductions in investments and, therefore, reductions in the demand for real credit, but there are some exceptions. For example, regulations that require businesses to invest in pollution abatement equipment may increase the demand for real credit.

Real Credit Market Examples

Let's use what we have learned in this chapter to analyze five cases where external shocks to an economy cause the cost of real credit to change.

13 Among the accounting measures of income used for this purpose are EBIT (i.e., earnings before interest and taxes), EBITA (i.e., earnings before interest, taxes, and amortization), and EBITDA (i.e., earnings before interest, taxes, depreciation, and amortization).

Effects of Falling Government Deficits on the Cost of Real Credit

In 1991, negotiations began in Maastricht, the Netherlands, to form a currency union among the members of the European Union (EU). An agreement was reached in 1992, the treaty was ratified by 1993, and the currency union was scheduled to begin on January 1, 1999, for 11 member nations (all except the United Kingdom). Membership in the new currency union was not automatic. EU nations felt that the new currency union's chances of success would be greater if the members' economies converged before the union. Therefore, the Maastricht Treaty laid out five economic convergence criteria for nations to meet to qualify for membership in the European Monetary Union (EMU).[14]

- Criterion 1: Control prices so its inflation rate was no more than 1.5% above the average of the three nations with the lowest inflation rates.
- Criterion 2: Restrict government budget deficits to no more than 3% of GDP.
- Criterion 3: Restrict the ratio of government debt to gross domestic product to no more than 60% of GDP.
- Criterion 4: Keep the nation's exchange rate relative to other EU nations within required margins (i.e., a 30% band, which was 15% above and 15% below defined parity rates) for at least two years.
- Criterion 5: Control the nominal long-term interest rate (i.e., 10-year government bond rate) so that it did not exceed by more than 2.0% the average of the three nations with the lowest interest rates.

What does our real credit framework predict should happen to the cost of real euro credit if aspirant nations successfully fulfilled Criterion 2 and reduced their budget deficits? Figure 10.12 shows that a reduction in the demand for real credit from D_1 to D_2 moves equilibrium from Point A to Point B. As a result, the cost of real credit falls from r_A to r_B, and the amount of real credit supplied and demanded falls from RC_A to RC_B.

Between 1993, when the Maastricht Treaty was signed, and 1999, when the Euro-Area began, interest rates fell significantly. Of course, other factors were also at work during this period. The reduction in budget deficits was just one of them, which helped to reduce the cost of real credit.

Effects of Expansionary Monetary Policy on the Cost of Real Credit

What does the real credit framework predict should happen if a central bank pursues expansionary monetary policy? An increase in a nation's real money supply

14 Nations were required to meet these conditions by July 1, 1998, but the evaluation of each country was based on its performance in 1997.

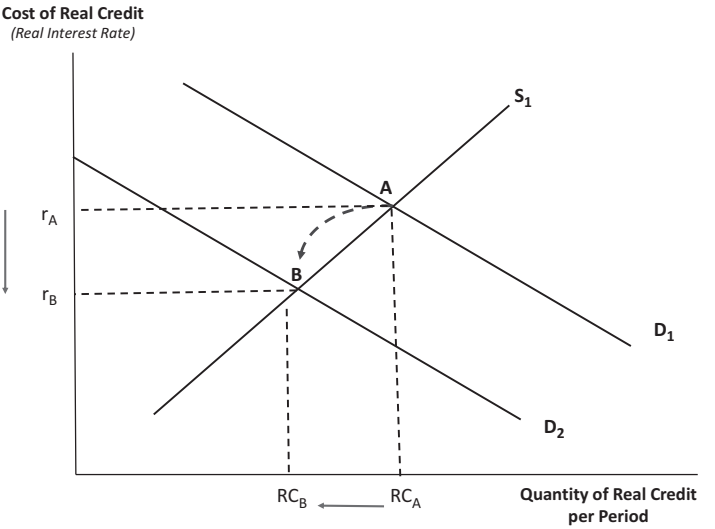

Figure 10.12: Effects of a Reduction in Real Government Budget Deficits.

causes the supply of real credit to increase from S_1 to S_2 (see Figure 10.13), which lowers the cost of real credit from r_A to r_B, and increases the amount of real credit supplied and demanded per period from RC_A to RC_B.

From 2007 to 2018, the U.S. Federal Reserve and many other central banks around the world expanded their money supplies at historically rapid rates. The result was interest rates fell, as predicted in Figure 10.13.

The Liquidity Trap

The liquidity trap occurs when interest rates are so low that expansionary monetary policies cannot reduce them further.[15] In Figure 10.14, the liquidity trap occurs over the flat portion of the real credit supply curve. Notice that any increase

15 If nominal interest rates fall below zero, people have an incentive to withdraw their funds from banks and hold cash. Holding cash also has associated costs, such as storage, protection, and insurance. The point is that there are limits to the "fee" people will pay to hold their funds in bank deposits. After that point, they will withdraw their funds from banks, hold cash, and negative interest rates will backfire, by becoming contractionary. The European Union, Denmark, Sweden, Switzerland, and Japan are contemporary examples of countries that have had negative nominal interest rates. In the future, if cryptocurrencies become more popular and the movement toward "cashless" or "less-cash" societies continues, the negative interest issue will endure and continue to attract attention.

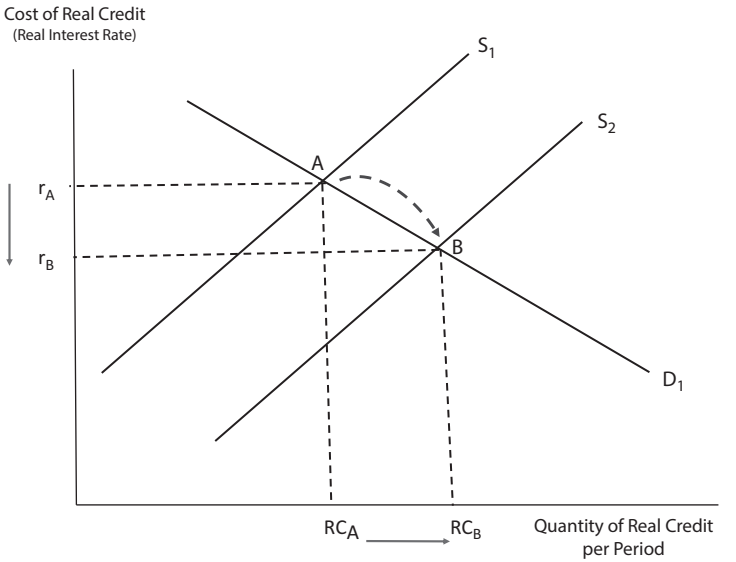

Figure 10.13: Effects of an Increase in the Real Money Supply.

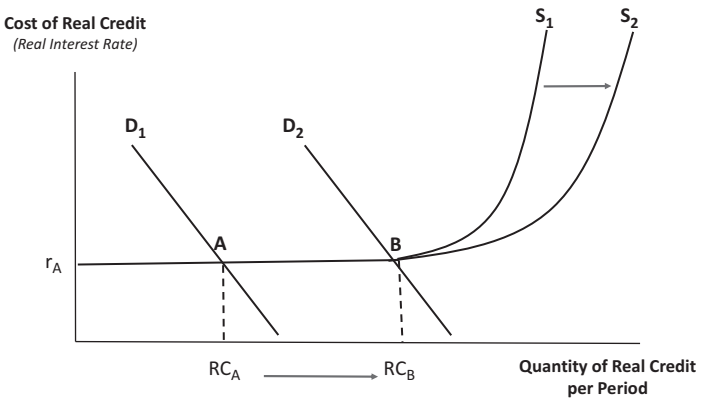

Figure 10.14: Effects of Increases in the Real Money Supply and Demand in the Liquidity Trap.

in supply merely extends the right side of the supply (e.g., from S_1 to S_2) but does not cause the horizontal portion to change. Two important conclusions emerge from this liquidity trap example.

First, if a nation's demand and supply for real credit equal D_1 and S_1, respectively, then an increase in real credit supply from S_1 to S_2 has no effect on the real interest rate. It remains at r_A. At this point, central banks become seemingly powerless to stimulate economic activity because the conduit linking an increased real money supply, lower real interest rates, and greater spending is broken.

Second, the liquidity trap enhances fiscal policies. To finance increases in spending or reductions in taxes, governments need to borrow, which increases their demand for real credit and normally raises the real interest rate. A higher real interest rate discourages consumer and business borrowing and spending. In the liquidity trap, increases in government borrowing do not change the real interest rate, thereby increasing the effectiveness of expansionary (or contractionary) fiscal policies.

Effects of Speculative Capital Outflows on the Cost of Real Credit

In 2018, Turkey experienced massive net capital outflows, due to the nation's excessively high balance of payments deficit,[16] growing debt denominated in foreign currencies, and increasing political turmoil.

As a result, investors scrambled to reduce their asset exposures in Turkish-lira-denominated assets and to increase their Turkish-lira-denominated liabilities. With the value of the lira falling rapidly relative to the U.S. dollar and euro, the investors bet that the burden of lira-denominated debts would decline as their dollar and euro-denominated assets rose in value.

As investors sought other assets, Turkey's real credit supply fell, causing the real interest rate to rise and quantity of real credit per period to fall. At the same time, the increase in demand for Turkish lira caused the cost of real credit to rise and the quantity per period to grow. As Figure 10.15 shows, if the demand for real credit increases from D_1 to D_2 and the supply falls from S_1 to S_2, there is an unequivocal increase in Turkey's cost of real credit from r_A to r_B to r_C. By contrast, the change in the quantity of real credit per period is uncertain. The higher demand increases the equilibrium quantity per period, and the lower supply reduces it. Figure 10.15 shows no net change in the equilibrium quantity of real credit per period, but this does not have to be the case. The net change depends on the relative strength of the supply and demand fluctuations.

16 This deficit was in Turkey's current account, which we will discuss in Chapter 17, "Balance of Payments."

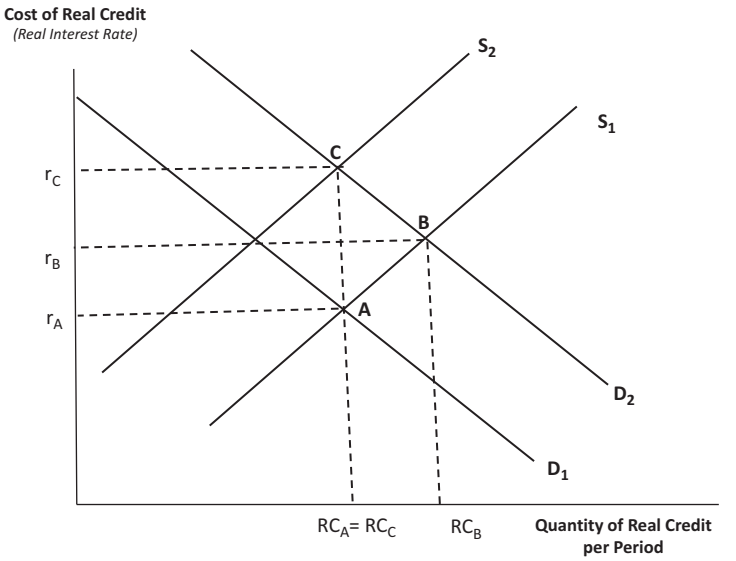

Figure 10.15: Effects of Speculative Capital Outflows.

Real GDP Effects on the Cost of Real Credit

How does the cost of real credit change during business cycles, as real GDP rises and falls? We will find that the answer is uncertain due to the multiple sectors that are influenced by real GDP and the conflicting effects it has on them.

Suppose a nation is in the expansionary phase of its business cycle, which means real GDP is rising. The increase in real GDP (all other things remaining constant) increases household and business saving, thereby increasing the supply of real credit and reducing the cost of real credit. At the same time, increases in real GDP cause government budget deficits (i.e., national, state, and local) to fall because they collect more tax revenues, and their transfer payments for unemployment and social welfare programs are reduced. Due to declining budget deficits, the demand for real credit falls, also causing the cost of real credit to fall. Finally, rising real GDP increases imports and, therefore, reduces net exports. As a result, either the demand for real credit falls or the supply rises, causing the cost of real credit to fall.

So far, all the forces in an expansionary cycle have pushed down the cost of real credit, but there are opposing forces that cause it to rise. For instance, rising real GDP stimulates household and business sector borrowing. Household demand increases with better living standards and the accouterments that accompany them, such as better vehicles, appliances, and vacations. Companies

borrow to expand capacity, raise inventory levels, and repair or improve existing plant and equipment. As the demand for real credit increases, the cost of real credit rises.

So, what happens to the cost of real credit as nations grow? Which forces are most influential? The answer is, "It depends." The qualitative change cannot be determined until more information is provided. All we can say for now is, if the supply-side forces overpower the demand-side forces, the real interest rate falls, and if demand-side forces dominate, the cost of real credit rises. Figure 10.16 summarizes all of the effects changes in real GDP have on the real credit market.

If Real GDP Rises, then	Effect on Real Credit Market	Effect on Real Credit Cost
Household and business saving increases	Increases supply	Falls
Government budget deficits fall	Decreases demand	Falls
Net export deficit rises or surplus falls	Increases foreign supply or decreases foreign demand	Falls
Borrowing by businesses increases	Increases demand	Rises
Borrowing by households may increase	Increases demand	Rises
Net effect		**Uncertain**

Figure 10.16: Effects of Increased Real GDP on the Cost of Real Credit.

Inflationary Expectations' Effects on the Cost of Real Credit

On average, what effects do rising inflationary expectations have on a nation's real interest rate? The answer is "None"—so long as these expectations are not accompanied by a rising risk premium due to higher inflation volatility. The average expected inflation rate is a separate building block that contributes to the nominal interest rate, just as the premiums for risk, taxes, and maturity are added to the cost of real credit. In the short term, changes in expected inflation depend on anticipated movements in a nation's demand and supply for goods and services. The factors that shift these supply and demand curves will be discussed in Chapter 12, "Real Goods and Services Markets." In the long run, expected inflation is determined mainly by expected changes in a nation's money supply. This relationship will be discussed fully in Chapter 23, "Long-Term Inflation, Exchange Rates, and Unemployment."

The Rest of the Story

Can Central Banks Set Interest Rates?

Are central banks able to control interest rates? If so, how much control do they have over them? Answers to these questions depend, in part, on what is meant by "control" and, in part, by what interest rate the central bank wants to target. Many central banks around the world use the *nominal* interbank interest rate (e.g., the federal funds rate in the United States) as an intermediate target for their monetary policies. Whether they succeed depends on three major factors: the competence and credibility of their monetary policies, financial artistry that comes with experience, and a bit of luck.

Unlike the discount rate, which is set by central banks at whatever levels they choose, the cost of real credit is determined by the forces of supply and demand. Let's look first at a central bank's ability to target the cost of real credit and then investigate their ability to control nominal interest rates.

Targeting the Cost of Real Credit

The cost of real credit will change with movements in exogenous factors that influence real credit supply and demand (see Figure 10.17). Two major components that affect the cost of real credit are the real risk-free interest rate and risk premium (see Figure 10.2). Do central banks control these variables?

Real Risk-Free Interest Rate

Most central banks focus exclusively on the supply side of their real credit markets (i.e., most do not borrow). If central banks want the cost of real credit to rise, they decrease the real money supply, and if they want this rate to fall, they increase the real money supply. Problems arise because central banks are not the sole sources of real credit supply. Domestic and foreign households, businesses, and governments also supply credit to these markets. Therefore, the ability of a central bank to target the cost of real credit depends on how effectively and quickly it reacts to supply-induced and demand-induced shifts in the real credit market.

Risk Premiums

Essential to the cost of real credit are risk factors, which are deeply and intricately tied to broad economic, political, and social factors. Central banks may influence these variables, but they do not control them, which means their

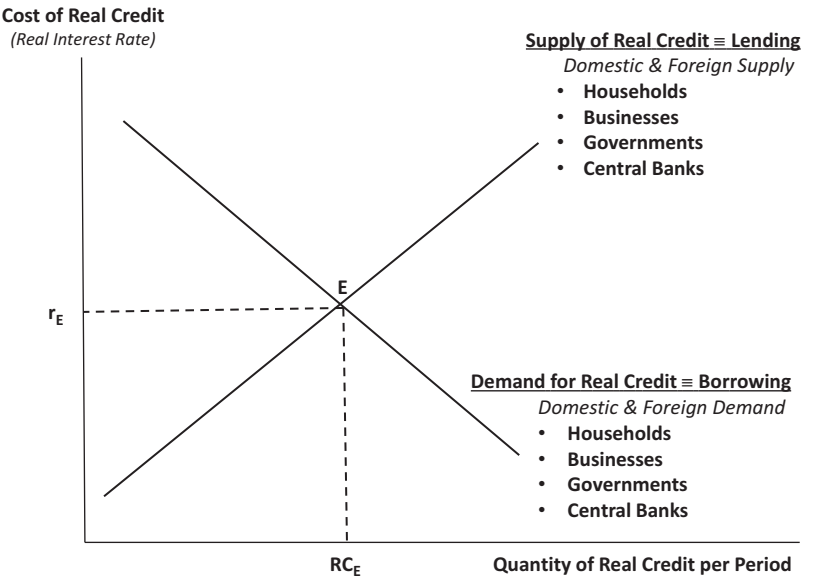

Figure 10.17: Do Central Banks Control the Cost of Real Credit?.

interest rate targets are vulnerable to changing risks. As a result, central banks are put in positions of responding retroactively to risk-induced shifts in real credit demand and supply.

Targeting Nominal Interest Rates

It is important to remember that a nation's nominal interest rate depends on the cost of real credit and expected inflation (see Figure 10.2). When central bank policies are effective, the cost of real credit hovers around its target level, but this raises a new problem. Any attempt by central banks to control the cost of real credit could cause them to lose control of the nominal interest rate. Let's consider how this might happen.

Suppose a central bank's nominal interest rate target was 5%. At the time, the expected inflation rate was 2% and cost of real credit was 3%, allowing the central bank to hit its target. What would happen if business demand for real credit increased, causing the cost of real credit to rise from 3% to 4%? As a result, the nominal interest rate would increase from 5% to 6%.[17] To reduce the nominal interest rate to its targeted (5%) level, the central bank would increase

17 Nominal interest rate ≡ Cost of real credit + Expected inflation = 4% + 2% = 6%.

M2, which would increase the supply of real credit and reduce the cost of real credit. At the same time, the increased money supply might also stimulate spending, resulting in rising inflation, and inflationary expectations.

If expected inflation rose from 2% to 4% at the same time the real interest rate fell from 4% to 3%, the nominal interest rate would rise to 7% (i.e., 3% cost of real credit plus 4% expected inflation). At this point, the central bank would face a dilemma. On the one hand, it could raise the nominal interest rate target. After all, the target is only a target because it helps with the inflation mandate. On the other, the central bank could try to reduce the cost of real credit by increasing the real money supply and, thereby, run the risk of losing control over both expected inflation and its nominal interest rate target. Therefore, the answer to the question, "Can central banks effectively target nominal interest rates?" depends on whether they choose to abandon their targets or keep them. If they choose the latter, then success depends on maintaining control of real credit costs without losing control of inflationary expectations.

Conclusion

The nominal interest rate has two major components, the real interest rate and the expected inflation rate. Changes in the real interest rate are caused by movements in the real risk-free cost of credit, plus premiums for risk, tax rates, and maturities.

The cost of real credit is determined by the forces of supply and demand. In this market, the significant sources of supply are from domestic and foreign households, businesses, governments, financial intermediaries, and central banks. The demand for real credit is determined mainly by domestic and foreign households, businesses, financial intermediaries, and governments. Central banks are excluded from the demand side if they are not borrowers.

The risk premium paid by borrowers is related to relative levels of credit risk, market risk, industry risk, and country risk. Credit risk depends on the solvency and liquidity (i.e., access to cash) of the borrower. Industry risk depends on the relative volatility of cash flows in a particular business sector, and country risk depends on the relative volatility of a nation's economic, political, and social environment.

Figure 10.18 shows the three major macroeconomic markets that are the focus of this book. Notice how the "Credit Market" gear has become the "*Real* Credit Market," and the "Goods and Services Market" gear has become the "*Real* Goods and Services Market." These changes will set us up for the material in Chapter 12, "Real Goods and Services Market."

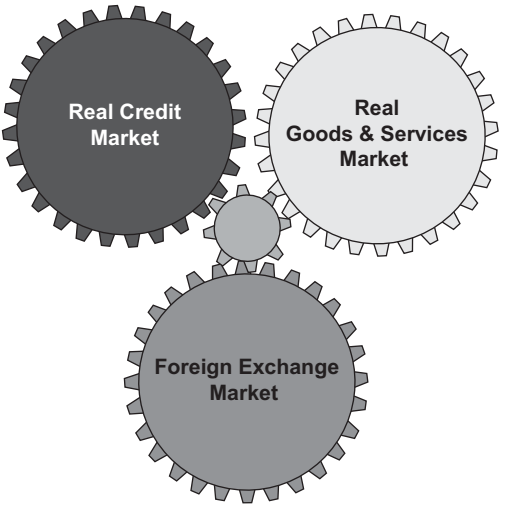

Figure 10.18: Three Major Macroeconomic Markets.

With the real credit market in mind, Chapter 12, "Real Goods and Services Markets," will discuss how the forces of supply and demand determine real GDP and a nation's GDP Price Index. Subsequently, Chapter 16, "Foreign Exchange Markets," will explain how the forces of supply and demand determine nominal exchange rates and quantity of foreign exchange per period, which will complete the building blocks needed for our three-sector macroeconomic analyses.

Key Points

- The nominal cost of credit depends on the cost of real credit plus expected inflation.
- The cost of real credit depends on the real risk-free interest rate, risk premium, tax/subsidy premium or discount, and maturity discount or premium.
- Risk premiums
  a. Risks (i.e., credit-, market-, industry-, and country risks) influence the cost of real credit.
  b. Credit risk depends on a borrower's solvency and liquidity.
     i. A solvent company's assets exceed its liabilities. Solvency risk increases when this relationship is threatened. Solvent companies can fail due to a lack of liquidity.
     ii. Liquidity risk is the likelihood that a company's cash flows will be insufficient to pay its obligations.
  c. Market risk is due to unexpected changes in macroeconomic variables.

d. Relative international economic, political, and social conditions affect a nation's country risk premium.

– Taxes/subsidies
  a. Taxes reduce the returns to lenders/savers, which decrease the supply of real credit. Business taxes reduce the after-tax profits of real business investments, which lower the demand for real credit. Subsidies have the opposite effect.
– Supply of real credit
  a. Domestic and foreign individuals, businesses, financial institutions, governments, and central banks are the sources of real credit supply.
  b. A rising real interest rate encourages:
    i. Households to save, which increases the quantity supplied of real credit.
    ii. Household portfolio adjustments, which increase the quantity of real credit supplied.
    iii. Businesses and governments to increase the quantity of funds supplied to the real credit market.
    iv. Real credit inflows from foreign nations.
  c. Increases in real GDP
    i. Raise household and business saving, which increases the supply of real credit.
    ii. Increases government surpluses, which expand the supply of real credit per period.
  d. Wealth has an inverse relationship with real household saving and the supply of real credit.
  e. Favorable economic, political, and social expectations decrease real household and business saving.
  f. Higher indebtedness levels increase saving rates.
  g. Discretionary tax rate increases raise the supply of real credit because the adverse effects they have on households' and businesses' saving are offset by the positive impacts they have on the government tax revenues.
  h. Changes in the supply of real credit are influenced by fluctuations in the M2 money multiplier and monetary base.
  i. If Nation A has a net export deficit, it is financed by the supply of foreign credit (because Nation A must borrow from foreigners to finance the deficit).
– Demand for real credit
  a. Households, businesses, financial intermediaries, and governments are major borrowers in the real credit market.
  b. Consumer and business demand for real credit tends to increase as real GDP rises.
  c. As the rate of economic activity improves, government deficits and borrowing fall automatically.
  d. If Nation A has a net export surplus, foreign nations are demanding credit from Nation A (because they have net export deficits to finance).
  e. As a nation's real GDP rises, its net exports fall, causing the net international demand for real credit in that nation to fall.
  f. Changes in expected prices, income, and interest rates have direct impacts on real (domestic and foreign) household and business borrowing.
  g. Lower taxes can increase real household and business spending and borrowing.

h. Increased indebtedness levels have an inverse relationship with real consumer and business borrowing.
i. Regulations can raise or lower real business borrowing.
j. Changes in real GDP have conflicting effects on the demand and cost of real credit.

Review Questions

1. What is the difference between the money market and capital market? Which market is more important for financing the day-to-day transactions of a company?
2. Explain the difference between the primary and secondary markets.
3. In what way, if any, is the secondary market related to liquidity risk?
4. What are the major components of the nominal interest rate?
5. Among developed nations of equal default risk and with highly developed capital markets (e.g., England and the United States), why do interest rates vary?
6. If Japanese interest rates are lower than Turkish interest rates, why don't Turkish corporations finance all or most of their expenditures by borrowing exclusively yen?
7. Explain the difference between market risk and country risk.
8. Explain liquidity risk and default risk. Is it correct to say that if you have one type of risk, then you must have the other?
9. Suppose that, at the beginning of the year, the M2 money supply was $15 trillion. During the year, Firm A borrows $20 million from an investor, and Firm B borrows $50 million from a bank. Calculate the quantity of credit per year and the change in the M2 money supply as a result of these transactions.
10. What factors cause the real interest rate to change?
11. "If the supply of real credit rises, the real money supply must rise." Explain whether you agree or disagree with this statement.
12. Suppose that you are in an employment interview with a company doing business in India. The interviewer says to you, "Economics is great in theory but lousy in practice. Here's an example. The central bank of India is increasing the money supply, yet interest rates are rising. That makes no economic sense. Right?" To reflect your understanding of macroeconomics, how should you respond? (Ignore the obvious answer, which is "You're completely right—please give me a job.")
13. Suppose the government of South Africa increased its budget deficit and financed the deficit by borrowing in the domestic private capital markets. Explain the effect this deficit financing should have on South Africa's real interest rate, monetary base, M2 money multiplier, and M2 money supply.
14. Suppose a change of government in Argentina ignited capital flight from the peso. What effect should capital flight have on Argentina's real interest rate?
15. What effect, if any, does each of the following shocks (only consider the initial effect) have on Japan's real interest rate? Briefly explain and use supply and demand curves to support your conclusions. Make sure that you label all axes and curves.
    a. A decrease in the Japanese money supply with no change in prices
    b. A decrease in global lending to Japan
    c. An increase in real private saving in Japan

d. An increase in the Japanese government's budget deficit
e. Speculative short-term international capital inflows to Japan
f. An increase in Japan's real GDP
g. A rise in Japan's expected inflation rate

16. Use a supply and demand diagram of the Eurozone's real credit market to illustrate the effects of the following events on the real interest rate and the quantity of real credit per period.
    a. Improving expectations cause European firms to increase their investment spending.
    b. The European Central Bank implements open market purchases.
    c. What are the results if both of the previous two events occur at the same time?
17. In 2018, Venezuela replaced its currency, the bolivar fuerte (strong bolivar), with the bolivar soberano ("sovereign bolivar") at the exchange rate of 1 bolivar soberano to 100,000 bolivar fuerte. This effectively reduced the money supply and all prices by a factor of 100,000. What effect should this change have had on the supply of and demand for real credit and the real interest rate in Venezuela?

Discussion Questions

18. Is it accurate to say that central banks have complete control over nominal interest rates? Explain why or why not.
19. In commonsense terms (as if you were talking to a close relative), explain why the real interest rate is more important than the nominal interest rate. Use as the basis for your answer a nation that has a 20% nominal rate and a –5% real rate.

Chapter 11
The Economics of Cryptocurrencies

The creation and evolution of *cryptocurrencies*, such as bitcoin, Ether, Dash, Ripple, Monero, NEO, EOS, Litecoin, Zcash, and Cardano, have captured the attention and imagination of many. Today, hundreds of cryptocurrencies are alive and functioning, with more to come.[1]

What are cryptocurrencies? Who or what creates them, and where can I go to buy one? Are they legal to use and own? Governments, central banks, and international agencies around the world have been paying closer attention to the growth and development of cryptocurrencies, due to the potential threat they pose to nations' financial stability, their seemingly close connection to criminal activities, and the difficulties of tracking crypto payments and receipts. The prospects for what cryptocurrencies can do are as potentially exciting and rewarding as they are dangerous and threatening—especially in the area of personal privacy and users' vulnerability to financial losses.

This chapter explains cryptocurrencies and how they differ from fiat money. It goes on to describe how and where to buy and sell them, their relationship to blockchain, the platform on which they are built, and how the forces of supply and demand determine cryptocurrency exchange rates. Do these currencies have the potential to alter the effectiveness of monetary and fiscal policies? Are cryptocurrencies money?

The Basics

Legal Tender, Fiat, Digital, and Cryptocurrencies

A convenient and helpful entry point into the cryptocurrency discussion is differentiating among legal tender, fiat currencies, and digital currencies. *Legal tender* currencies gain special status from governments, which declare their use and acceptance within the country or currency area for the payment

1 For readers who are new to cryptocurrencies, reading "Bitcoin" in *The Rest of the Story* section of this chapter might be the best way to start—especially because many of this chapter's examples refer to bitcoin, which is the largest and most widely known cryptocurrency.

https://doi.org/10.1515/9781547401437-011

of debts. A legal tender currency can be fully backed or partially backed by an asset, such as gold or silver, or they can have no intrinsic value or relationship to their production costs. *Fiat* currencies have no (or trivial) intrinsic values, but they are accepted, with or without legal tender status, in exchange for goods and services or the payment of debts. Many governments issue fiat currencies and then declare them to be *legal tender*. The physical U.S. dollar bill is a perfect example of fiat legal tender because it costs fewer than five cents to produce, carries a considerably higher transaction value, and must be accepted in the United States for the payment of dollar-denominated debts.

Digital currencies (also called *digital money*) include all forms of intangible, electronic money. Because they have no intrinsic value, digital currencies are a form of fiat money. Transactions using credit cards and wire transfers are examples of digital currencies. A checking account is an interesting form of digital money because it is a fiat, digital currency but not legal tender, even though its value is tied directly to the U.S. dollar.

Cryptocurrencies are also a type of digital money. Like fiat digital currencies, they are intangible, but cryptocurrencies differ in many important ways. One of the most important differences is that cryptocurrencies have no official ties to any nation's or currency area's legal tender. Furthermore, their legal rights and tax status are not firmly established. Cryptocurrencies have no geographical or political borders and may be, therefore, generally outside the scope and control of governments and central banks. In contrast to fiat currencies, whose supplies are governed by central banks and often tied to prevailing economic conditions, cryptocurrencies are regulated by computer programs, without regard to the economic environment. They are also highly controversial, resulting in some countries banning their use.

Bitcoin is an excellent example of a cryptocurrency because it is intangible, borderless, and lacks formal ties to any country's legal tender, as well as having uncertain legal rights and tax status. The quantity of bitcoins and its rate of growth are not tied to past, current, or future economic conditions. Instead, it is programmed to increase at a decreasing rate, with its total supply reaching a maximum of 21 million bitcoins in 2140. Among the countries that have banned bitcoin's use or its connection to domestic financial intermediaries are Bolivia, China, Columbia, Ecuador, Russia, and Vietnam. Other countries, such as the United States and members of the European Union, allow the use of bitcoin for economic transactions, as long as all legal and regulatory requirements are met.

Trust

The acceptance and use of fiat currencies, such as the dollar, euro, and yuan, have been built on people's trust in established, centralized financial systems and intermediaries, such as commercial banks, savings institutions, mutual funds, and central banks. In most countries, deposits at financial institutions are insured, which enhances the protections offered to account holders. Furthermore, central banks stand ready, as lenders of last resort, in cases of systemic liquidity shortages of fiat currencies.

Trust is also the basis for a cryptocurrency's success, but instead of customers placing their trust in regulators, a centralized system of financial intermediaries, and central banks, they put it in computer programs, encryption algorithms,[2] and cryptographic techniques. The computers executing these programs all must run the same code, and a majority of them must agree on the state of the cryptocurrency's ledger at all times. These programs execute and verify transactions, store and safeguard customers' accounts, and regulate the rate of increase, so the currency is not debased. In the beginning, cryptocurrencies, such as bitcoin, were closely linked in people's minds to criminal activities and the dark web. This wave of distrust continued when they were in the spotlight for price manipulation and other questionable financial practices, such as pump-and-dump schemes, wash trading, spoofing, front-running, conflicts of interest, and insider trading, as well as unbacked and fraudulently used *stablecoins*, which will be discussed shortly.[3] The combination resulted in cryptocurrency growth falling short of its potential.

Buying, Selling, and Using Cryptocurrencies

Cryptocurrencies can be bought, sold, and transferred in three major ways. The most popular method is via centralized or decentralized exchanges, but transactions can also be done person-to-person and with debit cards linked to cryptocurrency wallets.

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2 An algorithm is a set of instructions that codify a process or set of rules. These mathematical procedures employ cryptography, behavioral economics, and decentralized decision-making to ensure that no single entity can manipulate or control a cryptocurrency.

3 Nouriel Roubini, Testimony for the Hearing of the U.S. Senate Committee on Banking, Housing and Community Affairs on "Exploring the Cryptocurrency and Blockchain Ecosystem" October 2018, https://www.banking.senate.gov/imo/media/doc/Roubini%20Testimony%2010-11-18.pdf (accessed September 3, 2019).

Exchange-Traded Cryptocurrencies

Cryptocurrency exchanges are online platforms (think, websites) that allow users to buy, sell, and transfer digital assets. Some of them, such as Coinbase and Kraken, permit conversions from fiat currencies, such as dollars, euros, pounds, and yen, into selected cryptocurrencies. Others, such as Binance and GDAX, only allow the conversion of one cryptocurrency into another, such as trading bitcoins for ether.

To purchase a cryptocurrency using an exchange, you must first open an account (called an electronic wallet). This is done by going online to any one of the many exchange homepages and following the "Get started" instructions. You can pay for the cryptocurrency with bank transfers or debit cards. Once your account has been opened, you can use it to send and receive cryptocurrencies.

Exchanges offer convenience and have relatively familiar, user-friendly online environments. Customers trust them to execute their digital currency transactions in efficient, effective, and inexpensive ways, as well as to protect their cryptocurrency holdings. On the downside, cryptocurrency exchanges have been targets of numerous hacking attacks, resulting in millions of dollars in stolen cryptocurrency deposits. Exchanges have reacted to these cyberattacks by insuring customers' crypto-deposits, but this protection is only against exchange-related mistakes. It does not protect customers from their own mistakes, such as transferring funds to incorrect accounts or hacks that compromise the private keys of a token holder, such as a phone number transfer or SIM-card hack.

Centralized exchanges store confidential customer information and, therefore, can be subject to government and central bank regulations, as well as information-seeking subpoenas.[4] Those who use centralized exchanges sacrifice a certain degree of anonymity or pseudonymity for convenience. The cryptocurrency market has reacted to these potential confidentiality breaches by creating decentralized exchanges, such as Ox and Airswap, which do not rely on third-party services to hold and manage customers' funds. Instead, trades are peer-to-peer and completely automated. Decentralized exchanges have the added benefit of providing cryptocurrencies that are new and less-well-known with access to public exchanges.

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4 A subpoena is a court-ordered or government-agency-ordered summons that compels a witness to testify or provide evidence. Failure to comply can result in penalties.

Peer-to-Peer-Traded Cryptocurrencies

Peer-to-peer cryptocurrency transactions are done over the internet, using downloaded computer software. With bitcoin, you start by going to bitcoin.com, downloading the bitcoin wallet onto your computer or smartphone, and receiving, automatically, both a public and private key, which are long strings of random numbers and letters—similar to a username and password on a secure computer. To transfer bitcoins into your wallet, the sender needs to know your public key, but access to and use of these funds requires your private key, which only you should know. Once bitcoins are in your electronic wallet, you can transfer them to others, by using their public keys.

Peer-to-peer cryptocurrency transactions are called "decentralized" because they allow users to circumvent financial intermediaries. These transactions have the power to emancipate individuals from government oversight, control, and taxation, letting them spend more of *their* money, in ways *they* want—and away from prying eyes. Besides anonymity or pseudonymity, they also offer users enhanced network confidentiality, security, and defense from counterfeiting.

There are crucial differences between peer-to-peer cryptocurrency transactions and those using fiat digital currencies, such as checking accounts or credit cards. First, banks and credit card companies keep customer transactions confidential. By contrast, bitcoin posts all transactions openly, online but without revealing names—they are, so-called, *pseudonymous*. The only information disclosed are transaction amounts and public keys. Associating any individual's name with a particular transaction is like trying to locate a high school friend using a New York City phonebook that lists telephone numbers but not names.

Second, banks and credit card companies store a considerable amount of confidential customer information, which could be disclosed using legal or illegal means. By contrast, cryptocurrency wallets have little or nothing in the way of private customer information, which means they are less vulnerable to subpoena or theft.[5]

Finally, peer-to-peer cryptocurrency transactions can be riskier than those using checking accounts or credit cards. Unlike banks, cryptocurrencies have no customer service desks to visit or hotlines to call when mistakes are made. They are safeguarded only by the care and precautions that owners take to

5 Cryptocurrency transactions could have embedded messages, which might help identify counterparties.

protect themselves. These online wallets are not insured. Theft, failure to remember a private key, coercion that results in the disclosure of a private key, and the inability to follow cryptocurrency protocols can result in the loss of all funds in a wallet.

Crypto Debit Cards

While still in their infancy, debit cards backed by the funds in cryptocurrency wallets are now offered on VISA and MasterCard platforms. Instead of drawing funds from customers' dollar, euro, or yen bank accounts, crypto debit cards take them from customers' cryptocurrency wallets. Conversion from cryptocurrencies to dollars, euros, or yen is done automatically and invisibly by the credit/debit card company, which means merchants might never know that a cryptocurrency stood behind their transactions. If successful, crypto debit cards have the potential to end or reduce user worries about making exchange rate calculations and finding merchants willing to accept their cryptocurrencies.

Blockchain, Altcoins, and Enterprise Distributed Ledger Technology

Many cryptocurrencies, such as bitcoin, are based on blockchain technology, which is a historical record of cryptocurrency ownership. Blockchain is a "distributed ledger technology" because historical ownership records are downloaded onto many users' computers, rather than stored in a single, centralized location. Each information block includes bundled pieces of cryptographically secured and verified ownership information. After it has been verified, each of these information bundles is cryptographically linked to the historical chain, thereby forming a chronological blockchain. To add a block to the chain requires a 51% consensus of users, and to change (or in any way modify) an old block requires the same. As new blocks are added to the chain, it becomes increasingly difficult to change information on previous blocks because all the subsequent ones need to be changed, as well, which means reaching a 51% consensus for each block.

The historical ownership record created by blockchain technology is often called "immutable" (i.e., unchangeable), but this is true *only if* the cost to alter an already-validated block of information is prohibitively high, which depends heavily on the size of the verification network, number of transactions in each block, and the cryptocurrency's economic security guarantees. The more extensive the network and higher the verification expenses, the

more difficult it is to go back and alter historical ownership records. Only if the network size is small, the security guarantees are weak, or a small group controls verification could blockchain's ownership history be rewritten.[6]

To understand the ease or difficulty of altering past records, consider this example. Suppose Alice, Bart, and Carol decide to take turns playing a video game. The first game pits Alice against Bob, with Carol as the spectator. Bob wins decisively and should have his name inscribed on the "Winners' List," but verification is done by majority vote. With a network of only three, Alice and Carol could agree to alter history by telling everyone that Alice won, thereby transferring the "Winners'-List" honor away from Bob and to Alice. As long as Alice and Carol (a majority) agree, there is little Bob can do.

This scenario would change dramatically if Alice's and Bob's video game was broadcast on television (i.e., downloaded) and watched by thousands (i.e., the network)—not just Carol. Rewriting history might be possible but highly unlikely and very expensive. If changing the historical record of just this one video game seems remote, consider how difficult it would be if the competition between Alice and Bob was a best-of-seven championship series, requiring Alice and Carol to change the consensus on each of the previous games before the first one could be altered.

Network size is especially crucial for cryptocurrencies because they are blessed and cursed by a *vicious circle of success*, which means a cryptocurrency can succeed only if many merchants and creditors accept it, but merchants and creditors will accept a cryptocurrency only if many customers use it. Having their success based on a community of users reinforces the centuries-old notion that *commerce follows community*.

Altcoins and Smart Contracts

Besides bitcoin, there are other cryptocurrencies that have been built on blockchain technology. Collectively, they are called "altcoins." Anyone can download blockchain software, and many have done so to use as a platform for building applications, such as new cryptocurrencies and smart contracts, which allow the

6 A group of transaction verifiers (i.e., miners) can become so large that it has the power to change blockchain information, permitting, for example, double spending of the same cryptocurrency balance. This is often called a "51% attack." If the transaction validation process is done by consensus, when more than 50% of those participating in the process agree to a change, it can be done. In short, to ensure ledger immutability, the good guys need to outweigh the bad guys.

execution and enforcement of agreements without human involvement. The current and future legal status of smart contracts is still in limbo. To date, errors in the contract code have been relatively abundant and problematic, making their legal status somewhat nebulous.

Bitcoin and altcoins compete on the quality and quantity of their attributes, such as transaction costs, network size, anonymity or pseudonymity, processing speeds, verification accuracy, decentralization, distribution, storage, divisibility, and portability, as well as resistance to censorship, counterfeiting, and double spending. With the proliferation and growth of cryptocurrencies have come demands for efficient, low-cost financial services, such as clearinghouses that can handle both fiat-legal-tender currencies and an assortment of cryptocurrencies. Growth has stimulated demands for cryptocurrency-denominated investment assets, such as exchange-traded funds, financing sources, such as venture capital companies, and derivative instruments for low-cost and effective hedging.

Enterprise DLT

A relatively recent development has been the introduction and use of *enterprise distributed ledger technologies* ("enterprise DLT") by companies such as AT&T and JPMorgan Chase. Enterprise DLTs do not require cryptocurrencies to function and are used mainly for internal corporate transactions and those facilitating customer payments. The chief motivation behind their development has been to increase efficiency and reduce costs, for example, by eliminating transaction fees and bid-ask spreads on currency conversions. Whether they are actual "blockchain applications" is debatable, because enterprise DLTs are private, centralized, and distributed only among a few permissioned and controlled users. They allow peer-to-peer transactions but only those among known entities. The trust that users place in them is based on the credibility, reputation, and record of a centralized organization, which verifies transactions.

Since they began, corporate enthusiasm for enterprise DLTs has waxed and waned. Only time will tell if they become fully integrated into companies' operations by either increasing the quality of their services or reducing costs.

Cryptocurrency Exchange Rate Determination

The price of a cryptocurrency is determined in the same way as any exchange rate, namely, by the forces of supply and demand. Let's use the bitcoin-dollar exchange market as an example. In this exchange market, demanding bitcoins

means supplying dollars, and supplying bitcoins means demanding dollars.[7] Among the potential bitcoin buyers are dollar holders who want to: (1) hold bitcoins as assets, (2) invest or speculate in securities and real assets denominated in bitcoins, (3) transfer bitcoins to others, and (4) purchase bitcoin-denominated goods and services. Among the potential bitcoin suppliers are those who want to (1) hold dollar deposits, bills, or coins, (2) invest and speculate in dollar-denominated securities and real assets, (3) purchase dollar-denominated goods and services, and (4) transfer dollars to others, which can be done anonymously, by using physical dollar bills, or more transparently by using checking accounts or other means of electronic payment.

Figure 11.1 shows the supply and demand curves for bitcoins, with the equilibrium exchange rate equal to $(\$/฿)_1$ and quantity traded per period equal to $(฿/t)_1$. These supply and demand curves reflect desired currency flows per period by sellers and buyers over a range of possible exchange rates. The supply curve's upward slope and demand curve's downward slope ensure that equilibrium is stable, which means errant movements of the exchange rate above or below equilibrium cause surpluses or shortages that return the market to equilibrium.

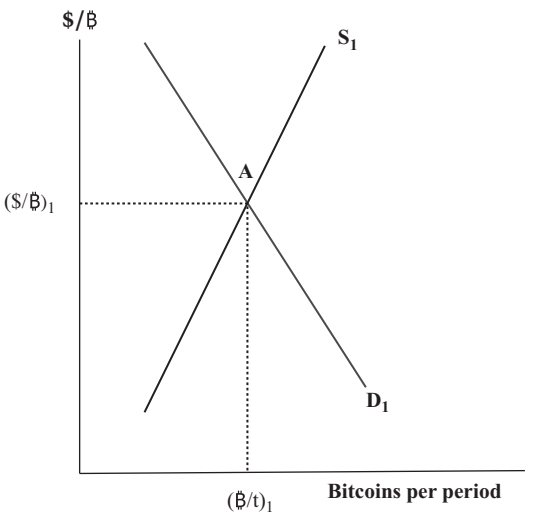

Figure 11.1: U.S. Dollar-Bitcoin Exchange Market.

In Figure 11.1, the supply and demand curves are drawn to convey the impression that the relationship between bitcoin's exchange rate and quantity supplied and

7 See Chapter 16, "Foreign Exchange Markets," for a full description of exchange rates.

demanded per period is highly inelastic.[8] If so, then it is logical that shifts in supply and demand (i.e., movements of the entire curves) cause exaggerated changes in price relative to the quantity traded per period.

Elasticities reflect the extent to which buyers and sellers react to changes in the dollar price of bitcoins, holding all other factors constant. Because so few goods and services are denominated in bitcoins, households and businesses are not highly sensitive to bitcoin price changes. For investors and speculators, the price of bitcoin is far less critical than *expected* price changes, which is an exogenous variable that shifts the entire bitcoin demand and supply curves. Furthermore, central banks are not major participants in the dollar-bitcoin market.

An example might help center our *inelasticity* discussion. Suppose you own bitcoins and want to purchase a new car. If the dollar price of the car were $20,000 and a bitcoin was worth $5,000, then it would cost you four bitcoins to purchase the vehicle. If bitcoin's value fell to $2,500, the cost would rise to eight bitcoins, which might discourage you from converting your bitcoins into dollars to purchase the car. For transactions that require the exchange of bitcoins for dollars, it is easy to see how bitcoin holders might react to exchange rate changes.

Now, let's take this same example, but instead of analyzing it from the perspective of exchanging bitcoins for dollars, see how it looks in reverse. If bitcoin's value depreciated by 50%, from $5,000 to $2,500, then the dollar's value would double from ₿0.0002/$ to ₿0.0004/$. Therefore, the dollar cost of a car with a four-bitcoin price would fall from $20,000, before depreciation, to $10,000 afterward. The problem is how you would take advantage of the dollar's appreciation. If no companies advertise and sell cars denominated in bitcoins, the dollar's appreciation, on one side, would be confronted with a lack of available products on the other side.[9]

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8 All linear, downward-sloping demand curves have elastic, inelastic, and unit elastic portions. The portion of demand shown in Figure 11.1 is intended to represent the inelastic portion.

9 Estimates reveal that only about one-third (or less) of all bitcoin transactions are for the purchase of goods and services, which means the vast majority has no economic effect on the real goods and services market, where prices are set. Most transactions reflect "so-called mixers reshuffling balances between their own accounts, mining pools disbursing coins to members, outright scams such as spoofing and market manipulation, according to analytics provider Coinmetrics." See Olga Kharif, 2018. "Cryptocurrencies: Up to Two-Thirds of Bitcoin Transactions Have No Economic Value." *Bloomberg*. Available at: https://www.bloomberg.com/news/articles/2018-07-26/up-to-two-thirds-of-bitcoin-transactions-have-no-economic-value (accessed September 3, 2019).

In the dollar-bitcoin exchange market, bitcoin's supply is inelastic but probably less so than demand. As was mentioned in the previous example, owners of bitcoins can reap cost benefits if the cryptocurrency's value rises because many goods and services are denominated in U.S. dollars.[10] Similarly, bitcoin holders who wish to invest in U.S.-dollar-related investments are potential sources of bitcoin supply as the cryptocurrency appreciates—especially those wishing to diversify their portfolios or cash-out of bitcoin-denominated investments that have already appreciated.

Bitcoin has no central bank. Its supply increases at a predetermined rate. Miners, who earn the newly created bitcoins by verifying transactions, can either hold their newly acquired bitcoins or convert them into dollars. They could also convert them into another fiat currency, virtual currency, or other cryptocurrencies. If they decide to hold them, their creation has no direct effect on bitcoin supply to the dollar-bitcoin exchange market.

Fixed Versus Fluctuating Exchange Rates

Cryptocurrencies can float freely relative to other currencies, such as bitcoin does against the dollar and euro. Alternatively, they may be backed by a stable currency, basket of currencies, commodity, or precious metal. Fiat currency systems across the world have run the full spectrum of these possibilities.[11] Some economists see the day when the world may have just three dominant fiat currencies—perhaps the dollar, euro, and yen or yuan. Others feel that, someday, there might be only one. Is the same true of cryptocurrencies? Are there clear economic advantages, such as significant economies of scale, which come from adopting a popular cryptocurrency or from fixing all cryptocurrencies to a dominant widely used one?

Cryptocurrencies and Monetary Policies

If cryptocurrencies become widely accepted for real-world use, would they complicate the job of monetary authorities by disconnecting changes in the demand

10 Among the very few companies that pay their employees in bitcoins are Japan's GMO Internet Group, Wagepoint (Canada), Bench, and RateHub.

11 International exchange rate arrangements are reported annually by the International Monetary Fund. See IMF "Report on Exchange Rate Arrangements and Exchange Restrictions: 2012," De Facto Classification of Exchange Rate Arrangements and Monetary Policy Frameworks, April 30, 2012, https://www.imf.org/en/Publications/Annual-Report-on-Exchange-Arrangements-and-Exchange-Restrictions/Issues/2016/12/31/Annual-Report-on-Exchange-Arrangements-and-Exchange-Restrictions-2012-26012 (accessed September 3, 2019).

for goods and services from changes in controlled fiat monetary aggregates, such as M2? For many, the cause-and-effect implications are as discomfiting as a car with its steering wheel and throttle disconnected from the tires and engine.

Fears that cryptocurrencies might one day threaten nations' financial stability are often based on the following pillars. Cryptocurrencies:

- Can be created and distributed without oversight or control by central banks, banking commissions, or private organizations, such as bankers' associations;
- Have no reserve requirements, which implies a potentially high crypto-money-multiplier;
- Have little or no legal security;
- Offer no guarantees of repayment;
- Are challenging to hedge due to a lack of reliable derivative markets;
- Offer individuals little or no defense against cyberattacks;
- Have no lender of last resort to save a cryptocurrency experiencing a temporary, but severe, liquidity crisis, which might be caused by massive conversions into other currencies (i.e., capital flight);
- Are not insured by well-capitalized deposit insurance companies;
- Operate primarily outside legacy financial intermediaries and payment systems—usually with systems of their own. Therefore, their operational efficiency, security, and confidentiality are controlled by computer software;
- Are not legal tender, have no formal link to any nation's or currency area's official currency, and have no intrinsic value;
- Have become popular mediums of exchange for illegal uses, such as money laundering, tax evasion, tax fraud, drug trade, illegal immigration, financing terrorism, extortion, bribery, racketeering, human trafficking, and financing terrorism; and
- Make it nearly impossible to identify the counterparties to each transaction, thereby promoting illegal activities.

The validity of these fears will need to be tested. For example, consider bitcoins and U.S. dollars. Bitcoin is a global currency that can be spent anywhere in the world where merchants, individuals, and creditors accept it. Therefore, increases in bitcoin's supply and expanded usage could influence spending patterns, inflation rates, and economic growth rates anywhere in the world. Yet, could the same be said about U.S. dollars? Travelers to countries as far away from the United States as Kazakhstan, Uzbekistan, and China, understand that dollars are accepted (often preferred) to the local currencies. The total supply of cryptocurrencies (i.e., the value of public chains) is transparent and published

online. Many of them grow at predetermined rates. If they became popular and began competing seriously with commonly used legal tender and fiat currencies, how hard would it be for central banks to include these currencies into the nations' money supplies? Would including cryptocurrencies be any different for a central bank than switching its focus from the M1 money supply, which excludes near money financial assets, to M2, which includes them?

Currently, the risk of cryptocurrencies destabilizing any major nation's financial system is quite small due to their relatively diminutive size and the ability of governments and central banks to impose controls that harness their impact—primarily through cryptocurrency exchanges. In 2018, the cryptocurrency market's size was about $0.20 trillion, while the global money supply was about $90.4 trillion.[12] Governments are also taking action by imposing rules on centralized cryptocurrency exchanges, such as anti-money-laundering (AML) rules and know-your-customer (KYC) regulations.

Taxation and Government Regulation

Cryptocurrencies are different from bank accounts or credit cards. Instead of making money transfers through highly connected financial intermediaries, cryptocurrencies use decentralized systems built on cryptographically created computer algorithms. Peer-to-peer transactions can be conducted anywhere, without identifiable locations to search, records to subpoena, or lists of management executives to contact. If cryptocurrencies continue to grow, will government tax authorities need to solve the problem of deteriorating tax bases? Will their attempts to tax largely anonymous and untraceable currency transactions be a bit like lassoing clouds with a rope, which means tax evasion and tax fraud could be mounting future problems.

Cryptocurrencies and Criminal Activities

Combining money with anonymity or pseudo-anonymity is both a blight and a blessing for criminals. On one hand, blockchain cryptocurrencies create an immutable (or near immutable) ledger of transactions, providing (if discovered) a public audit trail for all time. On the other hand, cryptocurrencies

12 See CoinMarketCap, "Top 100 Cryptocurrencies by Market Capitalization," https://coinmarketcap.com/ (accessed September 3, 2019). Jeff Desjardins, "All of the World's Money and Markets in One Visualization," *The Money Project*, http://money.visualcapitalist.com/worlds-money-markets-one-visualization-2017/ (accessed September 3, 2019).

have opened a Pandora's Box of possible ways to engage in criminal activities without being caught. The key is using cryptocurrencies, which leave no audit trail, such as Monero or Zcash. They have indeed been used for bribes, extortion, and the purchase of illegal goods, as well as the creation of cyber brothels, illegal gaming sites, online scams, phishing, spyware, spam, hacking, and credit card thefts, but the same is true for dollars, euros, and yen. Until it was closed, the online marketplace called Silk Road operated as a website on the dark web and was known as the "Amazon of illegal drugs."[13] Silk Road's currency of choice was bitcoin because customers wanted their transactions kept as confidential and untraceable as possible.[14] To some extent, bitcoin's reputation is still recovering from its tarnished association with Silk Road. Nevertheless, the black market currencies of choice remain the U.S. dollar, euro, yen, and Swiss franc.

In the United States, cryptocurrencies have been investigated by the Internal Revenue Service, Securities and Exchange Commission, Commodity Futures Trading Commission, Financial Action Task Force (on Money Laundering—FATF), and Treasury Department's Financial Crimes Enforcement Network (FinCEN). Internationally, the European Banking Authority and European Central Bank have also investigated them, but the list does not stop there. Many departments and commissions of international organizations have been investigating cryptocurrencies, such as the International Monetary Fund's Monetary and Capital Markets Department, United Nations' Office on Payments and Market Infrastructure, Bank for International Settlements' Committee on Payments and Market Infrastructure, and Organization for Economic Cooperation and Development's Directorate of Financial and Enterprise Affairs. It would be difficult to name a central bank in the world that has not taken time to address potential issues related to cryptocurrencies.

Are Cryptocurrencies "Money"?

Changes in a nation's money supply can have strong influences on domestic inflation rates, expected inflation rates, and nominal interest rates. A central bank's ability to effectively control inflation requires the power to regulate key monetary aggregates, such as the monetary base and M2 money supply. The first

13 The U.S. FBI closed Silk Road in October 2013.

14 The Gizmodo website provided access to Silk Road. Its homepage was named "The Underground Website Where You Can Buy Any Drug Imaginable."

step in doing so is accurately defining and measuring these monetary variables, which is not as easy as it may first appear. A nation's money supply should include financial instruments that most directly affect residents' spending, but new payment vehicles and financial instruments are continually being developed. Furthermore, household and business preferences for financial instruments vary from country-to-country and over time. Most nations include coins and bills in their money supply measures because these assets have legal tender status, but, from there, determining what to include is problematic. Should checking accounts, savings accounts, money market mutual funds, time deposits, or money market mutual funds be included? How about frequent flyer miles? Should the measured money supply include bitcoin and popular altcoins?

The Functions of Money

We learned in Chapter 6, "Monetary Aggregates," that money has three primary functions, which are as a medium of exchange, store of value, and unit of account. As a medium of exchange, fiat money facilitates trade because most people accept it for the things that money can buy—not for the money itself. Money's role as a store-of-value is based on its ability to retain purchasing power over time. Finally, as a unit of account, money allows us to place values on goods, services, and credit transactions. Any digital currency that fulfills all of these functions can unequivocally be called "money." You might be asking yourself, "If not money, what would cryptocurrency be?" The answer is it would just be an asset, like gold, silver, or baseball cards, which can increase or decrease in value.

Cryptocurrencies and the Functions of Money

"Are cryptocurrencies money?" At first, it may seem that the answer to this question requires the same sort of inductive reasoning used for the "Duck Test," which is, "*If it looks like a duck, swims like a duck, and quacks like a duck, then it is probably a duck.*" For a cryptocurrency, the Duck Test might be rephrased as follows: *If a cryptocurrency is a unit of account, medium of exchange, and store of value, then it is probably money*. Let's look more closely at each money function to see if cryptocurrencies qualify. What we will find is that their attributes have *evolved*. Market competition has gradually transformed cryptocurrencies from speculative assets into ones that are more money-like. Full transformation is not yet complete and may never be, but the momentum is clearly on the side of cryptocurrencies fulfilling the major functions of money.

Are Cryptocurrencies Mediums of Exchange?

A growing, but still meager, number of merchants worldwide accept cryptocurrencies in payment for goods and services.[15] Those that do accept cryptocurrencies typically convert their receipts immediately into stable fiat currencies to reduce their currency exposures and cash-flow risks—because price fluctuations of some cryptocurrencies have been so large they could wipe out a business's profits in a single day.

The relatively recent introduction and growth of crypto debit cards have the potential to popularize cryptocurrencies as mediums of exchange. With them, users can draw from a single cryptocurrency wallet or multiple ones, the most popular of which are bitcoin, Ethereum, Dash, and Litecoin. TenX was the first company to offer a crypto credit card, but competitors have followed quickly, such as BitPay, Cryptopay, Monaco, TokenCard, and Wirex.

There is hope that crypto debit cards might act as propellants that increase cryptocurrencies' use, but there are also grounds for doubts. Credit cards backed by multiple fiat currencies, such as dollars, euros, and yuan, have existed for years, but relatively few individuals use them, which may imply that the biggest obstacle facing cryptocurrencies is the reluctance by most people to think about transactions in more than one currency.

Are Cryptocurrencies Stores of Value?

Between 2016 and late 2017, cryptocurrency prices soared. Bitcoin rose from $435 to nearly $20,000. Ether rose from $12 to more than $1,400, and Litecoin rose from $3.60 to about $360. Between 2017 and late 2018, these prices plummeted, with bitcoin losing more than 80% of its value, and both Ether and Litecoin depreciating by more than 90% (see Figure 11.2).[16] To be a store of value, an asset needs a relatively stable value, but the history of most cryptocurrencies has been just the opposite—more aligned with assets that have fueled speculative bubbles, such as tulips. Some cryptocurrency prices have fluctuated by as much as 30% in a single day.

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15 A list of these establishments can be found at CNN, "Companies that Accept Bitcoin—List Updated for 2019," https://www.ccn.com/companies-that-accept-bitcoin (accessed September 3, 2019). Among the most recognized are Baidu (China), Bloomberg, Craigslist, eGifter, Expedia.com, Intuit, Microsoft, Newegg.com, Overstock.com, San Jose Earthquakes (soccer team), Subway, Tesla, Virgin Galactic, Wikipedia, and Zynga. Wikileaks, Freenet, Pioneer One, and LulzSec (an admitted hacking organization) have received donations denominated in bitcoins.

16 To see how much more volatile a bitcoin's value is relative to national currencies, such as the euro, go to The Bitcoin Volatility Index at https://www.buybitcoinworldwide.com/volatility-index/ (accessed on September 3, 2019).

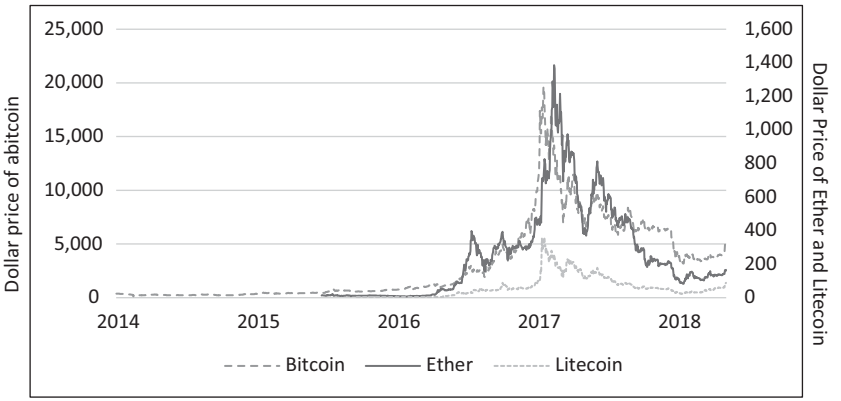

Figure 11.2: Dollar Value of Bitcoin, Ether, and Litecoin.

Until recently, cryptocurrency values have been so volatile relative to other money alternatives that they have not been meaningful stores of value, but times are changing, and the cryptocurrency market has begun to address this weakness by introducing "stablecoins." A stablecoin tries to minimize price volatility by pegging its value to a secure asset, such as a national currency (e.g., the U.S. dollar), weighted basket of currencies (e.g., the special drawing right),[17] commodity (e.g., oil), or precious metal (e.g., gold).

Examples of stable coins are Tether, TrueUSD, Dai, Paxos Standard Token, USD Coin, and Gemini Dollar. Tether is a cryptocurrency that is supposed to be fully backed by fiat currencies, such as the dollar, euro, or yen. Suspicions arose in 2018 and 2019 that it was not fully backed and company-promised audits were not done.

By contrast, Dai is a relatively recent example of a stablecoin that could assuage the concerns of stablecoin skeptics. This decentralized cryptocurrency is fixed against the U.S. dollar but is neither backed by U.S. dollars nor is its value fixed by a centralized authority, such as a central bank. Instead, Dai is backed by cryptocurrency collateral and uses margin trading and smart contract incentives to keep its value fixed at (or very near to) one U.S. dollar. As a decentralized currency, Dai cannot be censored or shut down.

Since 2009, when bitcoin started, cryptocurrencies have been mostly unregulated, but, lately, even this has changed. In 2018, a blockchain start-up

17 The *special drawing right* was created by the International Monetary Fund in 1969. Today, its value is a weighted average of five currencies, which are the U.S. dollar, Euro Area euro, Japanese yen, British pound, and Chinese renminbi.

named Paxos, introduced the Paxos Standard, which is a cryptocurrency fully backed by the U.S. dollar, as well as approved and regulated by the State of New York's Department of Financial Services. Paxos Standard is also approved and regulated as a qualified custodian of customer funds by the U.S. Securities and Exchange Commission.[18] Other companies, such as Gemini, have been trying to do the same by embracing regulation, rather than trying to avoid it.[19] In Japan, a consortium of banks planned to issue its own, federally approved cryptocurrency, called the J-Coin, which would be pegged to the yen. Its expected release date was the opening of the 2020 Olympics in Tokyo.

In the end, a stablecoin's value will depend on its verifiable backing and the trust people have in it. Suspicions of partial or unaudited backing, such as occurred with Tether, could quickly lose the trust that potential users place in this type of cryptocurrency.

Are Cryptocurrencies Units of Account?

Companies, worldwide, have shown an increasing willingness to accept cryptocurrencies, but very few quote prices in them. Instead, they price their goods and services in fiat currency units, such as dollars, euros, and pesos, requiring users to make exchange rate conversions and calculations. For example, if the cost of a car is $20,000 and one bitcoin is worth $5,000, then a potential buyer understands the car costs four bitcoins ($20,000/car ÷ $5,000/₿ = ₿4/car).

Converting bitcoins into dollars to purchase dollar-denominated goods and services is easy to understand because there are so many goods and services denominated in dollars. The U.S. Consumer Price Index measures retail prices for a market basket of goods and services purchased by the typical U.S. urban consumer. Few goods and services have their prices quoted in cryptocurrencies, and there are no market baskets of goods and services denominated in them. The value of two currencies should bear some long-term relationship to the cost of purchasing the products denominated in them. With no cryptocurrency-denominated market basket, it is problematic at best and impossible at worst to

18 See Nikhilesh De, "Paxos Unveils Dollar-Backed Stablecoin Approved by New York Regulator," *Coindesk*, September 10, 2018, https://www.coindesk.com/paxos-unveils-dollar-backed-stablecoin-approved-by-new-york-regulator (accessed September 3, 2019).

19 In its report, entitled "Regulation of Cryptocurrency Around the World," the U.S. Library of Congress surveyed 130 countries and some regional organizations for their legal and policy treatment of cryptocurrencies. See "Regulation of Cryptocurrency Around the World," *The Law Library of Congress, Global Research Center*, June 2018, https://www.loc.gov/law/help/cryptocurrency/world-survey.php (accessed September 3, 2019).

track the purchasing power parity value of a cryptocurrency. Therefore, cryptocurrencies do not appear to fulfill the unit-of-account function. It is not that they are unable to satisfy this function. Instead, they are currently not used in this way.

Final Verdict: Are Cryptocurrencies Money? No, Not Currently

Even if a cryptocurrency had all the functions of money, there still could be reasons central banks would exclude it from their domestic money supply statistics. Only if it had a meaningful impact on spending and prices would and should a cryptocurrency be included. Perhaps, one day, a cryptocurrency will reach this level of widespread acceptability, but for now, the lot of them are still relatively insignificant players in the global financial world, with negligible impacts on nominal and relative real-world prices and output. Cryptocurrencies have the potential to serve as mediums of exchange, stores of value, and units of account, but up to now, their record has not been stellar. As Table 11.1 indicates, they are potential contenders, but currently relegated to minor roles as members of the "not ready for prime time" players.

Table 11.1: Are Cryptocurrencies "Money"?

	National Fiat Currencies ***(e.g., dollars, euros, and yen)***	**Cryptocurrencies Currencies** ***(e.g., Bitcoins, Ethereum, and Litecoin)***
Medium of Exchange	Yes	*Not Yet but Developing* – Not widely used, but crypto credit cards could be game-changers
Store of Value	Yes	*Not Yet but Developing* – Volatile prices, but stablecoins could be game-changers
Unit of Account	Yes	*Not Yet* – Few products are denominated in cryptocurrencies

National and Central Bank Digital Currencies

If Satoshi Nakamoto can create bitcoin, programmers at Ethereum can create Ether, and consortiums of Japanese banks can create and issue their own cryptocurrencies, then why not governments and central banks? Governments have already done so, and some central banks are considering issuing their own digital

currencies, called *central bank digital currencies* (CBDC). A national cryptocurrency or CBDC might start by focusing on wholesale systems that handle large-value, high-priority payments, such as interbank transfers. Alternatively, it might focus on large volume, low-value retail transactions, which are typically financed with checks, credit cards, and debit cards. A retail focus would allow ordinary people and businesses to have accounts at their central banks, from which and into which they could make electronic payments and receipts.

The government of Dubai, a city in the United Arab Emirates, has issued EmCash;[20] Venezuela has issued the Petro;[21] Tunisia has issued the eDinar,[22] and Senegal has issued the eCFT.[23] Other nations have also signaled their intention to do so, such as Sweden (E-krona), Russia (Cryptoruble), and Israel (digital shekel). Whether they succeed or fail, and whether their enthusiasm increases or decreases is very much in question. For example, Estonia backed away from its own cryptocurrency, the Estcoin, after thinking through conflicts that might arise for a euro area member that has agreed to abide by mandatory European Central bank rules on monetary policies.

The introduction and widespread use of national cryptocurrencies or CBDCs could be revolutionary in terms of settling debates about whether or not cryptocurrencies satisfy the three major functions of money. They would qualify, but success would bring a menu of advantages and disadvantages to households, businesses, and any government that introduced them. Whether they would yield net benefits is very much uncertain. Among the potential advantages that national cryptocurrencies or CBDCs offer households and businesses are:

- The automation of digital payments, thereby making bill paying easier, less expensive, and more secure
- Faster processing speeds, improved delivery times, and reduced complexity
- Secure official connections between a cryptocurrency, the national fiat currency, and legacy financial systems
- Regulation by a central bank and government agencies
- Control over the issuance of cryptocurrencies and the fairness of distribution
- A legal framework within which to adjudicate disputes, criminal acts, and unfair treatment

20 In 2017, the government of Dubai launched its blockchain-based cryptocurrency.

21 In 2018, Venezuela's government issued a cryptocurrency, called the Petro, which is controlled by the government and, purportedly, backed by the nation's oil, gas, and diamond (i.e., "raw materials") reserves. Initial purchases of the Petro could only be made in hard foreign currencies.

22 Tunisia put its national currency on a blockchain in 2016.

23 In 2016, Senegal introduced its own cryptocurrency, based on its national currency.

Despite these advantages, many households and businesses will resist government cryptocurrencies or CBDCs because they associate them with centralized *big brothers*. These groups want to push governments further away from their private financial transactions, instead of bringing them closer. For this group, unless national cryptocurrencies were run on permissionless networks with decentralized transaction verification, they would be nothing more than centrally managed digital currency systems built on blockchain, which many feel are not actual cryptocurrencies.

For governments and central banks, there would be a range of advantages and disadvantages from issuing national cryptocurrencies or CBDCs. Among the potential benefits are:

- Moving the nation further down the road toward a cashless or less-cash society.
- Reducing costs and increasing efficiency, which could result in significantly improved financial transparency due to the reduced need for our complex and intricate web of correspondent commercial bank relationships.
- Making fiscal policies more effective by facilitating tax collections, as well as reducing tax evasion, tax fraud, money laundering, and other black market transactions.
- Reducing the demand for private cryptocurrencies, which could widen the tax base and strengthen fiscal policies.
- Making monetary policies more effective by enhancing central bank controls and also providing them with unconventional tools, such as an ability to impose negative nominal interest rates.
- Allowing nations targeted with international sanctions and currency restrictions, such as Iran and Venezuela, to borrow on global capital markets, evade international sanctions, circumvent currency restrictions, and deal confidentially with anyone they choose.
- Starting to provide underbanked individuals (approximately two billion people worldwide) with reliable and efficient financial platforms and networks for intra-country and international transactions.

Despite these potential advantages, many (if not most) governments and central banks have resisted issuing and maintaining their own cryptocurrencies. There are just too many unknowns, making the risk-weighted net benefits unclear. The fear is, if mistakes are made, they could be significant and disruptive, rather than marginal and contained, causing considerable financial damage. Among the most prominent reasons for not moving forward are:

- National cryptocurrencies and CBDCs would offer a bonanza of centralized confidential information, which could be the target of large-scale cyberattacks. If accessed, the database could be used and abused by criminals.
- In times of stress, a safe and secure national cryptocurrency might drain the commercial banks (e.g., JPMorgan Chase and Wells Fargo in the United States, and Barclays and Deutsche Bank in Europe) of funds at precisely the time liquidity is needed most, thereby creating financial disruption and possible bank failures.
- If nations' banking, payment, and processing systems are already reasonably fast and reliable, then why is there a need to fix something that is not broken?
- If they replace or significantly displace commercial banks, central banks would have dual, and perhaps conflicting, mandates. On the one hand, they would be responsible for sound, secure, and smoothly functioning financial systems, monetary control, and inflation stabilization. On the other hand, they would be responsible for financial innovations, in areas such as payments and processing, which would ordinarily emerge from commercial experiments in the private sector. In general, the record of successful financial innovation by central banks has not been stellar.
- National currencies or CBDCs could become highly bureaucratic and susceptible to political and commercial influence.
- Verifying cryptocurrency transactions, such as for bitcoin, is so energy-intensive that widespread use could cause environmental damage.[24]

The Future of Cryptocurrencies

For years, the financial services industry has been the center of some of the most fundamental and potentially transformative changes in technology. To be sure, the introduction and growth of cryptocurrencies and blockchain technology, as well as the possible introduction of national cryptocurrencies and CBDCs, have been significant forces in the financial markets, but they are not the only or most important forces at work. Advances in artificial intelligence,

24 In 2019, bitcoin miners used about 0.27% of the world's electricity consumption, which was roughly equivalent to the yearly electricity use in Colombia. By 2020, bitcoin's electricity consumption was predicted to match Denmark's annual consumption. "Bitcoin Energy Consumption Index," *Digiconomist*, https://digiconomist.net/bitcoin-energy-consumption (accessed September 3, 2019).

big data, and the internet of things (IoT) have also played important roles. Sorting out which becomes the most transformative will be left for economic historians to decide.

Vitalik Buterin, the co-founder of Ethereum, identified a fundamental tradeoff for any currency—new or old, fiat or not, electronic or physical. When applied to cryptocurrencies, his "Cryptocurrency Trilemma" can be stated as follows. *Given three desirable currency attributes, which are scalability, decentralization, and security, it is possible for a currency to have any two of these characteristics but not all three.* Electronic fiat currencies are scalable and offer protection, but they are centralized. Bitcoin is decentralized and secure but, to date, not scalable.

In 2019, social media giant Facebook was preparing to launch Project Libra, a cryptocurrency payment system built on top of its large social network. Facebook was expected to target regions where traditional financial institutions have not been reliable or their fees (especially on cross-border remittances) have been high. If Facebook develops a successful cryptocurrency that is readily accepted, internationally, by one and all, what are the implications for well-established e-commerce channels? What confidentiality challenges will it present to regulators, potential users, and shareholders? With one-third of the world's population (a two billion person user base) logging on to Facebook monthly and increasingly making online purchases, the implications are thought-provoking.

Success at anything depends on how you define it. For cryptocurrencies, is it possible that we have not correctly defined "success?" Will we wake up one day in the future and ask ourselves, "Was it worth the cost?" Considerable effort has already been put into the creation of cryptocurrencies. The electricity needed to mine new bitcoins has been linked to concerns about environmental damage. Is it possible that the proliferation of these currencies will end up reducing efficiency and complicating our lives?

Secure cross-border interbank financial transactions are already handled efficiently by SWIFT (The Society for Worldwide Interbank Financial Telecommunication), which is a long-standing consortium of the world's major financial institutions. Will Ripple turn out to be superior to SWIFT? Similarly, VISA and MasterCard have functioned well as credit and debit cards, able to process 25,000 transactions per second. Cryptocurrencies are nowhere close to their speed, reliability, and volume. Eurosystem's TARGET Instant Payment Settlement service (TIPS) offers users 24/7, real-time retail payment services. Will cryptocurrency providers offer fund transfers at superior rates and accuracy?

Cryptocurrencies and blockchain are still very young. Perhaps, we are expecting too much from this child. Industrial scale automobiles started in 1912 with Ford's Model T, which was more than 50 years after the internal combustion engine was invented. The first transistor patent was filed in 1925, but they did not reach mass adoption until decades later. The first workable prototype of the internet started in the 1960s, but large scale adoption did not happen until the mid-1990s.

The Rest of the Story

Bitcoin

Bitcoin is a completely distributed (i.e., noncentralized) and pseudonymous digital currency. It was developed in 2009 for real-world uses by *Satoshi Nakamoto*—which is a pseudonym because no such person (connected to bitcoin) exists.[25] Satoshi could be a man, woman, or group of individuals located anywhere in the world. No one knows. As of December 2019, the founder of bitcoin and blockchain technology had not been discovered. Some may ascribe a sinister or unsavory purpose to any currency whose founder and developer is anonymous. While this may be the case, such an assumption should be guarded because bitcoins have numerous good uses and benefits for both individuals and nations. For one, they can free individuals from harmful monopoly currencies and hyperinflation, such as the Venezuelan bolivar (2018–2019) and Zimbabwean dollar (2008–2009), and they can be oases of financial stability in turbulent times, as they were during the 2013 financial crisis in Cyprus. If bitcoins or other cryptocurrencies prove to be highly successful, the day could come when they replace or reduce the demand for well-known, safe-haven currencies, such as the U.S. dollar and Swiss franc.

Bitcoin transactions are pseudonymous, irreversible, and challenging (but not impossible) to trace. Bitcoin's ledger is stored on a multitude of personal computers around the world. The ledger keeps track of who owns what and how much is held, but in this case, the "who" is simply a long string of numbers and letters, called a private key. As for taxes, payments using bitcoins are

25 The first published description of bitcoin was in 1998 by Wei Dai on the *Cypherpunks* mailing list. Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System," http://bitcoin.org/bitcoin.pdf (accessed September 3, 2019).

taxable events, however, without any way to identify the payer and payee, efforts to tax these transactions are problematic.

To get bitcoins, one can trade or purchase them with physical currencies (e.g., dollar bills), fiat digital currencies (e.g., credit cards or wire transfers), or other cryptocurrencies. Currency conversions can be done person-to-person (e.g., payment in a café, with bitcoins wired afterward), via local payment networks, or with a bitcoin-backed debit card, but the most common practice is to use online exchanges (centralized and decentralized), such as Coinbase, Binance, BitMEX, OKEX, Kraken, and Huobi. Almost all of these centralized online exchanges follow anti-money-laundering (AML) and know-your-customer (KYC) rules, which reduce the chances of criminal activities, such as money laundering, tax evasion, financing terrorism, and extortion. Nevertheless, these crimes still take place and are part of the cybercurrency ecosystem. Critics argue the same is true for cash payments in legal tender.[26]

Bitcoins can also be acquired by "mining." Every ten minutes, bitcoin transactions are combined into information blocks and verified by "miners." These miners do so by solving bitcoin's complex verification puzzle, which means incurring considerable expenses on computer time and electricity, as well as hardware (e.g., integrated circuits) and software upgrades. Miners are businesses and individuals, who compete to solve bitcoin's complex computer puzzle.

It is not out of benevolence or allegiance to lofty goals that miners do this work. On the contrary, they are rewarded with newly created bitcoins and transaction fees.[27] Initially, this reward was set at ₿50, but it fell to ₿25 in late 2012 and fell again to ₿12.5 in 2016.[28] At a value of $5,000 per bitcoin, that amounts to $62,500 for 10 minutes work. At one time, bitcoin's price was nearly $20,000. Winning is purely by luck, which means the more computer power a miner has, the more likely are his/her chances of solving the puzzle and winning the reward. Newly created bitcoins are automatically transferred into the winning miner's wallet (i.e., account).

26 Despite the exchanges' compliance with AML and KYC rules, suspected increases in money laundering activities have prompted the U.S. Internal Revenue Service to send thousands of warnings to cryptocurrency holders for potentially failing to report taxable income. Aggressive anti-money laundering efforts have also started around the world. This book makes no judgement about the suitability of any cybersecurity as an investment. Investors need to understand the risk and the volatility of these markets before taking positions.

27 Users who want their transactions expedited pay miners' transaction fees.

28 In May 2020, bitcoin's mining reward is scheduled to be cut in half to 6.25 bitcoins per ten minutes.

Bitcoin is programmed so that its complex verification puzzle is solved about every ten minutes. If improved computing power allows miners to solve the complex puzzle more quickly than ten minutes, its difficulty level is automatically increased, so the ten-minute release rate is maintained. Every 210,000 blocks (approximately four years), bitcoin's reward is cut in half. Therefore, its supply increases at a decreasing rate, reaching a maximum of 21 million bitcoins (i.e., ₿21 million) in 2140.[29] This amount may seem small relative to other macroeconomic variables, such as the U.S. M1 and M2 money supplies, but be careful not to confuse the quantity of bitcoins with their value. Because the lowest denomination bitcoin (i.e., a satoshi) equals ₿0.00000001, the potential supply of satoshis is 2.1 quadrillion (i.e., 2,100,000,000,000,000 = $2.1E^{15}$). Combine this information with the fact that a satoshi's value changes with the forces of supply and demand and could, one-day, be worth a dollar or more. Therefore, bitcoin's potential supply is immense.

Because it grows at a programmed rate that is not tied to any nation's business cycle, bitcoins might be viewed as the twenty-first-century embodiment of a recommendation to abolish central banks and replace them with computers that increase the money supply at a constant (noninflationary) rate.[30] This idea, called the "k-percent rule," is based on the belief that central bankers' actions may (inadvertently) exacerbate business cycles, due to the recognition, implementation, and impact lags (see Chapter 9, "Central Banks") as shown in Figure 11.3. It calls for scheduled, yearly increases in liquidity by tying a nation's money supply growth rate to a fixed target, such as the average long-term real GDP growth rate. By adopting this rule, countries would not be penalized by well-meaning, but misguided, central bankers, who have difficulties reading economic tea leaves and delivering monetary medicine when and where it is needed. One reason bitcoin might *not be* the best example of the k-percent rule is its growth is not tied to the world's average real GDP growth rate. The consequences of this are still being debated.

In contrast to banks that defend customer privacy by keeping transactions confidential, bitcoin publishes all transactions on the internet and preserves

29 The current supply of bitcoins can be found at https://www.blockchain.com/en/charts/total-bitcoins (accessed September 3, 2019).

30 This is the idea of economist Milton Friedman and known as the "k-percent rule." It has spurred spirited, lively debates, which continue to this day, on whether central bankers should use monetary rules or discretion. See Milton Friedman, "The Optimum Quantity of Money," in *The Optimum Quantity of Money and Other Essays*, Chicago: Aldine Publishing Company (1969), pp. 1–50. Also see Milton Friedman, "Monetary Policy: Theory and Practice," *Journal of Money, Credit, and Banking*, Volume 14, Number 3, August 1982, pp. 98–118.

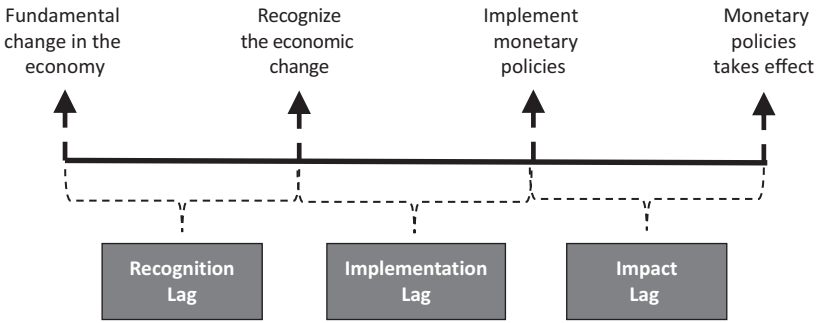

Figure 11.3: Lags in Monetary Policy.

privacy by disclosing only transaction amounts and public keys, with no personal identification. Peer-to-peer bitcoin accounts can be compromised but mainly if customers' electronic wallets are accessed by hackers or the computer is infected with a virus.[31] Because there is no clearinghouse or centralized oversight, tracking, tracing, or retrieving lost bitcoin funds is almost impossible. If lost, they are gone forever—like spilling a bag of coins off the deck of an ocean liner traveling at mid-sea.

Conclusion

Money exists to facilitate transactions that involve buying, selling, lending, borrowing, or transferring something of value. It existed long before governments and central banks became involved. Money is to economic systems as motor oil is to automobiles. Without it, cars seize up quickly, but oil does not propel these vehicles—gas does. Similarly, money is a lubricant for economic activity. The propellants are investments in human and business capital, technological improvements, and meaningful regulations. In the past, societies have tried to exist without money, but they were few and far between and, ultimately, all of them failed.

Central banks and governments are concerned about the creation of cryptocurrencies that might challenge the authority, validity, and acceptability of their domestic money supplies. Because cryptocurrencies can be used anonymously or

31 In 2011, the antivirus company Symantec warned bitcoin about the possibility of illegal money creation.

pseudonymously to demand real-world goods and services, serious questions arise about the threat they pose to central banks' abilities to control inflation and governments' abilities to finance their activities from broad tax bases.

Some observers herald the rise of cryptocurrencies for their potential to help oppressed individuals circumvent authoritarian governments and non-credible central banks. Others cite their efficiency and value as a competitive, non-monopolistic, free-market alternatives to legal tender. Because cryptocurrencies are internationally distributed, no country is free from their influence. At the same time, because they are globally distributed, rather than focused on any one nation, their impact is likely to be diffused.

Cryptocurrencies have introduced a variety of perplexing issues, which governments, courts, legal experts, and legislative bodies will need to resolve. Are they private property? What rights of transferability (e.g., inheritance) should apply to them? For businesses, what are the credit, liquidity, and operational risks associated with the increasing use of cryptocurrencies? Do they threaten users' privacy? Will they eventually be able to record, trace, and analyze every transaction we make? What are their growing links to social networks, where individuals share confidential information with trusted friends?

In the past, we trusted banks and other financial intermediaries to make our payments and clear our deposited checks. We trusted grocers, dentists, and pharmacist to accept our cash, credit cards, and checks, and they trusted us not to use counterfeit bills or write checks on accounts with insufficient funds. We also trusted our central banks to increase the money supply at reasonable rates and distribute it in fair and unbiased ways. In some countries, this trust has been destroyed by risk-taking banks and central banks that excessively increased their money supplies.

Using cryptocurrencies means trusting computer programs and algorithms to:

1. Efficiently execute and clear our payments and receipts
2. Convince grocers, dentists, and pharmacists to accept the cryptocurrencies we offer in exchange for their goods and services
3. Protect merchants from fraudulent payment schemes
4. Defend cryptocurrency accounts from hackers and other criminals
5. Increase the cryptocurrency money supply at reasonable rates and in fair and unbiased ways

In the future, trust and confidence will surely be the driving forces behind the development of cryptocurrencies. At present, cryptocurrencies do not appear to have significant effects on the financial and economic systems of any nation. In part, this is due to their relatively small size and lack of meaningful interaction with the three major macroeconomic markets (i.e., the real credit market, real

goods and services market, and foreign exchange market). As for those who see cryptocurrencies as very short-term bubbles, one is reminded of the alleged statements made in the past by respected, practical, and well-educated individuals, which proved to be highly inaccurate, such as:

- "Heavier-than-air flying machines are impossible." —Lord Kelvin, British mathematician and physicist, President of the British Royal Society (1895)
- "There is not the slightest indication that nuclear energy will ever be obtainable. It would mean that the atom would have to be shattered at will." —Albert Einstein (1932)
- "I think there is a world market for about five computers." —Thomas J. Watson, President of IBM (1943)
- There is "no reason for any individual to have a computer in his home." —Ken Olsen, founder of Digital Equipment (1977)

For those who believe that cryptocurrencies will replace money, as we know it, and ultimately revolutionize financial transactions, remember the 1955 prediction of Alex Lewyt, President of Lewyt Vacuum Company, who said:

- "Nuclear-powered vacuum cleaners will probably be a reality within ten years."

Key Points

- Cryptocurrencies are types of digital (i.e., intangible) money, which are usually unregulated, internationally distributed, and disconnected from familiar financial intermediaries or any nation's legal tender.
- Engendering trust in computer software, rather than financial intermediaries, will be the key to cryptocurrencies future success.
- Cryptocurrencies can be traded peer-to-peer and on centralized or decentralized exchanges.
- Blockchain is called a "distributed ledger technology" because the historical ownership records are downloaded onto many users' computers, rather than stored in a centralized location.
- Historical information stored on blockchain can be altered if the verification network is small.
- Altcoins are cryptocurrencies, other than bitcoin, that are built on blockchain.
- Due to their small relative size, cryptocurrencies do not currently threaten any nation's financial or economic system.
- The forces of supply and demand determine bitcoin's exchange-rate value.
- Whether the widespread use of cryptocurrencies will complicate the jobs of central bankers is still being discussed.

- Taxing peer-to-peer cryptocurrency transactions is problematic because they are anonymous or pseudonymous, which makes them almost untraceable.
- To be "money," an asset must be a unit of account, medium of exchange, and store of value. Currently, no cryptocurrency fulfills all the functions of money adequately.
- Some governments and central banks have begun to issue their own digital currencies.
- Bitcoin has the following features, but many of them are shared by fiat currencies, such as dollars, euros, francs, yen, and pesos.
  - Bitcoin is a peer-to-peer, noncentralized cryptocurrency, which allows pseudonymous digital currency transactions.
  - Bitcoins can be used for unsavory purposes, but they also have numerous potential good uses, such as breaking the chains of harmful monopoly currencies and providing an oasis of stability in turbulent financial times.
  - Bitcoin's supply is regulated by mathematical algorithms that permit moderate increases at a continuously diminishing geometric rate and reaches a maximum size of ₿21 million by 2140.
  - Bitcoin is a freely floating currency that has experienced dramatic price fluctuations.
  - Bitcoins can be used for criminal activities, but the same is true of legal tender.
- Trust is the key to any cryptocurrency's future success.

Review Questions

1. What is are differences among legal tender, fiat currencies, digital currencies, and cryptocurrencies?
2. Why is *trust* so important to the future success of cryptocurrencies?
3. Should individuals who are most interested in anonymity or pseudonymity use online, peer-to-peer cryptocurrency transactions or perform these transactions on exchanges? If one of these is better than the other, why does anyone use the other?
4. How are the values of cryptocurrencies determined?
5. Explain why the demand for cryptocurrencies is inelastic (i.e., the percentage change in the quantity of cryptocurrency demanded per period is less than the percentage change in exchange rate price of the cryptocurrency.)
6. Are cryptocurrencies "money," and, if they are, should they be included in nations' money supplies?
7. Is it accurate to say that a major threat of cryptocurrencies is that all the transactions connected to them evade national income taxation?

Discussion Questions

8. Do cryptocurrencies affect economic activity, and if they do, should they be regulated?
9. How can governments and central banks regulate the spread of cryptocurrencies?
10. Explain the costs and benefits of bitcoins in terms of Milton Friedman's "k-percent rule."

11. Under what conditions might the creation of cryptocurrencies be inflationary?
12. With regard to a cryptocurrency, such as bitcoin, explain the phrase "commerce follows community." Do you agree?
13. What effect does the purchase of cryptocurrencies have on a nation's monetary base, M2 money supply, and M2 money multiplier?

Chapter 12
Real Goods and Services Markets

Healthy sales growth is a manager's dream. Not only can it raise profits, stock prices, and salaries, but sales growth can also boost morale and hide a multitude of management sins. Company sales revenues depend on two significant factors: quantity sold and price. For most businesses, output growth is the first sign of market acceptance and an indication that production, marketing, and distribution channels are working in harmony. It also enables companies to benefit from economies of scale and other production-related efficiencies.

Companies also try to increase their sales revenues by raising prices, but competition often makes this route difficult or unreliable. In the absence of inflation, raising prices with any degree of certainty requires businesses to have at least a measure of market power, such as patents, trade secrets, product differentiation, or market niches.

Similarly, regardless of managers' capabilities and expertise, sales growth depends, in large part, on how rapidly economies are expanding. Operating in prosperous, swiftly moving nations is like swimming in a rapidly moving stream because it makes increased sales volume easier to achieve and price hikes easier to implement. When companies operate in countries with inflationary climates, price increases are necessary just to keep even in real terms.

What causes short-run changes in a nation's average price level (i.e., GDP Price Index) and output (i.e., real GDP)? What happens to the GDP Price Index and real GDP when oil prices rise due to an embargo, war in the Middle East, or increased demand by China and India? Are there economic differences when prices rise due to increasing costs as opposed to increasing demand? What is the relationship between a nation's unemployment rate and GDP Price Index? How can companies factor these changes into their financial planning? This chapter addresses these questions using the aggregate supply and aggregate demand framework.

The Basics

Aggregate Supply Curve

The aggregate supply (AS) curve shows the quantity of domestically produced goods and services that firms are willing and able to produce and sell at various average national price levels during a given period. A nation's average price level is just another name for the GDP Price Index (P), and as Figure 12.1 shows,

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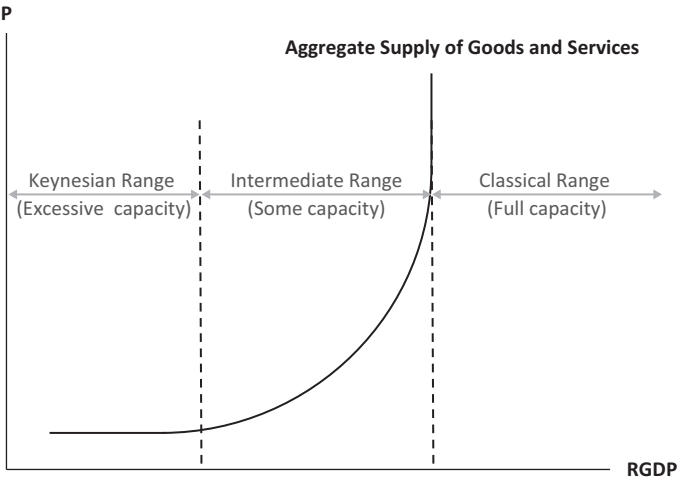

Figure 12.1: Aggregate Supply Curve: Keynesian, Classical, and Intermediate Ranges.

it is placed on the vertical axis of the aggregate supply graph, with real gross domestic product (RGDP) placed on the horizontal axis.

The curvature of the aggregate supply curve shown in Figure 12.1 is easiest to understand if we separate it into three ranges, which are the Keynesian range, classical range, and intermediate range.

Keynesian Range

The horizontal portion of aggregate supply is called the *Keynesian range*, where a nation's real GDP is extremely low (depression-like), unemployment is very high, and companies have plenty of excess capacity. In this segment of aggregate supply, businesses are much more interested in raising output rates, getting employees back to work, and reemploying machinery than they are about raising prices. The Keynesian range was named in honor of John Maynard Keynes, a British economist whose thoughtful contributions to the science of economics were particularly applicable during the Great Depression when aggregate supply was thought (by many) to be flat.[1]

1 Among Keynes's most famous works was a path-breaking book entitled *The General Theory of Employment, Interest, and Money* (1936). *The General Theory* was innovative, iconoclastic, and controversial because it focused on short-term, macroeconomic demand management. Keynes's book revolutionized the way the world looks at macroeconomics, and his theories opened the door to more significant government intervention in the macroeconomy.

Classical Range

The vertical (far-right) portion of aggregate supply is called the *classical range*. It is associated with a real GDP that fully employs a nation's resources.[2] At this rate of output, the nation has reached the limitations of its short-run capacity. It is called the "classical range" because, in this range, increases in demand raise prices with no change in real GDP, which is consistent with classical economic theory. In classical theory, changes in real GDP have more to do with increases in productive capacities and abilities than increases in aggregate demand.

Intermediate Range

The upward-sloping portion of the aggregate supply curve, which lies between the Keynesian range and the classical range, is called the *intermediate range*. In this aggregate supply segment, the GDP Price Index and real GDP rise (and fall) in tandem. As most nations are somewhere in this range, it is the focus of this book and the overwhelming majority of country analyses. In general, the closer a nation is to the classical range, the steeper its aggregate supply curve, and the closer it is to the Keynesian range, the flatter its aggregate supply curve.

Gauging How Close a Nation Is to the Keynesian or Classical Range

If most countries are somewhere in the intermediate range of the aggregate supply curve, how can we determine whether any particular one is closer to the relatively flat or steep portion? To answer this question, let's look at measures of labor market and physical capital market utilization.

How Fully Employed is the Nation's Labor Force?

In general, the lower a nation's *unemployment rate* and the higher its *employment-to-population ratio*, the closer that nation is to the classical range and full employment. Popular news reports tend to emphasize the unemployment rate. Perhaps this is because most people are interested more in the percent of a nation's workforce without jobs than with them. Another reason could be our employment goals are usually stated in terms of unemployment rates.

2 The "classical range" may also be thought of as the portion of the aggregate supply curve where a country reaches its full employment *goal*, which may be (for example) frictional unemployment equal to 5%.

Nevertheless, the employment-to-population rate adds essential information to any macroeconomic analysis.[3]

How Fully Employed are a Nation's Physical Capital Resources?

To determine a country's position on the aggregate supply curve, it is also essential to know the extent to which its capital resources (e.g., machinery, equipment, tools, and factories) are employed. For this, a useful guide is the *capacity utilization index*[4] (CUI), which is a monthly indicator that measures how completely a nation is utilizing its capital base. The higher the CUI, the closer a country is to the vertical portion of its aggregate supply curve, and the lower the CUI, the closer it is to the horizontal part.

Suppose a nation had one million machines, and all of them were being used. If purchases of goods and services rose, it would be difficult to increase production to meet the new demand. One option would be to run the machinery overtime (e.g., on double shifts or triple shifts), but there are only 24 hours in a day, and increased usage would cause more frequent breakdowns. Consequently, it would become challenging for efficient production to keep pace with demand. Therefore, prices would increase in the short run to ration the newly produced goods and services.[5]

By contrast, if only half of the nation's one million machines were fully employed, employers might be more interested in getting their idle machinery back to work than raising prices. Consequently, growing demand would be met by relatively significant increases in output and relatively weak inflationary pressures.

Though 100% is the theoretical maximum for the CUI, inflationary pressures would begin before this maximum was reached. For instance, suppose at the 85% level, U.S. policymakers become concerned about the inflationary impact of expansionary monetary and fiscal policies. Therefore, this 85% level

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3 An informative comparison of international employment-to-population ratios can be found at ankei.com, Rankings and Records, http://www.aneki.com/highest_employment.html (accessed September 3, 2019).

4 In the United States, the CUI is calculated monthly by the Federal Reserve. See http://www.federalreserve.gov/releases/g17/current/ (accessed July 27, 2019).

5 Of course, it is possible to increase a nation's capacity by investing in new plant and equipment, but they need time to be built, brought online, and made efficient. As a result, there is a gap between when these investments are made and output can be increased. In the short run, a nation's potential output should not increase substantially due to increased *current* investments. Remember that, in this section of the text, we are addressing short-run country analyses. Investment-related increases in a nation's long-term output potential will be discussed in Chapter 22, "Long-Term Growth and Development."

could be viewed as a sort of tipping point for the U.S. inflation rate, where the slope of the aggregate supply curve becomes significantly steeper.

Movements Along the Aggregate Supply Curve

A nation moves along its aggregate supply curve due to simultaneous changes in two endogenous variables, namely, the GDP Price Index and real GDP. They are called "endogenous" because the forces of supply and demand jointly determine these variables. You can always recognize an endogenous variable because it is either on the vertical or horizontal axis. All other variables (besides the GDP Price Index and real GDP) that have a significant influence on aggregate supply are called "exogenous" and shift the entire curve.

Movements along the aggregate supply curve could be stimulated by either a change in the GDP Price Index, which would cause real GDP to change, or they could be induced by movements in real GDP, which would cause the GDP Price Index to change. Suppose the GDP Price Index rose. Why would that ignite an increase in production and real GDP? One reason is during inflationary periods, if prices rise faster than wages, then business profits grow, thereby providing companies with incentives to hire and increase production.

Now consider the effect real GDP movements have on the GDP Price Index. When real GDP increases, businesses are often forced to use less productive resources and operate machinery beyond its most cost-efficient levels. In general, when average productivity declines, unit costs rise, causing prices to increase as companies try to pass on these added costs to consumers.

Shifts of the Aggregate Supply Curve

An increase (decrease) in aggregate supply means that, at every GDP Price Index, there is a larger (smaller) quantity of goods and services that businesses are willing and able to produce and make available for sale each period. In Figure 12.2, an increase in aggregate supply is a shift to the right, and a decrease is a shift to the left.

As previously mentioned, the economic factors that cause such shifts are called "exogenous" (i.e., "external") sources of change. Among the most important are changes in technology, productivity, input prices, exchange rates, climate, natural disasters, diseases, immigration and emigration, discoveries of new resources, regulations, taxes, and expectations. Let's take a closer look at each of these variables.

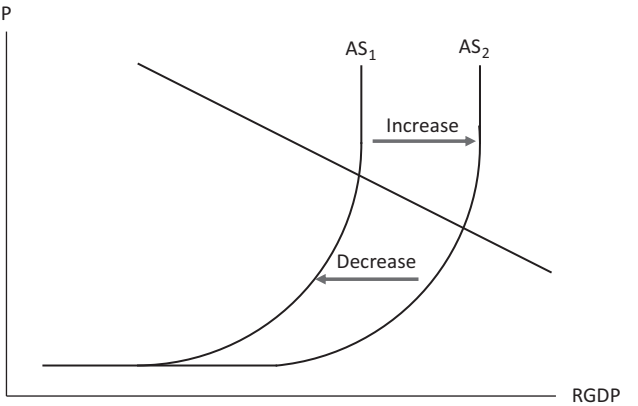

Figure 12.2: Increase and Decrease in the Aggregate Supply Curve.

Technology and Productivity

Improvements in technology and productivity shift the aggregate supply curve to the right. Such improvements typically require expenditures for human capital development (i.e., education), the adoption of innovative and effective management practices, investments in physical assets (e.g., machinery, factories, roads, and dams),[6] invention of new technologies (e.g., computer software and biotech pharmaceuticals), and discovery of profitable ways to market and sell the latest technologies. Therefore, the relationship between the aggregate supply curve and technology or productivity is positive.

Input Prices

Declining input costs reduce business expenses, thereby increasing (i.e., shifting rightward) the aggregate supply curve. If input costs rise, the aggregate supply curve falls (i.e., shifts leftward). Oil provides a perfect example. Increases in oil prices raise the cost of production for a broad cross-section of the economy. As average output costs increase, the aggregate supply curve falls. Therefore, the relationship between the aggregate supply curve and the price of inputs is inverse.

6 Usually, these productivity improvements are the result of investments made years before that are now fully integrated into company operations and contributing to profits.

Productivity Changes and Per Unit Input Costs

When analyzing the effect of input prices on aggregate supply, we must make sure to consider whether resource productivity has also changed. The reason for caution is that more productive resources should cost more. Therefore, it is only when resource costs increase more rapidly than productivity that the nation's aggregate supply curve falls.[7]

An example might help clarify this point. Suppose labor cost $20 per hour, and each worker produces 20 units per hour. On average, the per unit labor cost would equal $1. If the hourly wage increased to $25 and each worker's hourly productivity increased to 25 units, the cost per unit would stay at $1. Therefore, even though labor was paid 25% more (i.e., an increase from $20/hour to $25/hour), unit costs would remain the same if productivity also increased by 25%.

The Relative Importance of an Input Also Matters

Another factor to consider when evaluating the impact of changing input prices is the weight each input contributes to a product's total cost. Not all resources are equally important. For instance, a service, such as consulting, might have nearly 100% of its costs tied to labor, which means a 20% increase in the wage rate (without any change in productivity) would raise the cost of these services by 20%. If a product had only 50% labor content, such as with some types of clothing, the same 20% wage increase would raise the cost by only 10% (i.e., 50% labor content times the 20% increase in wage).

International Currency Values—Exchange Rates

If a nation's currency appreciates (i.e., foreign currencies depreciate) and relative international prices remain the same, the country's global purchasing power increases. As a result, the cost of all imported inputs (i.e., inputs that are sourced abroad) falls. The reduction in foreign-sourced input prices causes the nation's aggregate supply curve to increase. Therefore, the relationship between the aggregate supply curve and the value of the domestic currency is positive. Of course, the extent to which aggregate supply changes depends on how significant foreign-sourced inputs are as a portion of total production costs.

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7 The Organization for Economic Cooperation and Development is a rich source of information on unit labor costs among countries. See OECD, *OECD Economic Outlook* http://www.oecd.org/eco/outlook/ (accessed September 3, 2019).

Climate, Natural Disasters, and Diseases

Climate, natural disasters, and diseases are also vital factors that affect the aggregate supply curve. Good weather conditions cause aggregate supply to increase, and poor conditions, natural disasters, and diseases cause it to decrease. Powerful forces of nature, such as avalanches, earthquakes, epidemics, floods, heat waves, storms, tsunamis, and volcanos, are alike in their ability to destroy homes, disrupt normal living patterns, and incapacitate nations' transportation, communication, and production facilities, potentially, leaving hard-hit areas with years of work before they fully recover.

Immigration, Emigration, and the Discovery of New Resources

Immigration and the discovery of new resources also increase the aggregate supply curve but only if they are combined with viable and supportive economic, political, and social systems. We know this because some of the most resource-rich nations in the world, such as Brazil, Nigeria, and Venezuela, have living standards that are considerably below those of relatively resource-poor countries, like Japan and Switzerland. Therefore, given the right environment, the relationship between aggregate supply and immigration and between aggregate supply and new resource discovery is positive.

In the twenty-first century, immigration and emigration have become contentious issues. Poverty, corruption, violence, and the lack of employment opportunities in countries, such as El Salvador, Honduras, and Venezuela, have driven away millions of people, draining these countries of their most valuable assets for future growth. Similarly, destination countries have been forced to deal with the costs of temporarily sustaining, vetting, and dealing with the potential impact that immigrants have had on these nations' social and economic fabric. Because many of these immigrants compete for low-paying jobs, issues related to income distribution have become prominent.

Changes in Regulations and Business Taxes

Businesses respond to after-tax cash flows and after-tax profits. Regulations that increase production costs cause output rates to fall. Higher tax rates (TX%) have the same effect because they reduce business cash flows and profits, making internal sources of investment funding scarcer and investor returns lower, thereby, reducing production rates. Therefore, the relationship between the aggregate supply curve and business regulations or taxes is inverse.

Changes in Expectations

Changing expectations can have substantial impacts on a nation's aggregate supply. Of the many possible types of expectations, *inflationary expectations* deserve special attention because they affect both aggregate supply and aggregate demand. Rising inflationary expectations spark businesses fears that their ingredients' prices and labor costs will increase. In anticipation, they increase their prices, causing aggregate supply to fall, which results in declining real GDP, rising unemployment, and higher GDP Price Index. Inflationary expectations also influence aggregate demand because individuals and businesses try to purchase goods and services before their prices increase. Of the two, the contractionary effects that inflationary expectations have on aggregate supply tend to dominate the expansionary impacts of rising aggregate demand, which makes the lesson clear: Monetary and fiscal policies should not expect rising inflationary expectations to do them any favors. To be sure, they could make economic conditions worse.

Table 12.1 summarizes the main factors that influence a nation's aggregate supply curve.

Table 12.1: Main Exogenous Variables Affecting Aggregate Supply.

Exogenous Variable		Shift in Aggregate Supply
Name	**Change**	
Technology	↑	AS ↑
Productivity	↑	AS ↑
Input prices	↓	AS ↑
Exchange rates (Domestic currency value)	↑	AS ↑
Bad weather, natural disasters, and diseases	↓	AS ↑
Discovery of new resources	↑	AS ↑
Immigration	↑	AS ↑
Emigration	↓	AS ↑
Regulations that increase costs	↓	AS ↑
Business taxes	↓	AS ↑
Inflationary expectations	↓	AS ↑

Aggregate Demand Curve

The aggregate demand (AD) curve shows the inverse relationship between the quantity of domestically produced goods and services that individuals (both domestic and foreign) are willing and able to purchase at various levels of the GDP Price Index during a given period. The components of aggregate demand are personal consumption expenditures (C), gross private domestic investment expenditures (I), government expenditures for newly produced, final goods and services (G), and net exports (NX).[8]

Movements Along the Aggregate Demand Curve

The endogenous variables affecting the aggregate demand curve are the same as for the aggregate supply curve—namely, the nation's GDP Price Index, which is on the vertical axis, and real GDP, which is on the horizontal axis. When these endogenous variables change, a nation moves along its aggregate demand curve (see Figure 12.3). For example, if a nation's GDP Price Index rises, the quantity of newly produced, final goods and services purchased by domestic and foreign consumers, businesses, and governments falls. Therefore, there is an inverse relationship between the GDP Price index and the amount of real GDP demanded.[9]

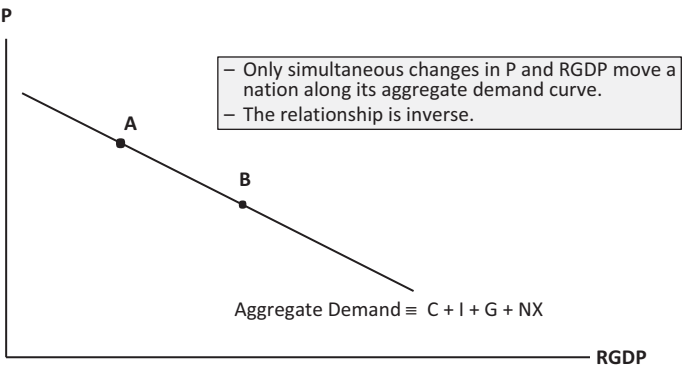

Figure 12.3: Aggregate Demand Curve.

8 Notice that imports are not a part of aggregate demand because they are netted out by the "net export" (NX) component.

9 The negative relationship between the GDP Price Index and real GDP demanded is not as simple as explaining a downward-sloping demand for a company or industry. For this reason, a technical explanation is relegated to *The Rest of the Story* section of this chapter under the heading *Why Does a Nation's Aggregate Demand Slope Downward?*

Shifts of the Demand Curve

As was the case with the aggregate supply curve, shifts in the aggregate demand curve are caused by changes in exogenous economic variables. An increase in the aggregate demand curve is a shift of the entire curve to the right, which means that more quantity (RGDP) is demanded at every level of the GDP Price Index (see Figure 12.4). A decrease in aggregate demand is a movement to the left.

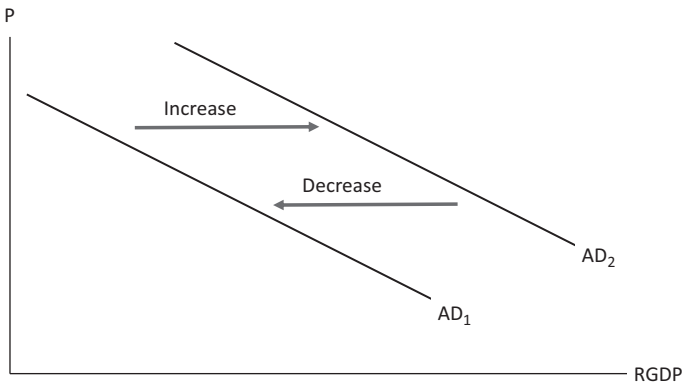

Figure 12.4: Increase and Decrease in the Aggregate Demand Curve.

Let's take a closer look at the exogenous factors that shift a nation's aggregate demand. In particular, we will focus on the principal factors that affect personal consumption expenditures, gross private domestic investment, government expenditures for final goods and services, and net exports.

Personal Consumption Expenditures (C)

The exogenous factors that affect personal consumption expenditures might come quickly to mind because we deal with them every day of our lives. Among the most important are changes in real household wealth (WLTH), indebtedness (IND), real interest rates (r), personal income taxes (TX%), and expectations (EXP). Let's see whether they have a positive or inverse relationship with consumption.

Real Wealth (WLTH)

Changes in an individual's wealth have a positive impact on consumption. For example, a rising stock market increases consumers' wealth, thereby raising their willingness and ability to spend more of their incomes. We can conclude,

therefore, as wealth rises, consumption rises, and aggregate demand shifts to the right. Therefore, there is a positive relationship between changes in real wealth and consumption.

Consumer Indebtedness (IND)

As indebtedness relative to income climbs, consumption falls because individuals are less willing to incur debt when substantial portions of their incomes are already being used to service existing loans. Moreover, increased levels of debt relative to income often increase borrowers' credit risk, which means banks are less willing to lend to them. Therefore, there is an inverse relationship between consumer indebtedness and consumption.

Real Interest Rate (r)

Changes in the real interest rate (i.e., cost of real credit) have an inverse relationship with consumption. If real interest rates rise, it is more expensive to borrow, and consumption falls.

Personal Income Tax Rates (TX%)

When tax rates increase, households' disposable incomes (i.e., after-tax incomes) fall, causing consumption to fall. Therefore, there is an inverse relationship between tax rates and consumption.

Consumer Expectations (EXP)

Expectations are among the most mercurial of all factors influencing consumption. Individuals have expectations about a variety of important economic variables, such as future incomes, interest rates, government regulations, and inflation rates. Because they are so varied and dissimilar in their effect on consumption, there is no single positive or negative relationship that can summarize all of them. Fortunately, the effects that changes in these expectations have on consumption are logical and, therefore, not difficult to discern.

Expectations of rising inflation and higher interest rates encourage people to buy now to beat higher future prices and more significant financing costs. Similarly, the expectation of increasing incomes encourages people to consume now because they realize that they will be able to service and repay debts from their higher expected earnings. For example, many students enter the workplace with substantial debts and increase them when they finance homes, cars, and appliances. They do so realizing that their incomes will grow during the

next 30–40 years of their working lives, making the repayment of these debts (hopefully) both realistic and possible.[10]

Though it is challenging to measure expectations, they can be estimated using surveys. For example, in the United States, the Consumer Confidence Index (CCI), which is published monthly by the Conference Board,[11] and the Michigan Consumer Sentiment Index (MCSI),[12] which is published monthly by the University of Michigan, try to measure consumer sentiment about future economic conditions.

Gross Private Domestic Investment (I)

Gross private domestic investment is influenced by factors such as technology (TECH), the real interest rate (r), tax rates (TX%), and expectations (EXP).

Technology (TECH)

Changes in technology can have substantial positive impacts on real investment and, therefore, on aggregate demand. Consider the enormous amount of expenditures that have surrounded technological developments, such as batteries, computers, the Internet, semiconductors, and solar cells. Therefore, there is a positive relationship between technology and investment spending.

Real Interest Rate (r)

Changes in real interest rates (i.e., the cost of real credit) have an inverse impact on real gross private domestic investment. Higher real interest rates mean higher borrowing costs, which reduce businesses' investment spending. Therefore, there is an inverse relationship between real interest rates and gross private domestic investment.

10 As mentioned earlier in this chapter, rising inflationary expectations affect aggregate demand and aggregate supply. Both of them increase a nation's GDP Price Index, but the contractionary impact on aggregate supply tends to be greater than the expansionary effects of aggregate demand, causing net reduction in real GDP.

11 The Conference Board is a private, nonprofit research organization that focuses mainly on the creation and dissemination of business information, https://www.conference-board.org/data/consumerconfidence.cfm (accessed September 3, 2019).

12 See University of Michigan, Survey of Consumers, http://www.sca.isr.umich.edu/ (accessed on September 3, 2019)

Business Tax Rates (TX%)

When business tax rates rise, profitability and cash flows fall, which cause investment to fall (and vice versa). Therefore, the relationship between tax rates and real investment is inverse.

Business Expectations (EXP)

Expectations are among the most volatile and important factors influencing business investments. Because they are difficult to quantify, these expectations can be (mistakenly) trivialized or deemphasized. Expectations affect investments in varied but intuitively straightforward and logical ways. For example, the expectation of higher real interest rates or rising prices encourages businesses to borrow, purchase investment assets at the relatively low current prices, and then sell the products later at the relatively higher prices. Similarly, expectations of an economic recovery or expansion encourage businesses to invest more now so they can enjoy the fruits of rising future demand. By contrast, the expectation of increasing taxes and more significant regulations can have chilling effects on business investment.

Government Spending on Goods and Services (G)

Government spending for newly produced, final goods and services is influenced by numerous economic, social, and political factors. A part of this spending is due to new legislation, but significant amounts are tied to legislation from previous years and not easily adjusted. Governments raise or lower aggregate demand for a wide variety of purposes, such as education, defense, health care, and infrastructure. If tax revenues are insufficient to cover these expenditures, the rest is usually financed by borrowing. For as many government spending programs as there are, an even larger number of motivations exists behind them.

Net Exports ($NX \equiv EX - IM$)

The final component of aggregate demand is net exports, which is equal to a nation's exports minus its imports. The major exogenous factors that influence net exports are changes in exchange rates and changes in *relative international* real GDP growth rates, price levels, real interest rates, trade restrictions, such as tariffs and quotas, and export incentives.

Exchange Rates

A crucial factor influencing net exports is the exchange rate, but this relationship is complicated because an exchange rate can be expressed as the amount

of home currency per foreign currency unit, like two dollars per euro ($2/€), or vice versa (i.e., one-half euro per dollar, or €0.5/$). They mean the same.

Suppose we were analyzing the United States, and the exchange rate was expressed as 0.50 euros per dollar (€0.50/$). What would happen to net exports if the exchange rate rose to 0.80 euros per dollar (€0.80/$)? As the U.S. dollar appreciated, goods and services produced in the United States would become more expensive to euro area residents, and euro area goods and services would become more affordable to residents of the United States. As a result, net exports from the United States would fall as exports decreased and imports increased. Therefore, there is a negative relationship between the exchange rate and U.S. net exports when the exchange rate is expressed as the number of foreign currency units (euros) per domestic currency unit (dollar).

Relative Real GDP Growth Rates

If foreign nations' real GDP (i.e., RGDP*) increased relative to U.S. real GDP (i.e., RGDP), then U.S. exports would rise relative to imports, causing U.S. net exports (i.e., EX – IM) to increase. Therefore, the relationship between a nation's net exports and *relative* real GDP (i.e., RGDP/RGDP*) is inverse.

Relative International Prices

If the U.S. GDP Price Index (P) rose relative to the rest of the world's average price level (i.e., P^*), then U.S. exports would fall and imports would rise, causing net exports to fall. Therefore, there is an inverse relationship between changes in a nation's domestic-price-to-foreign-price ratio (i.e., P/P*) and net exports.

Relative International Real Interest Rates

A rising real interest rate relative to foreign nations lowers net exports, but the relationship may not be immediately transparent. Here is one way to understand it better. Suppose the real interest rate rose in the United States relative to the rest of the world. As foreign demand for interest earning U.S. financial investments (e.g., bonds, notes, and bills) rose, so would the demand for U.S. dollars. Therefore, the dollar's international value would increase, causing U.S. exports to fall and U.S. imports to rise. Accordingly, there is an inverse relationship between a nation's *relative* real interest rate and net exports. We will have more to say about this relationship in Chapter 16, "Foreign Exchange Markets."

Relative International Trade Restrictions and Export Incentives

Government trade restrictions, such as tariffs and quotas, are intended to reduce imports, and, thereby, increase net exports. Their effectiveness depends on the extent to which foreign nations retaliate and the degree to which macroeconomic variables, such as exchange rates and inflation rates, change to offset their restrictive effects. Similarly, governments export incentives, such as tax breaks, insurance against credit risk, or low-cost funding, are aimed at increasing exports, but their success also depends on how foreign nations react to these incentives and the degree to which there are offsetting macroeconomic effects.

Summary of Variables Affecting Aggregated Demand

Figure 12.5 summarizes the endogenous variables and major exogenous variables that influence the aggregate demand curve.

AD ≡	C	+ I	+ G	+ NX
Move Along AD (Endogenous)	– Domestic RGDP – Domestic P	– Domestic RGDP – Domestic P	– Domestic RGDP – Domestic P	– Domestic RGDP – Domestic P
Shift Entire AD (Exogenous)	– r (–) – TX%(–) – EXP – IND(–) – WLTH(+)	– r (–) – TX%(–) – EXP – TECH(+)	– r (–) – EXP – Discretionary G	– r/r* (–) – TX%/TX%*(–) – EXP/EXP* – P/P*(–) – RGDP/RGDP* (–) – Exchange rate (–) ○ Price of domestic currency – Import restrictions(+)* – Export incentives(+)*
* Assumes no retaliation.				

Figure 12.5: Major Factors Causing a Change in Aggregate Demand.

Macroeconomic Equilibrium

Figure 12.6 combines a nation's aggregate supply and aggregate demand curves in the real goods and services market to determine the equilibrium GDP Price Index (i.e., P_E) and real GDP (i.e., $RGDP_E$). Notice that this equilibrium is *stable*. In this context, "stable" means any random movement away from P_E and $RGDP_E$, which is not caused by a shift of aggregate demand or aggregate

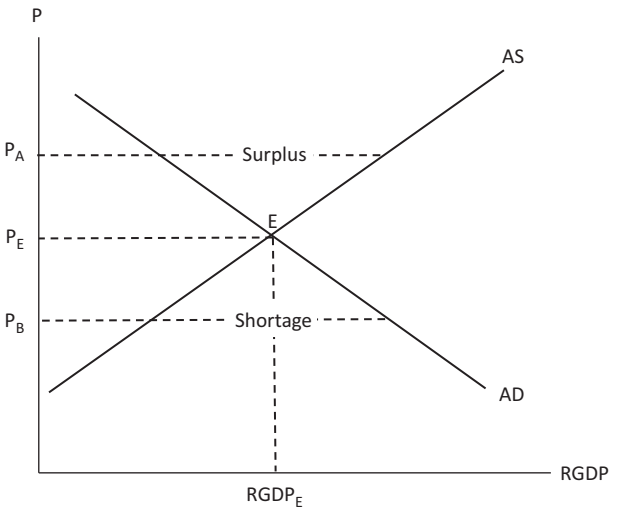

Figure 12.6: Equilibrium, Shortages, and Surpluses in the Real Goods and Services Market.

supply, will automatically create forces to return the economy to equilibrium. For instance, a GDP Price Index that is too high (e.g., P_A in Figure 12.6) creates a surplus that reduces prices, and a GDP Price Index that is too low (e.g., P_B in Figure 12.6) creates a shortage, causing prices to increase.

Macroeconomic equilibrium occurs when the value of final goods and services that the business sector *desires* (or *expects or anticipates*) to produce and make available for sale is equal to the value of the final goods and services that the domestic and foreign buyers *desire* (or *expect or anticipate*) to purchase from these producers. More simply, one could say that equilibrium occurs when the *desired* quantity of goods and services demanded by consumers, businesses, governments, and foreigners equals the *desired* quantity supplied by the domestic business sector. The adjectives *desired*, *expected*, and *anticipated* are synonymous and very important in macroeconomics because they refer to what suppliers and demanders intend to do and not what actually happens.[13]

If we use the mountain-of-goods-and-services analogy that was introduced in Chapter 2, *Taking an Economic Pulse*, then macroeconomic equilibrium means that the mountain of goods and services that the business sector desires to produce

13 This distinction between the actual and desired quantities supplied and demanded is developed further in *The Rest of the Story* section of this chapter under the heading *Actual Quantity Supplied Always Equals Actual Quantity Demanded*.

each period is entirely and willingly swept off the market by domestic and foreign buyers, with no surplus or shortage remaining at the end (see Figure 12.7).

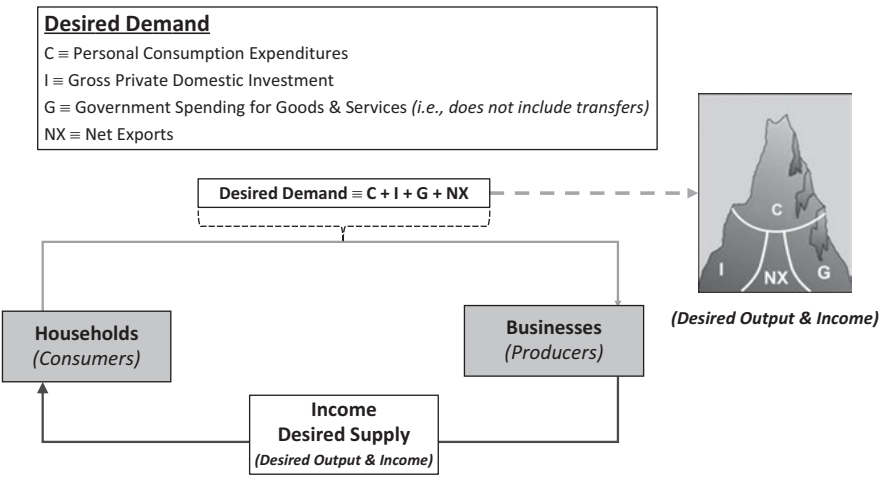

Figure 12.7: Equilibrium: Desired Quantity Demanded Equals Desired Quantity Supplied.

Is Equilibrium Good or Bad for a Nation?

Macroeconomic equilibrium is neither good nor bad because, in the short term, it can occur at any rate of real GDP, as long as the desired quantity supplied equals desired quantity demanded. This means, regardless of whether a nation's annual output is above a sustainable rate or far below it, there could still be short-term macroeconomic equilibrium. Therefore, equilibrium is merely an economic condition where there is no tendency for businesses to hire or fire and no tendency to raise or lower prices.

Don't Confuse Price Level Increases with Increasing Inflation

Analyses using aggregate supply and aggregate demand are most useful for evaluating short-term changes in *average prices* and not *inflation*. This distinction is relevant because increases in a nation's GDP Price Index do not necessarily mean increases in its inflation rate. To understand this point better, suppose the initial GDP Price Index was 100, and after a year, it rose to 105. This would be an annual inflation rate equal to 5% (i.e., 5/100 = 5%). Next year, if the price index rose, again, by 5 to 110, the nation would have higher prices than the year before, but

its inflation rate would have fallen from 5% to 4.8% (i.e., 5/105 = 4.8%). Therefore, just because the price index rises does not mean the inflation rate must rise.

While aggregate supply and aggregate demand analysis is more useful for determining short-term average price-level changes than short-term changes in inflation, it can still be a very insightful framework for evaluating the causes of inflation. In this book, we take the tack that an increase in a nation's GDP Price Index is *inflationary in nature* because the exogenous shocks that cause it result in higher prices than would have occurred without the shock. Similarly, any decrease in the GDP Price Index is viewed as a reduction of inflationary pressures.

Spending Multiplier

Increases in aggregate demand start with an initial exogenous shock, which causes real GDP and the GDP Price Index to rise. Afterward, the initial increase in income sparks spillover rounds of spending that reinforce it. The sum of these spillover rounds of income creation is called the "multiplier effect." An example helps to explain.

Suppose investment spending in Mexico increased, causing the aggregate demand to rise. This initial increase in aggregate demand would cause real GDP and the GDP Price index to rise, but the effects would not stop there. The initial change in investment spending would allow companies to employ workers, such as masons, electricians, mechanics, roofers, and laborers, whose incomes would increase. As these companies and their workers' incomes rose, they would spend more on clothing, food, recreation, medicine, and other goods and services, which would increase the incomes of others. Incomes would continue to rise, again-and-again, with each round of earning and spending. The cumulative effects of these recurring rounds of spending are called the "spending multiplier." If the spending multiplier equaled 2.0, then an initial (exogenous) increase in outlays of $50 billion would shift the aggregate demand curve to the right by $100 billion.[14]

In the example above, the spillover effects affected only consumption expenditures. Let's step back and take a broader view of these spillover changes. We will start with personal consumption expenditures (C) and then move on to discuss the impact changing real GDP has on gross private domestic investment (I),

14 When applied to central governments, the spending multiplier is called the *fiscal multiplier*, which we will explore in Chapter 13, "Fiscal Policy."

government transfers (GT), tax revenues (TXR), and net exports (NX). Figure 12.8 will be our guide.

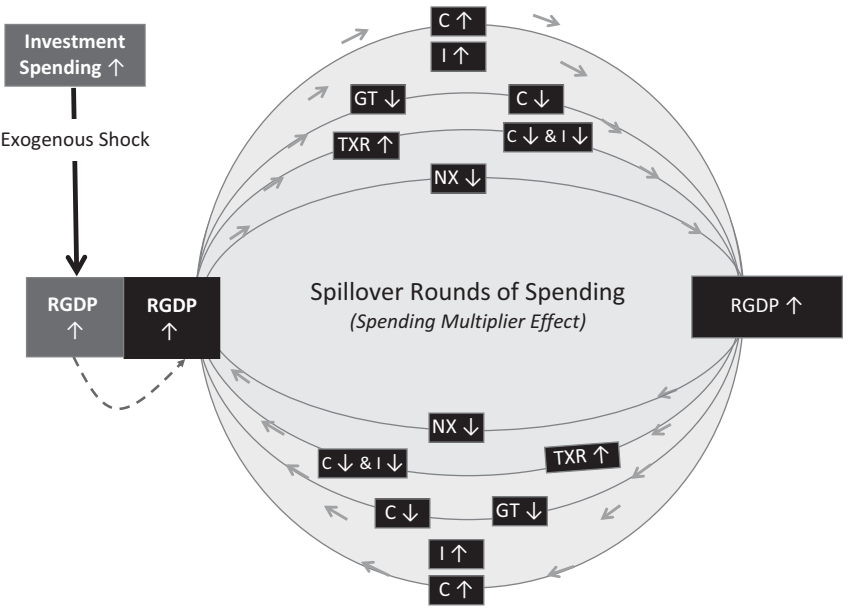

Figure 12.8: Exogenous Impact and Indirect (Spillover) Effects: The Spending Multiplier.

Personal Consumption Expenditures

As real GDP increases, household incomes rise, providing individuals with an ability to consume more. Therefore, the qualitative relationship between a change in real GDP and a change in consumption is positive. Beyond this initial adjustment, changes in consumption have spillover effects. As they rise, new rounds of income are earned, which stimulate fresh rounds of spending. It is helpful to remember that income is earned from the expenditures of others (see Figure 12.8).

Gross Private Domestic Investment

The initial increase in real GDP, which was caused by the external shock, affects the ability and willingness of companies to invest. As real GDP increases, business profitability improves, optimism rises, and new investments are encouraged. Therefore, the qualitative relationship between a change in real GDP and a change in investment is positive (see Figure 12.8).

As was the case with consumption, this secondary increase in investment sparks follow-on rounds of new income generation, which feed back into the economy and cause further changes in personal consumption expenditures, gross private domestic investment, government transfers, tax revenues, and net exports.

Government Transfer Payments

Government transfer payments are for social welfare programs, such as unemployment compensation, welfare, food stamps, and housing allowances. These expenditures are purely financial transactions for which no good or service is produced. Therefore, they are not directly included in real GDP. Instead, government transfers increase household incomes, and, when spent, they are included as part of consumption (C).

As a nation's real GDP falls, government transfers automatically increase to compensate unemployed workers and fund other social welfare programs. As the economy recovers, government transfers automatically fall (see Figure 12.8). Therefore, the relationship between changes in real GDP and government transfers is inverse. Due to their countercyclical nature, government transfers payments are called *automatic stabilizers* because they help to reduce systemic fluctuations in national spending.[15]

Government Tax Revenues

As an economy expands, personal income tax payments rise, thereby reducing some of the new purchasing power being created. Conversely, as economic conditions deteriorate, taxes revenues (TXR) fall automatically and lighten the burden on taxpayers. Therefore, the relationship between changes in real GDP and changes in tax revenues is positive (see Figure 12.8). Like government transfers, tax revenues are automatic stabilizers because they change passively with real income movements and, in doing so, take some of the momentum from rising and falling economies.

Net Exports

Changes in real GDP also influence net export expenditures. As real GDP (real income) rises, households and businesses spend more on imported goods and services. Therefore, real imports increase with real GDP, causing net exports (i.e., exports minus imports) to decrease. As Figure 12.8 shows, there is an inverse relationship between changes in real GDP and changes in net exports (NX).

15 We will have more to say about automatic stabilizers in Chapter 13, "Fiscal Policy."

Summary: Net Impact of Real GDP on C, I, GT, TXR, and NX

An exogenous increase in spending has initial and spillover effects on real GDP in the real goods and services market. The initial effect is due to the exogenous shock, and the spillover effects are caused by recurring rounds of spending, which are responsible for the spending multiplier. Rising real GDP increases a nation's consumption and investment expenditures, which further increase spending and income generation. At the same time, increases in a nation's real GDP cause net exports and government transfers to fall and cause tax revenues to rise, which reduce a nation's real GDP. These negative endogenous forces are never enough to completely offset the positive ones, but they can cause significant erosion (see Figure 12.9).

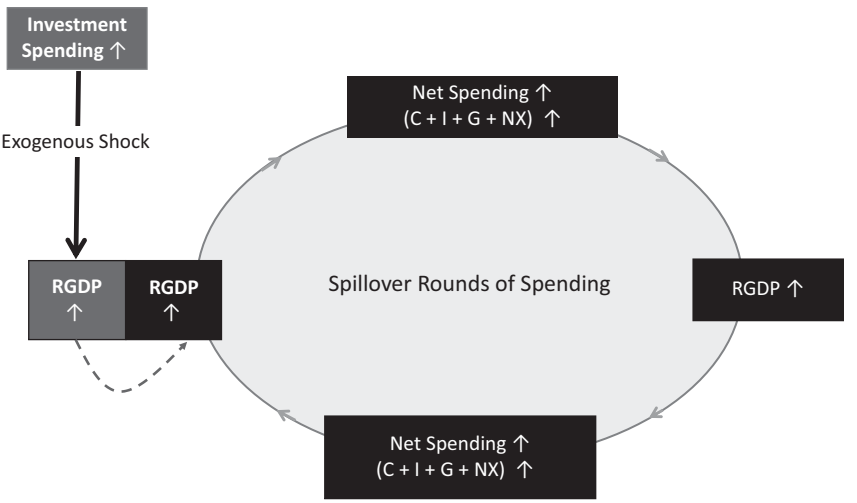

Figure 12.9: Spending Multiplier.

Aggregate Demand and the Spending Multiplier

Let's see how the spending multiplier affects aggregate demand. Because of the initial exogenous stimulus, aggregate demand rises from AD_1 to AD_2 (i.e., A to B). The shift from AD_2 to AD_3 (i.e., B to C) is the result of the endogenous spillover effects (see Figure 12.10).[16]

16 It is possible for the spending multiplier to be less than one, as we move closer to the classical range of aggregate supply, in which case the shift from B to C in Figure 12.10 would be to the left. Point C would still be to the right of A, as long as the spending multiplier is positive.

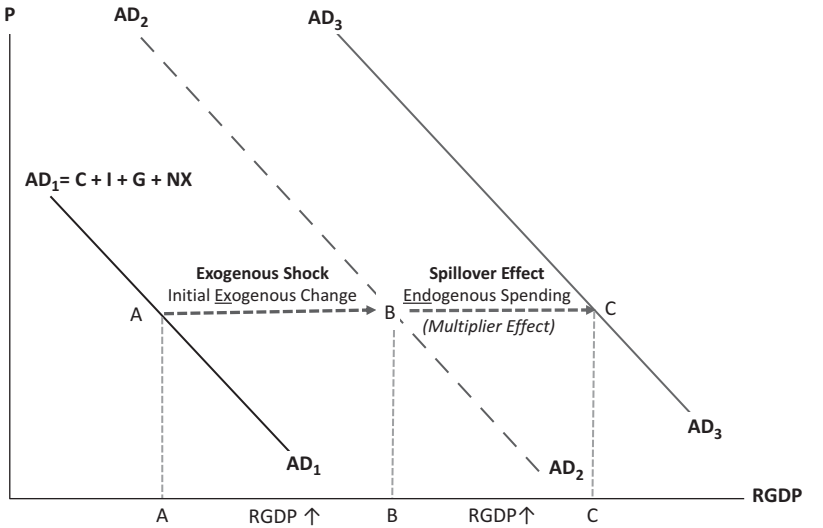

Figure 12.10: Changes in Aggregate Demand and the Spending Multiplier.

The Spending Multiplier and The Real Credit Market

Often, factors affecting the real goods and services market simultaneously affect the real credit market. Let's see how these two major macroeconomic markets interact. Suppose a favorable change in expectations causes business investment spending to increase, and, to finance these investments, the companies borrow in the real credit market. As a result, the demand for real credit rises, causing an increase in the real interest rate. As the real interest rate rises, both consumption and investment would fall, and these reductions in consumption and investment would partially offset the spillover increase in real GDP and, thereby, reducing the spending multiplier.

Using the aggregate demand curves in Figure 12.11, we can see how these feedback effects from the real credit market reduce the spending multiplier. Notice how the initial exogenous shock increases aggregate demand from AD_1 to AD_2, and the spending multiplier increases it once again from AD_2 to AD_3. The movement from AD_2 to AD_3 occurs if there is no change in the real interest rate. If the real interest rates rise, aggregate demand falls from AD_3 to AD_4.[17]

17 We would get this same result, even if these businesses already had sufficient funds to invest. As they withdrew funds from the real credit market, real credit supply would fall, thereby, increasing the cost of real credit and reducing both consumption and investment. In Chapter 13, "Fiscal Policy," we will revisit this issue in the context of government spending and the effect it has on real GDP.

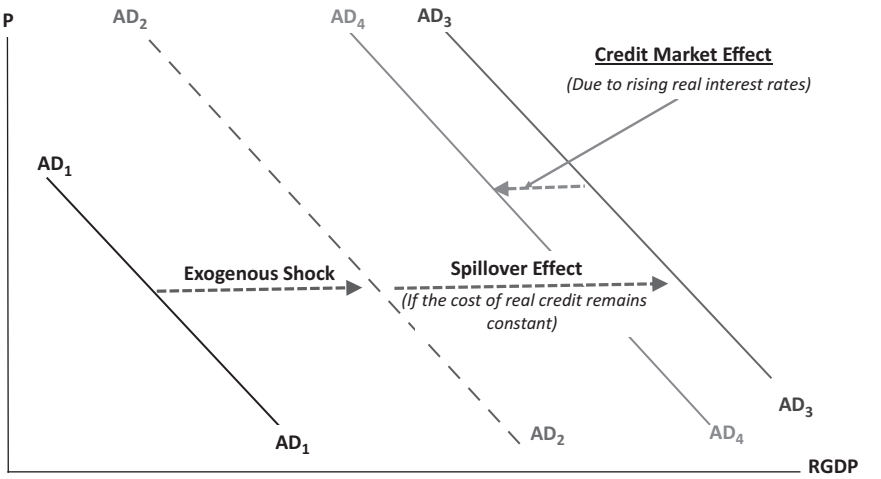

Figure 12.11: Effect of Real Credit Market Changes on the Spending Multiplier.

Applications

Let's apply aggregate supply and aggregate demand analysis to see whether the results given by the model we have developed are consistent with *your* common sense and intuition. In all our examples, the starting point will be at equilibrium, which is the point where the aggregate supply curve and aggregate demand curve intersect.

Example 1: Expansionary Monetary Policy by the Bank of Canada

Suppose Canada's central bank, the Bank of Canada, increased the Canadian money supply. What effect would this expansionary monetary policy have on the nation's GDP Price Index and real GDP? Let's assume that Canada is in the intermediate range (as usually is the case).

More money would increase Canada's real credit supply. As the supply of real credit rose, the real interest rate would fall, causing consumption and investment to rise. Aggregate demand would shift from AD_1 to AD_2 (see Figure 12.12). Notice that our model predicts that expansionary monetary policy will cause Canada's GDP Price Index to rise from P_1 to P_2 and real GDP to rise from $RGDP_1$ to $RGDP_2$.

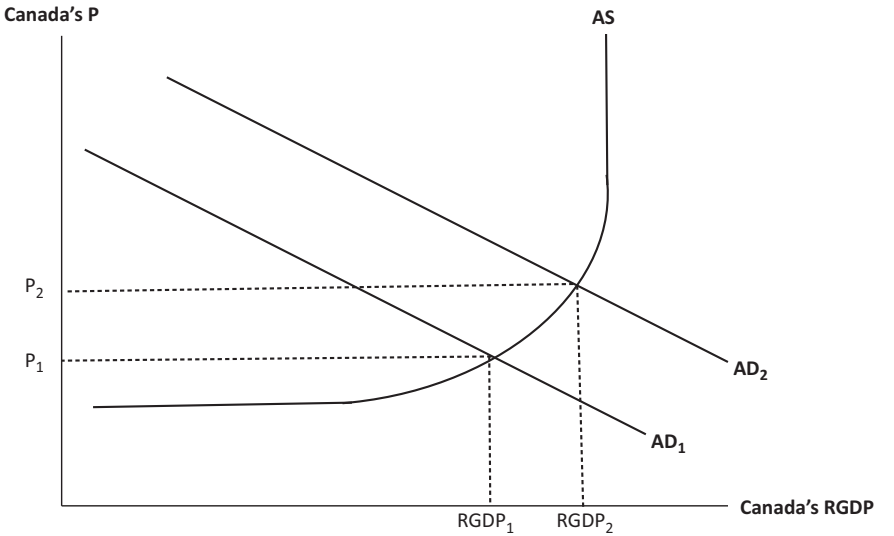

Figure 12.12: The Bank of Canada Increases the Money Supply.

Example 2: Depreciation of the Thai Baht

Suppose the value of the Thai baht fell. How would this affect the Thai economy? A decrease in the baht's value makes Thailand's exports cheaper to foreigners and imports from other nations more expensive to Thai residents.

Therefore, a depreciation of the baht causes Thailand's net exports to rise, increasing the nation's aggregate demand curve from AD_1 to AD_2 and moving equilibrium from A to B (see Shift 1 in Figure 12.13). This increase in demand raises real GDP from $RGDP_1$ to $RGDP_2$ and raises the GDP Price Index from P_1 to P_2.

At the same time, a depreciation of the baht increases the cost of Thailand's imported inputs, causing the Thai aggregate supply curve to fall from AS_1 to AS_2 and equilibrium to move from B to C. This decline in aggregate supply increases the GDP Price Index from P_2 to P_3 and reduces real GDP (see Shift 2 in Figure 12.13).

In Figure 12.13, there is no net change in real GDP, but that does not have to be the case. If Thailand were only marginally dependent on imports relative to exports, then the reduction in aggregate supply would be small relative to the increase in aggregate demand. In such a case, the net change in real GDP would be positive. Real GDP would fall from $RGDP_2$, but it would not fall back as far as $RGDP_1$.

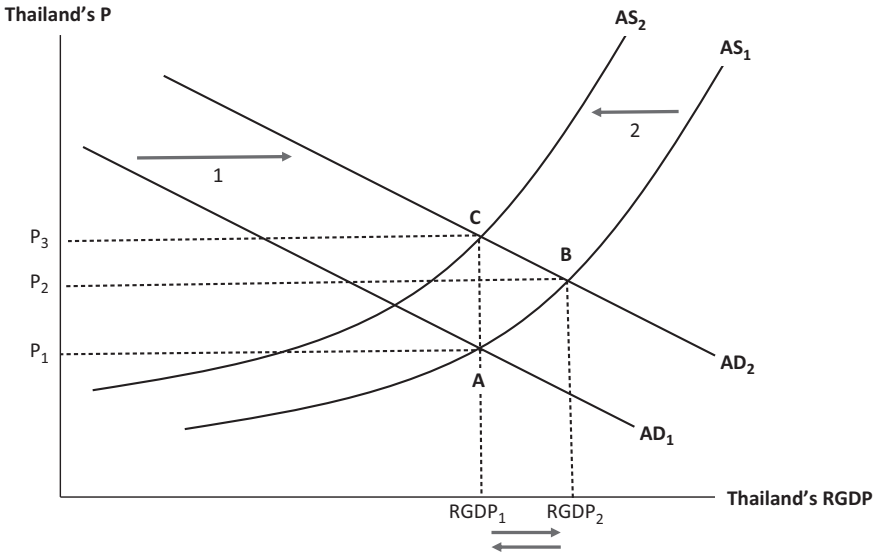

Figure 12.13: Thai Baht Depreciates.

In summary, our aggregate supply and aggregate demand analysis indicates that a depreciation of the baht should unambiguously increase Thailand's GDP Price Index. By contrast, the change in its real GDP is uncertain until we can determine the relative strength of shifts in aggregate supply and aggregate demand.

Example 3: German Balanced Budget in Taxes and Government Spending

To stimulate the nation's economy, suppose the German government reduced personal income tax rates and, thereby, increased the nation's after-tax income by €1,000 billion. At the same time, suppose it cut spending on goods and services by the same amount, hoping to prevent its budget deficit from rising. What effect would these changes have on the German economy?

A reduction in government spending (G) by €1,000 million would cause Germany's aggregate demand curve to fall by the same amount, but the reduction in taxes by €1,000 million would not necessarily cause aggregate demand to rise by €1,000 million. To see why, suppose you were given a tax rebate, causing your disposable income to rise by €1,000. You might spend a portion of that €1,000, but it is also likely that you would save a part of it. The portion of any increase in a nation's disposable (i.e., after-tax) income that is consumed is called the *marginal propensity to consume* (MPC), and the portion saved is

called the *marginal propensity to save* (MPS). Therefore, the MPC is the amount by which the household sector changes its consumption per new euro (or dollar or yen) of disposable income earned.

If the MPC were 0.80, then consumers would spend only 80% of each additional euro (or dollar or yen) of disposable income. In Germany's case, if the MPC were 0.80, then only €800 million (i.e., 0.80 × €1,000 million = €800 million) of the tax break would be consumed. Therefore, the policy of lowering spending and lowering taxes by the same amount would not be economically neutral, as you might first expect. Reducing government spending by €1,000 million and reducing taxes by €1,000 million would reduce (net) aggregate demand by €200 million.[18] Figure 12.14 shows graphically the changes in aggregate demand. By reducing government spending, the aggregate demand curve shifts to the left by €1,000 million (i.e., from AD_1 to AD_2). As a result, the GDP Price Index falls from P_1 to P_2, and real GDP falls from $RGDP_1$ to $RGDP_2$.

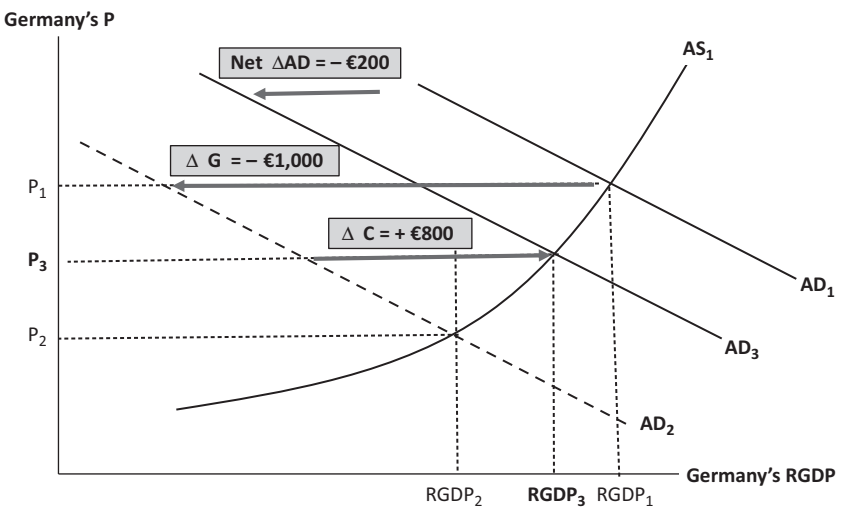

Figure 12.14: Germany Reduces Income Taxes and Government Spending on Final Goods and Services.

18 This result assumes that the increased saving does not feedback positively into the economy, but it is highly likely that greater saving would lower the real interest rate, thereby, increasing consumption and investment. The takeaway from this example is that the qualitative change in aggregate demand will *usually* be in the direction of the change in government spending. Nevertheless, it should be kept in mind that feedback effects could reduce or offset this net change.

At the same time, reducing taxes by €1,000 million causes consumption to rise by €800 million. As the aggregate demand curve shifts from AD_2 to AD_3, real GDP increases from $RGDP_2$ to $RGDP_3$ and the GDP Price Index rises from P_2 to P_3. In short, real GDP does not go back to $RGDP_1$, where it started, and the GDP Price Index does not go back to P_1, where it began. The decrease in government spending, combined with the increase in consumption, causes a net reduction in aggregate demand by €200 million. When we combine these two effects, the nation moves from AD_1 to AD_3, which means there is a net decrease in aggregate demand. A multiplier effect would also accompany these initial changes in government spending and taxes. If the spending multiplier were greater than one, real GDP would typically fall by more than €200 million.

The Rest of the Story

Demand Pull, Cost Push, and Spiral Inflation

With the basics of aggregate supply and aggregate demand in place, let's discuss demand-pull, cost-push, and spiral inflation.

Demand-Pull Inflation

An increase in aggregate demand causes demand-pull inflation. Its effect on real GDP relative to the GDP Price Index depends on whether the nation is in the Keynesian, intermediate, or classical range.

Intermediate Range

It is easiest to begin our analysis in the intermediate range (i.e., the upward-sloping portion) of the aggregate supply curve because prices *and* output increase as aggregate demand rises. For example, in Figure 12.15, if the aggregate demand curve increases from AD^I_1 to AD^I_2, both the GDP Price Index and real GDP rise. Increased demand provides businesses with an incentive to produce more and an ability to charge more. In addition, higher production rates often raise per unit costs, for example, if they force businesses to raise wages to keep and attract workers, require the use of less efficient resources, and elevate training expenses. As these costs rise, companies try to pass them on to consumers to maintain their margins. Furthermore, when increasing resource costs lag behind rising prices, as they often do, businesses have all the more reason to increase production rates because the *real* cost of resources per unit falls.

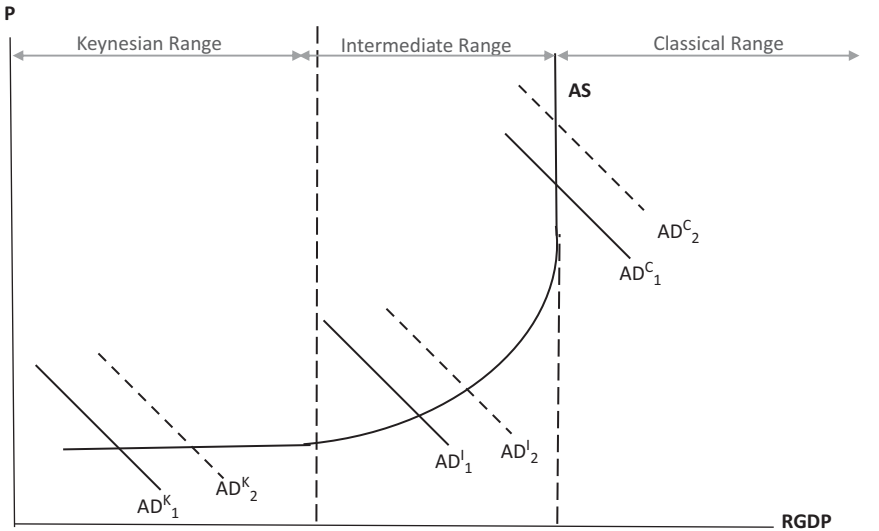

Figure 12.15: Demand-Pull Inflation.

In the intermediate range, the GDP Price Index and real GDP rise with increases in aggregate demand. At higher real GDP rates, the nation's unemployment rate falls. Therefore, higher real GDP and falling unemployment rates can be viewed as silver linings to the otherwise dark cloud of rising prices caused by demand-pull inflation.

Classical Range

In the classical range (i.e., vertical portion) of the aggregate supply curve, an increase in aggregate demand from AD^C_1 to AD^C_2 causes only the GDP Price Index to rise (see Figure 12.15). Because the nation is at full capacity, real GDP does not change. Therefore, in this range, changes in aggregate demand only affect prices.

Keynesian Range

Demand-pull inflation does not occur in the Keynesian range. In Figure 12.15, if aggregate demand rises from AD^K_1 to AD^K_2, only real GDP changes. The GDP Price Index remains the same because producers have neither the willingness nor ability to raise them.

Cost-Push Inflation

A reduction in aggregate supply causes cost-push inflation. Unlike demand-pull inflation, there is no silver lining to cost-push inflation. When the aggregate supply curve falls, the GDP Price Index rises *and* real GDP falls, which causes the unemployment rate to increase. This simultaneous increase of both inflation and unemployment is often called *stagflation*, which is a hybrid word that merges stag*nation* and *in*flation.

The reduction in a nation's aggregate supply could be due to factors such as decreased productivity, increased resource costs, product markups, or natural disasters that physically reduce the availability of needed production inputs or increase their prices. In Figure 12.16, when aggregate supply falls from AS_1 to AS_2, the GDP Price Index rises from P_1 to P_2, and real GDP falls from $RGDP_1$ to $RGDP_2$.

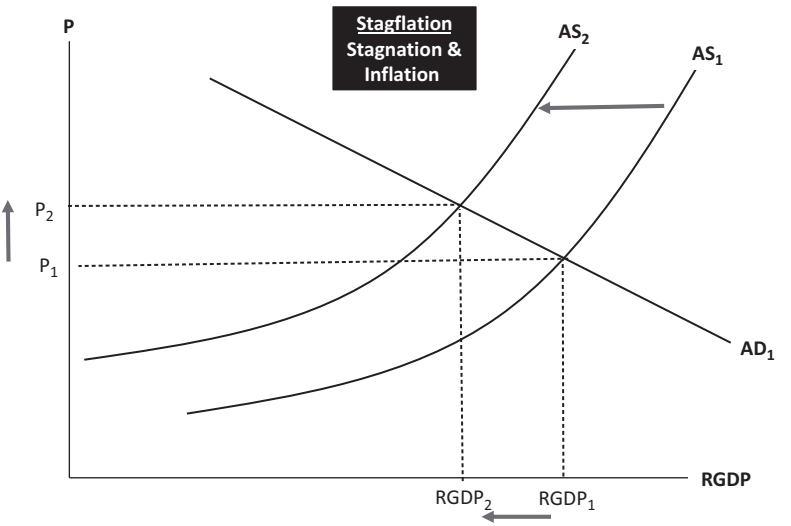

Figure 12.16: Cost-Push Inflation.

Spiral Inflation

Demand-pull inflation and cost-push inflation are "pure models" of inflation because there is only one shift in supply or one shift in demand. By contrast, "spiral inflation" is caused by mutually reinforcing changes in aggregate demand and aggregate supply.

Push-Pull Inflation

Push-pull inflation occurs when *cost-push* inflation *causes* a subsequent round of *demand-pull* inflation. For example, suppose foreign oil prices increase substantially, causing the nation's aggregate supply curve to fall. The declining aggregate supply would increase the nation's GDP Price Index and reduce its real GDP. As a result, the unemployment rate would rise, prompting the government and central bank to stimulate demand. Fiscal authorities might respond by reducing tax rates or raising government spending. The central bank could increase the real money supply. These expansionary fiscal and monetary policies would cause the nation's aggregate demand to rise, which would (once again) increase the GDP Price Index.

Pull-Push Inflation

Pull-push inflation occurs when *demand-pull* inflation *causes* a subsequent round of *cost-push* inflation. For example, suppose greater military spending causes a nation's aggregate demand to rise. Higher demand would increase both the nation's GDP Price Index and real GDP. If the increase in prices was unexpected, it would reduce wage earners' and other resource owners' purchasing power. In subsequent rounds of wage and salary negotiations, these resources would try to regain the inflationary tax on their incomes by bargaining for higher wages. If the resulting escalation in wages were greater than the increase in worker productivity, per unit operating costs would rise, thereby causing the aggregate supply curve to fall. As it did, these added expenses would cause cost-push inflation, which would raise the GDP Price Index, once again.

Push-Push Inflation

Push-push inflation occurs when one round of *cost-push* inflation *causes* another round of *cost-push inflation*. For example, a significant increase in energy prices would shift the aggregate supply curve to the left, causing the GDP Price Index to rise and real GDP to fall. Subsequently, a large national labor union would have an incentive to negotiate higher wages to regain members' purchasing power. Again, the aggregate supply curve would fall, causing the GDP Price Index to rise and real GDP to fall, but the momentum might not stop there. Other unions could then use the negotiated settlement as grounds for increasing their own demands for higher wages and salaries, thereby, reducing aggregate supply and raising the GDP Price Index, once again. In this way, one round of cost-push inflation could lead to recurring rounds of the same.

Pull-Pull Inflation

Finally, pull-pull inflation occurs when one round of *demand-pull* inflation *causes* another round of *demand-pull* inflation. For example, suppose aggregate demand rose due to a substantial increase in business investment spending for plant and equipment. As a result, the nation's GDP Price Index and real GDP would rise. If these increased prices caused the expectation of even higher prices, they could trigger new rounds of anticipatory spending, which would raise aggregate demand and (once again) increase the GDP Price Index.

Is Spiral Inflation Sustainable?

As you might expect, the cases of spiral inflation mentioned above are only a few of many possible combinations and permutations, but they all share one thing in common, which is they usually last for short periods. To survive, they need to be fed by steady increases in the nation's money supply. Without it, inflation dies of malnutrition. We will return to this issue in Chapter 23, "Long-Term Inflation, Exchange Rates, and Unemployment."

Short-Run Phillips Curve

In 1957, British economist A.W. Phillips analyzed the historical relationship between changes in British wage rates and unemployment rates. His data showed there was an inverse relationship between these two economic variables, which meant that, in the past, as British unemployment rates fell, wage rates increased (and vice versa). Today, most nations are more interested in prices (and inflation) than they are in wages (and wage rate changes). As a result, the Phillips Curve has switched from its original focus on percentage changes in wages and unemployment rates to inflation and unemployment rates.

Figure 12.17 shows a downward sloping line, depicting an inverse relationship between unemployment and inflation. For example, if the unemployment rate fell from U_1 to U_2, the inflation rate would rise from $\%\Delta PE_1$ to $\%\Delta PE_2$ (and vice versa).

The idea that inflation and unemployment are inversely related became very popular in many nations (including the United States) during the 1960s. Some governments and central bankers felt they had found an economic Rosetta Stone, which could be used to translate macroeconomic policies into educated tradeoffs between inflation and unemployment goals. Unfortunately, belief in this relationship faded as nations realized that this short-term trade-off did not stand the test of time and became even more nebulous in the long run.

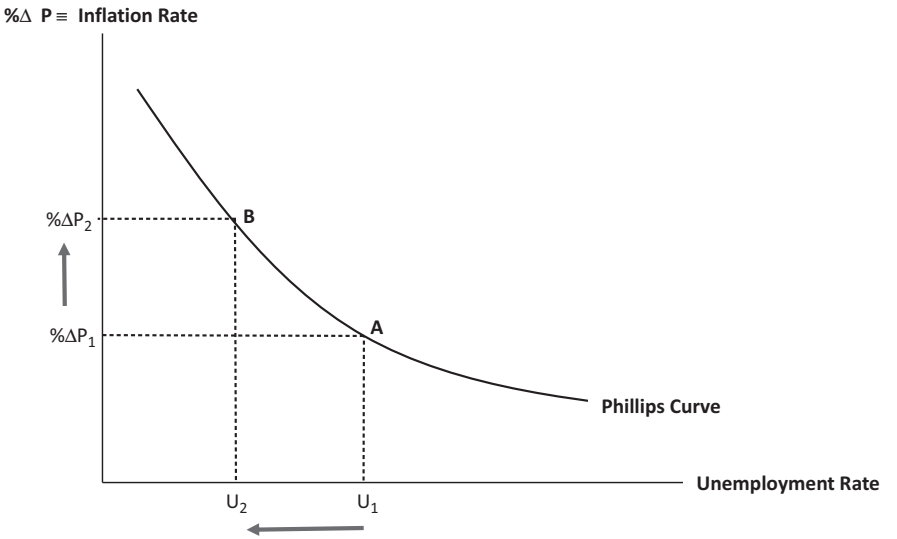

Figure 12.17: Short-Run Phillips Curve Relationship.

The Phillips Curve is simply a regression line drawn through historical points that best represent the combination of all inflation rates and unemployment rates—basically a statistical relationship in search of a theoretical explanation. Fortunately, demand-pull inflation provides a possible one. Today, many believe that a *short-term* trade-off between inflation and unemployment still exists when shifts in aggregate demand stimulate these changes. Moreover, this inverse relationship is most likely to occur if inflation is unexpected, causing unforeseen changes in business profitability. For example, if prices rise faster than resource costs, then profits rise, and businesses have an incentive to hire more workers. As a result, the inflation rate increases, and the unemployment rate falls.

If the downward-sloping Phillips Curve is due to unanticipated inflation that redistributes income from workers to businesses, then one can see why its effect may only be temporary. Given time, inflation and inflationary expectations should converge. If they do, then business profitability and unemployment tend to settle back to their old rates. We will have more to say about the shapes of the short-term and long-term Phillips Curves in Chapter 23, "Long-Term Inflation, Exchange Rates, and Unemployment."

Hyperinflation and Deflation

What are hyperinflation and deflation? In the twenty-first century, countries around the world have been plagued with both.

Hyperinflation

Hyperinflation is like *pornography* in the sense that neither word has an official definition, but people know it when they see it. Because hyperinflation has no formal definition, care should be taken to clarify what is meant when the term is used.

One of the most common, but unofficial, definitions is *hyperinflation occurs when a nation's prices increase above 50% per month for a sustained period*.[19] Consider the implications. If prices rose by 50% per month, the annual level of inflation would be almost 13,000% per year![20]

The storyline for nations with hyperinflation usually ends in an unfortunate, but predictable, way. Near the end, the old and valueless currency continues to circulate, but a dominant foreign currency replaces it (de facto) for purposes of pricing goods and services. Individuals and businesses still try to pay with the worthless domestic currency, but increasingly, merchants are unwilling to accept it, and the dominant foreign currency is used for this purpose. Eventually, the old currency is abolished, and a new one is created to replace it.

There are many examples of hyperinflation dating back centuries. For instance, during the U.S. Revolutionary War, the Continental Congress issued bills of credit to pay for the war, but the bills were over-issued. Between 1775, when they were first issued, and 1781 (only six years later), the value of these bills fell to one five-hundredths of their original value. The expression "Not worth a Continental" came from this experience.[21] During its Civil War in the 1860s, the United States had another bout with inflation, as greenbacks (as the currency was called) were printed excessively by the South and North to finance their expenditures.

So far, our examples have focused on the United States, but stopping there would ignore some of the world's most catastrophic cases of inflation. For instance, Germany experienced hyperinflation from 1922 to 1923, which was mainly the result of dramatic increases in its money supply to meet reparation

19 Phillip Cagan, "The Monetary Dynamics of Hyperinflation," in *Studies in the Quantity Theory of Money*, ed. Milton Friedman, Chicago: University of Chicago Press (1956).

20 $(1 + 0.50)^{12} - 1 = 128.75 = 12{,}875\%$

21 It is because of the hyperinflation during the Revolutionary War that the U.S. Constitution prohibits states from coining money and emitting bills of credit.

payments imposed at the Treaty of Versailles (1919), after World War I. The nation's loss of considerable industrial territory added to its repayment burden. Between 1918 and 1923, German's price level rose 1.4 trillion times. At one point, a candy bar in Germany cost about 200 billion marks, and residents were using paper currency notes with denominations as high as one billion marks. The old currency (i.e., the Reichsmark) stopped serving its intended, useful purpose and was replaced in 1923 by a new currency (i.e., the Rentenmark) at an exchange rate of one trillion-to-one.

Here is a taste of what everyday life was like in Germany during the 1920s, when hyperinflation ravaged the nation. People who dined at restaurants would pay for their meals before they ate them because, afterward, the price might be double. They would cover their walls with currency because it was less expensive than wallpaper. Given a choice, pickpockets would steal tissues from pedestrians' pockets and leave the worthless marks where they were.

People walked to stores with wheelbarrows full of money just to purchase a loaf of bread. The prices of many goods and services, as well as the currency denomination of long-term contracts, were quoted in foreign currencies rather than marks. Workers were paid twice a day (e.g., once at noon and again at the end of the day) and trusted relatives or friends would meet them at the gate to spend the earnings as fast as possible. The problem was, at the same time people were trying to get rid of their earnings as soon as possible, store shelves were bare because merchants were bartering their wares for objects of real value.

Germany's hyperinflation undermined all the valuable functions that money performs. Because the German mark lost significant value by the minute, it was not used as a store of value or suited for contracts of any length. Because very few merchants accepted it and began pricing their goods and services in terms of other currencies, the mark no longer served as Germany's medium of exchange or unit of account.

As high and outrageous as Germany's inflation rate was during the 1920s, it pales in comparison to Hungary's at the end of World War II. In a two-year period between 1944 and 1946, Hungarian prices rose by about 800 octillion percent![22] As is the case with all examples of hyperinflation, the cause of Hungary's explosive price increases was the over-issuance of money by the central bank. At that time, the Bank of Hungary printed money so fast that it had time to print just one

22 An octillion is a one followed by 27 zeroes. The highest-denomination Hungarian bill was worth 10,000,000,000,000,000,000,000,000 (10 billion trillion) pengös.

side of the bills. It was not unusual to see pengös (i.e., the Hungarian currency) in denominations of 100 quintillions (100 million trillion).[23]

Many think that super-high levels of inflation are relics of the past—events that happened years ago and, even then, only during or immediately after major wars or because of shocks of massive dimensions. Figure 12.18 shows some relatively recent examples of super-high inflation rates. For example, during the 1980s, countries such as Bolivia, Nicaragua, and Peru had inflation rates that averaged more than 1,000%. In 1989 and 1990, Argentina experienced inflation rates of 4,900% and 1,350%, respectively. In 1995, Yugoslavia's inflation, just for the month of January, was 313,000,000%, placing it in second place, behind Hungary, for the highest inflation rate in the twentieth century. During the twenty-first century, Zimbabwe wins first (or last, depending on how you look at it) prize for the nation with the highest inflation, when its inflation rate rose to $853\% \times 10^{21}$ during November 2008.[24] The Zimbabwe dollar still circulated but was replaced by foreign currencies, mainly the U.S. dollar. Finally, in 2018, Venezuela experienced inflation of 1.7 million percent, its highest rate on record.[25]

Deflation

Deflation is a sustained decrease in the weighted average price of all goods and services. Most of us are delighted when prices of the goods and services we purchase fall, but if this is true, why do falling national prices raise dark clouds of concern for monetary and fiscal policymakers?

Part of the answer depends on why prices are falling. There are two fundamental reasons for declining national price levels. The first is an increase in aggregate supply, and the second is a reduction in aggregate demand. Increases in aggregate supply are caused by beneficial changes, such as improved productivity and declining resource prices, which cause output and employment to rise. These price reductions should be met with public glee because the nation's living conditions improve.[26] The problem with falling prices is when the cause is that demand is falling (because declining prices are accompanied by falling output

23 The pengö was replaced by a new currency, called the *forint*, at a rate of 400 octillion pengös per forint.

24 $853\% \times 10^{21} = 853{,}000{,}000{,}000{,}000{,}000{,}000{,}000\%$.

25 See Trading Economics, Venezuela Inflation Rate, https://tradingeconomics.com/venezuela/inflation-cpi (accessed September 3, 2019).

26 There are very few examples of deflation caused by persistent increases in aggregate supply. China is sometimes offered as a recent example.

Country	Years	Average Percent
Albania	1992	226
Angola	1992-1997	1,611
	1999-2000	287
Armenia	1993-1994	4,503
Azerbaijan	1993-1995	1,068
Belarus	1993-1995	1,374
	1999	294
Bolivia	1983-1986	3,395
Brazil	1985	226
	1987-1994	1,328
Bulgaria	1991	334
	1997	1,061
Dem Rep of the Congo	1991-1996	5,534
	1999-2001	397
Croatia	1993	1,519
Israel	1980	317
	1984-1985	339
Kazakhstan	1993-1994	1,532
Kyrgyz Republic	1993	1,086
Lebanon	1987	487
FYR Macedonia	1993	339
Moldova	1993-1994	559
Mongolia	1992-1993	236
Nicaragua	1985-1990	4,962
Peru	1988-1991	2,989
Poland	1989-1990	418
Romania	1992-1993	233
Russia	1993-1994	591
Tajikistan	1993-1996	996
Turkmenistan	1993-1996	1,712
Uganda	1987	215
Ukraine	1993-1995	2,001
Uzbekistan	1993-1995	802
Venezuela	2016-2018	75,667 (est.)
Vietnam	1986-1988	396
Yugoslavia	1993-1994	$5\% \times 10^{15}$
Zimbabwe	November 2008	$853\% \times 10^{21}$

Figure 12.18: Examples of Countries with Inflation Rates above 200%, 1980–2018.
Source: International Monetary Fund, The World Economic Outlook Database, April 2018; for Zimbabwe, see Steve H. Hanke, R.I.P. Zimbabwe Dollar, CATO Institute; for Venezuela, see Business Monitor International, BMI Research, https://www.fitchsolutions.com/bmi-research (accessed on September 3, 2019).

and rising unemployment). Falling prices could create an additional issue by reducing *nominal* interest rates to the point where central banks find it hard to reduce them further to stimulate growth.

Actual Quantity Supplied Always Equals Actual Quantity Demanded

In the 1987 romantic comedy, *The Princess Bride*, swordsman Inigo Montoya turns to his Sicilian boss, Vizzini, and says: "You keep using that word. I do not think it means what you think it means." Montoya was referring to the word "inconceivable," but if we substitute the word "equilibrium," the link to macroeconomics is complete because both words are highly misunderstood.

Macroeconomic equilibrium occurs at a unique price where the desired *(or expected or anticipated) quantity demanded per period equals the* desired *(or expected or anticipated) quantity supplied per period because the* actual *quantity demanded and* actual *quantity supplied are* always equal.[27]

Consider P_A, in Figure 12.19, where the price level is *above* equilibrium. The amount of goods and services that buyers desire to purchase at P_A equals \$100 million, and the amount suppliers desire to make available for sale is \$130 million. As a result, producers are stuck with a \$30 million surplus of goods and services, causing the GDP Price Index to fall because the desired amount supplied exceeds the desired amount demanded.

Now let's consider the same example, but analyze what actually happens after the period ends. While the desired amount supplied and demanded are not equal, at P_A, the *actual* amount supplied and demanded are precisely balanced. At P_A, the actual amount supplied is \$130 million, and the *actual* amount demanded also equals \$130 million because the unpurchased goods end up in business inventories. An increase in inventories is counted as part of a nation's gross private domestic investment, which is part of actual business demand. In short, even though businesses did not want their inventories to increase by \$30 million, they had no choice, and this increase is considered part of actual demand. Because everything produced has to be demanded (either willingly or unwillingly as unexpected changes in inventories), the actual quantity supplied always equals actual quantity demanded. It is for this reason that macroeconomic equilibrium is defined as the GDP Price Index and real GDP rate at which the *desired* quantity supplied equals *desired* quantity demanded per period and *not* where the *actual* quantity supplied equals *actual* quantity demanded per period.

To cement this concept, consider P_B, in Figure 12.20, where the GDP Price Index is too low, causing a shortage of \$20 million. The desired amount of

27 To say that equilibrium occurs where desired aggregate *supply* equals desired aggregate *demand* is equivalent to saying the two curves overlap entirely. "Quantity demanded" and "quantity supplied" refer to points along the aggregate demand and supply curves. "Aggregate demand" and "aggregate supply" refer to the entire curves.

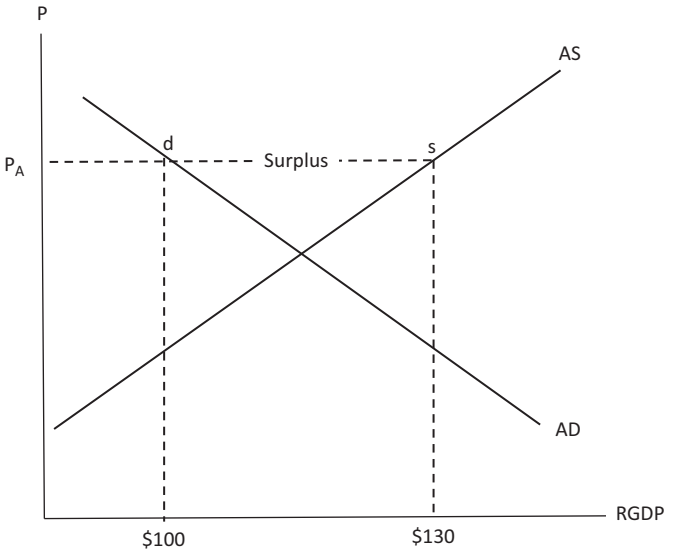

Figure 12.19: Macroeconomic Disequilibrium: Surplus.

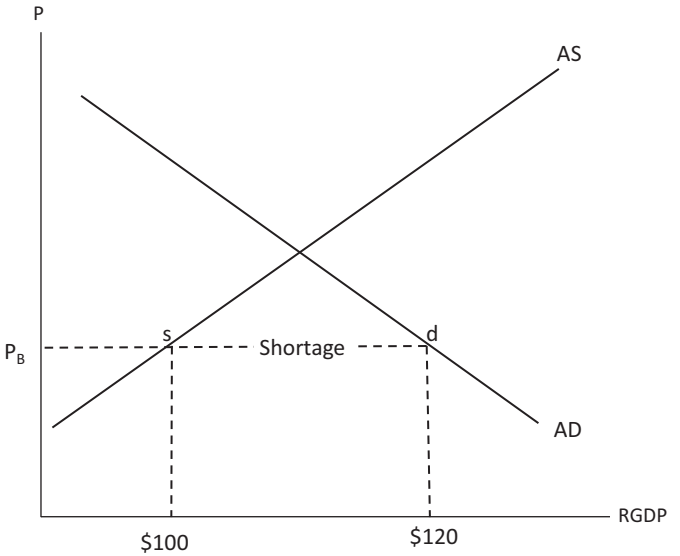

Figure 12.20: Macroeconomic Disequilibrium: Shortage.

goods and services demanded per year equals $120 million, and the desired amount supplied per year equals $100 million. This shortage would force the nation's GDP Price Index to rise, and as it did, the desired amount demanded would fall and the desired amount supplied would increase, thereby, reducing (or eliminating) the shortage. It should be clear that P_B is not an equilibrium.

Now, let's consider what *actually* happens at P_B, in Figure 12.20, after the period ends. If only $100 million were made available for sale, but $120 million were demanded, the only way businesses could supply the extra $20 million is by making undesired reductions in their inventories. As a result, the newly produced goods and services ($100 million) plus the undesired reduction in inventories ($20 million) would equal the amount demanded ($120 million). Alternatively, if companies had no inventories to fill the $20 million gap, then the actual amount supplied (i.e., $100 million) would equal the actual amount bought ($100 million).

Why Does a Nation's Aggregate Demand Slope Downward?

"If prices rise, the quantity purchased each period falls." This inverse relationship between price and quantity demanded is so firmly ingrained in our minds that many of us would be willing to move forward without challenging its logic. Nevertheless, let's resist this temptation because doing so will help show why macroeconomics is not merely a summation of microeconomic concepts.

Substitution and income effects can explain the downward-sloping demand curve for an individual company's or industry's product. For example, as the price of Coke rises relative to Pepsi and other beverages, such as juices and bottled water, it becomes relatively less attractive, and consumers purchase less of it. This is the substitution effect. In addition, increases in the price of Coke reduce consumers' real incomes, which decreases the amount bought. This is the income effect.

Explanations of why a nation's aggregate demand curve slopes downward are slightly different from the downward-sloping company or industry demand. One reason for the difference is that changes in the GDP Price Index imply that the average price level *for all products* has fluctuated. Therefore, substitution effects are different.

To start our analysis, we need a stimulus, and the one we choose is important. Remember that movements along the aggregate demand curve require simultaneous-inverse changes in a nation's GDP Price Index and real GDP (see Figure 12.21), but only one of them can be the initial stimulus. The other is the response. We will start this section using the GDP Price Index as the initial stimulus. Afterward, we will repeat the analysis using real GDP as the initial stimulus.

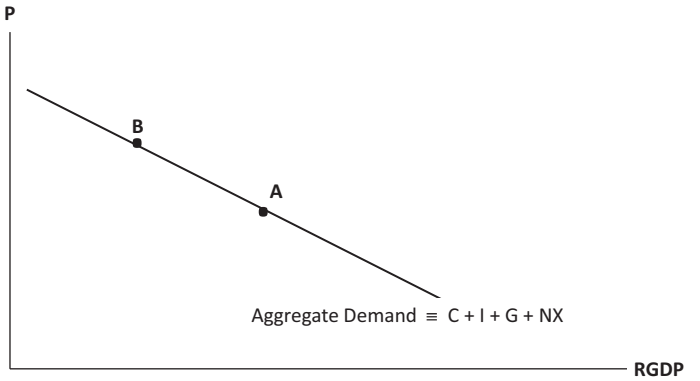

Figure 12.21: Why Does Aggregate Demand Slope Downward?

GDP Price Index as the Stimulus

Changes in the GDP Price Index have three significant effects on real GDP, namely, via real money supply effects, wealth effects, and net export effects. Let's consider each one.

Real Money Supply Effects

Increases in the GDP Price Index cause a nation's real (i.e., price-adjusted) money supply to fall,[28] which decreases the supply of real credit and raises the real interest rate. As the real interest rate rises, both consumption and investment fall. These changes reduce real GDP and move the nation along aggregate demand from A to B in Figure 12.21. Point B reflects the higher GDP Price Index and the lower real GDP. Figure 12.22 summarizes these the interest-induced consumption and investment effects.

Wealth Effects

A second reason for the inverse relationship between a nation's GDP Price Index and real GDP is the *wealth effect*, which has two causes. First, if the average price level rises, the real value of a nation's money holdings falls, causing purchasing power to drop. This reduction in purchasing power decreases wealth, which

28 For example, if the M2 money supply (M2) equaled $100 billion and the price index (P) equaled 1, the real money supply would be $100 billion (i.e., M2/P = $100 billion/1 = $100 billion). If the money supply remained the same and price index doubled to 2, then the real money supply would fall to $50 billion (i.e., M2/P = $100 billion/2 = $50 billion).

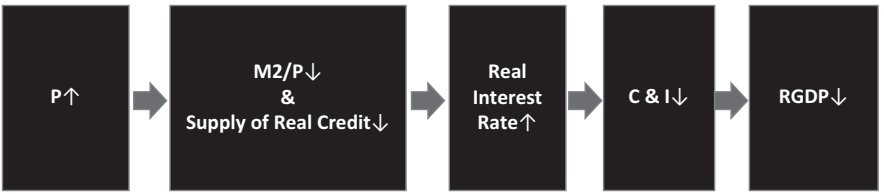

Figure 12.22: Why Does Aggregate Demand Slope Downward? Real Money Supply Effects.

reduces consumption and causes real GDP to fall. Second, increases in a nation's GDP Price Index cause the real interest rate to rise. If the higher real interest rate causes nominal interest rates to rise, the value of fixed-income securities (e.g., notes and bonds) held by financial investors falls, which also reduces wealth. As wealth falls, consumption falls, causing a decline in real GDP. These cause-and-effect linkages are shown in Figure 12.23.

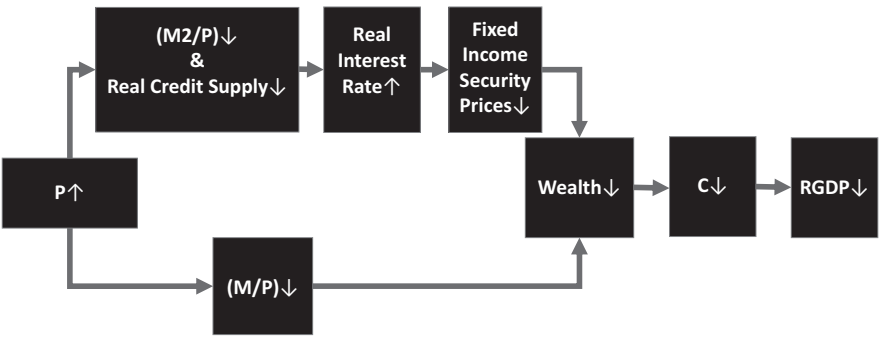

Figure 12.23: Why Does Aggregate Demand Slope Downward? Wealth Effects.

Net Export Effects

A final reason for the inverse relationship between a nation's GDP Price Index and real GDP is the net export effect, which is closely aligned with the substitution effect in microeconomics. Again, there are two causes. First, as a nation's average price level (P) increases relative to foreign prices (P*), domestic exports become less competitive relative to foreign suppliers, causing export revenues (EX) to fall. At the same time, foreign-produced goods and services become more attractive, causing import expenditures (IM) to rise. The combination of falling export revenues and increasing import costs causes net exports to fall. Therefore, higher national prices lead to declining levels of spending on domestically produced goods

and services, which causes real GDP to fall and moves a nation along its aggregate demand curve.

Second, rising interest rates, caused by the rising GDP Price Index and falling supply of real credit, attract international investors interested in earning the higher rates of return. To purchase these investments, they must first buy the domestic currency, which makes it appreciate in value and causes exports to fall and imports to rise. As a result, net exports fall, causing a reduction in real GDP, which moves the nation along aggregate demand. Figure 12.24 summarizes these net export effects.

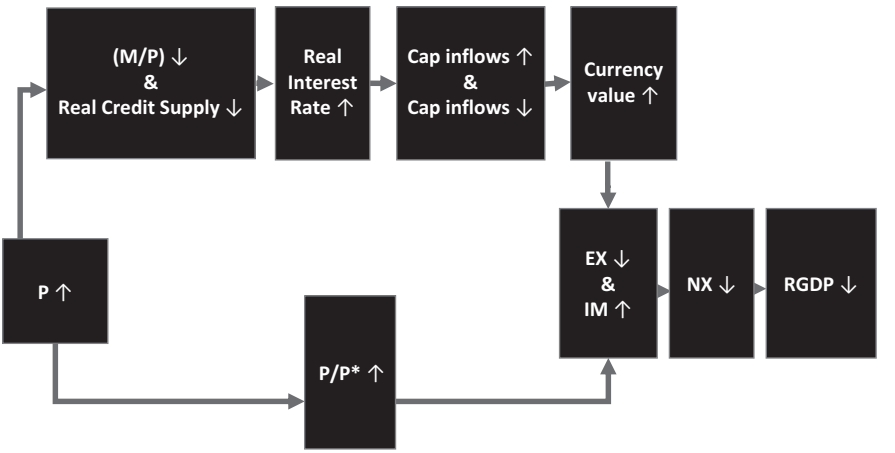

Figure 12.24: Why Does Aggregate Demand Slope Downward? Net Export Effects.

Summary of GDP Price Index Effects on Aggregate Demand

A nation's aggregate demand curve is downward sloping because fluctuations in its GDP Price Index cause inverse changes in total spending via three major channels: real money supply effects, wealth effects, and net export effects. Therefore, as a nation's GDP Price Index rises, personal consumption expenditures, gross private domestic investment, and net exports fall, moving a country along its aggregate demand curve.

Effects when a Change in Real GDP is the Stimulus

In the previous section, we analyzed how changes in a nation's GDP Price Index cause fluctuations in real GDP by influencing personal consumption expenditures, gross private domestic investment, and net exports. Now let's consider

how changes in real GDP cause fluctuations in the GDP Price Index. Our analysis uses reasoning that will be reinforced and expanded in Chapter 23, "Long-Term Inflation, Exchange Rates, and Unemployment," where the equation of exchange is formally introduced. The equation of exchange shows the interconnections among nation's GDP Price Index (P), real GDP (RGDP), nominal money supply (M), and money velocity (V), where *money velocity* is the number of times a nation's money supply is spent on newly produced, final goods and services per period. A nation's GDP is defined as equaling the money supply (M) times the velocity of money (V). Equally acceptable is to define GDP as a nation's GDP Price Index (P) times real GDP (RGDP). Therefore, $M \times V \equiv P \times RGDP$).

If there is no change in a nation's money supply (i.e., $\Delta M = 0$) and no change in the number of times a nation's residents spend money each period (i.e., $\Delta V = 0$), then increases in real GDP (i.e., RGDP) must cause the average price level (i.e., P) to fall. The added workload put on the existing money supply to purchase the greater number of goods and services produced can only be accomplished if the GDP Price Index falls.

For example, if the M = \$1,000 million, V = 4.0, and RGDP = 4,000 million, then the average price level must be 1.0, because $P = (M \times V)/RGDP$, which means (\$1,000 million × 4.0)/\$4,000 million = 1.0. If real GDP doubled to \$8,000 million and the money supply and velocity remained constant, the added goods and services could be purchased only if the price level dropped to 0.50 (i.e., (\$1,000 million × 4.0)/\$8,000 million = 0.50).

Conclusion

A keystone in the construction of most companies' financial projections is sales growth, which is hotwired to some of the most important macroeconomic variables affecting business revenues, expenses, assets, and liabilities.[29] For example, the cost of goods sold, marketing costs, distribution expenses, inventories, accounts receivable, accounts payable, and debt are affected by sales volume.[30]

29 This relationship holds even though many companies, especially technology services companies, place an increasingly high priority on decoupling sales revenues and headcount growth, to become leaner, more efficient, and more competitive.

30 Quality financial projections avoid tying all changes in a company's income statement, balance sheet, and cash flows to sales alone. While sales volume may influence many important business variables, the relationship to others (e.g., research, development, information technology, and maintenance) can be quite remote. Considerable care must be taken to determine the key drivers of a business' revenues and expenses and to use them to predict earnings and cash flows.

A company's revenues depend on the prices and quantities of the goods and services it sells. Raising sales volume and increasing prices are a lot easier to do when the economies in which a company operates are growing. Just as a rising tide lifts all ships, an expanding economy lifts the performance of all companies.

A useful framework for analyzing short-run changes in the GDP Price Index and real GDP is aggregate supply and aggregate demand analysis. The aggregate supply curve shows the quantity of domestically produced goods and services that businesses are willing and able to create and sell at various GDP Price Index levels during a given period. In general, there are three ranges on the aggregate supply curve, which are the Keynesian (horizontal), intermediate (upward sloping), and classical (vertical) ranges.

Aggregate demand shows the quantity of domestically produced goods and services that individuals (both domestic and foreign) are willing and able to purchase at various GDP Price Index levels during a given period. The aggregate demand curve is downward sloping, which means there is an inverse relationship between a nation's GDP Price Index and real GDP.

For aggregate demand and aggregate supply analysis, it is essential to distinguish between endogenous variables that move an economy along these curves and exogenous variables that shift them. The endogenous variables are the same for both the aggregate supply and aggregate demand—namely, the nation's GDP Price Index and real GDP. The exogenous variables affecting aggregate supply and aggregate demand may differ, but they conform closely to common sense and intuition.

Some of the major exogenous variables influencing aggregate supply are technology, productivity, input prices, exchange rates, climate, natural disasters, diseases, new resource discoveries, immigration, emigration, regulations, taxes, and expectations. The significant exogenous variables affecting aggregate demand can be separated into those that affect personal consumption expenditures, gross private domestic investment, government expenditures for final goods and services, and net exports. Consumption is influenced mainly by real interest rates, taxes, expectations, indebtedness levels, and wealth. Investment is affected by real interest rates, taxes, expectations, and technological changes. Government spending is affected by the discretionary decisions of politicians. Finally, the net export balance is influenced by exchange rates and *relative* international real GDP growth rates, prices, real interest rates, tax rates, expectations, exchange rates, trade restrictions, and export incentives.

Any exogenous change in spending has an initial effect and then subsequent spillover effects. These spillover effects are the basis for the spending multiplier. The higher the spending multiplier, the more significant the ultimate change in aggregate demand due to an exogenous shock. Feedback effects

from the real credit market can weaken the spending multiplier if changes in the real interest rate move consumption and investment in directions counter to the initial shock.

Pure models of inflation are caused by either changes in aggregate demand *or* aggregate supply. Inflation that is caused by an increase in aggregate demand is called *demand-pull inflation*. Demand-pull inflation causes the GDP Price Index to rise and unemployment to fall, which is closely associated with the Phillips Curve relationship. Inflation that is caused by a reduction in aggregate supply is called *cost-push inflation*. Cost-push inflation causes the GDP Price Index to rise and unemployment to rise. When inflation and unemployment rise, this economic condition is called *stagflation*. Spiral inflation occurs when one round of inflation causes another round of inflation (e.g., pull-push inflation, push-pull inflation, pull-pull inflation, or push-push inflation).

Finally, the Phillips Curve shows the historical inverse relationship between a nation's inflation and unemployment rates. It conforms to the results a country should expect with demand-pull inflation.

Key Points

- Aggregate Supply
  - Aggregate supply shows the quantity of domestically produced goods and services that firms are willing and able to produce and sell at various GDP Price Index levels during a given period.
  - The GDP Price Index and real GDP are endogenous variables that move a nation along its aggregate supply curve.
  - The Keynesian range of aggregate supply is horizontal. It is associated with very low levels of real GDP and high excess capacity.
  - The vertical portion of aggregate supply is called the classical range. It is associated with a real GDP rate that fully employs a nation's resources.
  - The upward-sloping portion of the aggregate supply curve is the intermediate range. In this range, the average price level and real GDP rate increase (and decrease) together.
  - The unemployment rate and employment-to-population ratio (i.e., employment ratio) are important indicators of where a nation is on its aggregate supply curve concerning labor market capacity.
  - The capacity utilization index is a helpful measure of where a nation is on its aggregate supply curve, with respect to the usage of capital resources.
  - The entire aggregate supply curve shifts to the right or left due to changes in exogenous factors, such as technology, productivity, price of inputs, exchange rates, climate, natural disasters, diseases, new resource discoveries, immigration, regulations, taxes, and expectations.

- Aggregate demand
  - Aggregate demand shows the inverse relationship between the quantity of domestically produced goods and services that individuals (both domestic and foreign) are willing and able to purchase at various levels of the GDP Price Index during a given period.
  - The GDP Price Index and real GDP are endogenous variables that move a nation along its downward-sloping aggregate demand curve.
  - The aggregate demand curve shifts due to changes in exogenous (external) forces that affect personal consumption expenditures, gross private domestic investment, government expenditures for final goods and services, or net exports.
    - Consumption is affected by fluctuations in variables such as real interest rates, taxes, expectations, indebtedness, and wealth.
    - Investment is affected by changes in variables such as real interest rates, taxes, expectations, and technology.
    - Net export changes are affected by variables such as the exchange rate and *relative* international real interest rates, taxes, expectations, real foreign GDP, price levels, trade restrictions, and export incentives.
- Macroeconomic equilibrium
  - Macroeconomic equilibrium occurs when the desired (or expected or anticipated) quantity supplied equals the desired (or expected or anticipated) quantity demanded of newly produced, final goods and services (i.e., where aggregate supply and aggregate demand intersect).
- Inflation
  - An increase in aggregate demand causes demand-pull inflation.
  - A reduction in aggregate supply causes cost-push inflation.
  - Spiral inflation is caused by mutually reinforcing changes in aggregate supply and aggregate demand.
- *Aggregate demand*: Aggregate demand slopes downward, due to real money supply effects, wealth effects, and net export effects.
- *Equilibrium*: The actual amount supplied always equals the actual amount demanded, which is why "equilibrium" occurs where the *desired* amounts supplied and demanded are equal.
- *Phillips Curve*: The Phillips Curve is the inverse relationship between a nation's unemployment rate and inflation rate.

Review Questions

1. What factors affect the steepness of the aggregate supply curve?
2. What factors cause a nation to move along its aggregate supply curve?
3. What factors cause a nation to move along its aggregate demand curve?
4. What economic factors cause the aggregate demand curve to shift?
5. What economic factors cause the aggregate supply curve to shift?
6. Suppose South Korea had a high GDP growth rate and little inflation. If the source of growth was from changes in aggregate demand, what would this imply about the shape of South Korea's aggregate supply curve?

7. Using aggregate supply and aggregate demand analysis, explain what effects, if any, the following changes have on each nation's GDP Price Index and real GDP. Explain your answers, and draw the appropriate supply and demand graphs (properly labeled).
   a. United States: A cold snap hits the southern part of the United States and destroys 25% of the crops.
   b. China: The People's Bank of China, which is China's central bank, tightens monetary policy.
   c. Canada: The government raises income taxes.
   d. Japan: The yen appreciates relative to the U.S. dollar.
   e. Greece: The Greek government's budget deficit is reduced drastically by increasing taxes.
   f. Japan: Japan's saving rate falls due to the nation's aging population.
   g. China: Turmoil between Iraq and Iran causes a sharp increase in the price of oil.
   h. United States: The U.S. housing market crashes, causing wealth to fall for a large cross section of the United States.
   i. El Salvador: Higher uncertainty reduces investment spending.
   j. Germany: New technological discoveries increase labor productivity.
   k. Mexico: The government cuts spending for final goods and services.
   l. Mexico: The government increases its spending and cuts taxes.
   m. Vietnam: A rise in expected inflation causes workers to demand higher wages.
   n. China: China's government spending on goods and services increases significantly and state banks make loans to inefficient state enterprises rather than to more qualified borrowers.
8. If China allows its exchange rate to appreciate relative to the U.S. dollar, what should happen to its aggregate demand and aggregate supply? How will these changes affect China's GDP Price Index and real GDP?
9. Using aggregate supply and aggregate demand analysis, explain what effects, if any, the following events should have on Australia's GDP Price Index and real GDP. Draw the appropriate supply and demand graphs (properly labeled) and write your conclusions.
   a. Consumption expenditures fall and wages increase.
   b. Foreign income rises and energy costs increase.
10. Suppose Chile's central bank increases the monetary base through open market purchases.
   a. What should happen to the real interest rate in Chile's credit market?
   b. As a result of your answer to part (a), what should happen in the real goods and services market?
   c. How should the change in monetary base impact Chile's unemployment level?
11. Suppose Indonesia increases the minimum wage by 30%. Explain the effect this policy should have on the nation's GDP Price Index, inflation rate, real GDP, and unemployment rate.
12. Is the following statement true or false? "A nation's actual aggregate amount supplied always equals its actual aggregate amount demanded." Explain fully.

Discussion Questions

13. Suppose Mexico makes structural reforms that improve the nation's overall labor productivity. These supply-side reforms focus on reducing regulation, promoting business competition, improving education, and reforming the tax system.
    a. Explain the effects these structural reforms should have on the nation's real goods and services market. Focus only on the aggregate supply side.
    b. Explain the spillover effects of these structural reforms from Mexico's real goods and services market to its real credit market.
14. Assume that Japan's government increases government spending by 100 billion yen (¥100 billion) and finances it by borrowing.
    a. Will Japan's real GDP increase by more or less than 100 billion yen (¥100 billion)?
    b. What macroeconomic factors strengthen or weaken this effect?
15. In the early 2000s, South Africa's gross saving rate was about 16% of GDP, but some economists felt that a saving rate of about 22% was needed to make a dent in the nation's poverty level. Explain how an increase in saving might promote growth. Then, explain how it might reduce economic growth.
16. Provide some examples of structural changes that you feel emerging nations, in general, could undertake to increase productivity. What effect do changes in productivity have on a nation's GDP Price Index and real GDP?
17. Are the reasons for a nation's downward-sloping aggregate demand curve the same as for the downward-sloping demand facing a firm? Explain.

Chapter 13
Fiscal Policy

Fiscal policy is the use of *government spending* and *taxation* measures to achieve macroeconomic, political, or social goals, such as economic growth, full employment, price stability, and responses to military, social, or environmental threats. Usually, these policies affect, simultaneously, both the real goods and services market and the real credit market, but they also have strong indirect impacts on foreign exchange markets. Companies' top-line sales growth, ability to raise prices, and input costs are tied directly to how rapidly or slowly real GDP is rising or falling. Similarly, borrowing rates and changes in foreign exchange rates are directly affected by the impact of governments' fiscal policies.

Governments are not companies, and it is helpful to keep this point in mind. For instance, companies succeed or fail based on how well their customers' demands are met. If they produce goods or services that few people want, then sales and profits suffer. If they make frivolous expenditures, then costs rise, productivity wanes, share prices fall, and the likelihood of bankruptcies or takeovers increases. If companies take on too much debt, their credit risk increases, which increases borrowing costs. Capital markets understand very well that, unless borrowed funds are invested wisely, debt service demands can overwhelm a company's positive cash flows.

By contrast, if a government offers services that few people want, it still has the power to finance them by taxing and borrowing, which gives them high credit ratings relative to most private domestic borrowers. These high credit ratings allow governments to bypass financial intermediaries, such as banks and savings institutions, and borrow directly in the real credit markets by issuing securities.

Unlike companies, governments do not have to worry about troublesome competitors or meddlesome shareholders. Of course, taxpayers could move to different countries in protest of a government's fiscal policies, but few do. Voters could try to fight fiscal imprudence by electing new representatives and leaders, but this process is slow. In some countries, it is virtually impossible. Furthermore, if a government spends indiscriminately, national productivity falls, but this injudicious spending is unlikely to spark foreign invasions (i.e., "takeovers") or force a nation to default on its financial obligations—at least not in the short run.

To better understand the focus of this chapter, suppose you work for a U.S. company that is interested in building a greenfield plant in Brazil. If you are responsible for preparing the capital budgeting analysis for this project, would you be optimistic or pessimistic about a projected increase in the

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Brazilian government's budget deficit? Would you expect the deficit to be expansionary, contractionary, or neutral—or is it impossible to determine the effect? How about interest rates? Would you expect Brazilian interest rates to rise and suggest borrowing now, or would you expect them to fall and suggest borrowing later? This chapter provides a framework for analyzing these and other questions related to the economic effects of fiscal policies.

The Basics

What Is Fiscal Policy?

Fiscal policy is the use of government spending and taxation to achieve macroeconomic, political, or social goals. *Discretionary fiscal policies* require the government to pass new legislation or reform existing legislation before they can be implemented. Tax rate reductions, new spending on health and education, increases in military spending, fighting the war on poverty, improving environmental conditions, and legislation to provide targeted assistance to families or small business are all examples of discretionary fiscal policies.

Nondiscretionary fiscal policies are changes in tax *revenues* and government *transfer payments* that are activated automatically by fluctuations in a nation's GDP. Governments determine the tax rate and prerequisites for those who qualify to receive government transfers, but once established, tax revenues and government transfer payments change without any further need for legislation or action by the congress, parliament, president, or prime minister. The payment of income taxes is an excellent example of a nondiscretionary fiscal policy. During recessions, tax revenues fall automatically as the nation's income declines, even though legislated tax rates remain the same. Likewise, during expansions, tax revenues rise automatically with income.

Government transfers for social welfare programs are also examples of nondiscretionary fiscal policies. These payments rise automatically during recessions because the unemployment rate increases, causing the government to spend more on benefits, such as unemployment compensation, welfare, and aid to families with dependent children.

It is important to remember that government transfer payments are purely financial transactions for which no good or service is exchanged and for which nothing is directly produced. As a result, they are not directly part of GDP and government spending on final goods and services (G). Instead, they increase household incomes, and, when spent, are included as part of personal consumption expenditures (C).

Separating Fiscal Policy from Monetary Policy

Fiscal policies are different from monetary policies, and it is worth keeping these differences in mind. Fiscal policies are enacted by the executive and legislative branches of government. They do not require central bank approval or involvement. For instance, in the United States, fiscal policies are the responsibility of the president and Congress. The Federal Reserve may be asked to comment on proposed fiscal policies, but it does not have a vote in the final decision.

Monetary policies are determined and implemented by central banks, and the more independent central banks are from their governments, the better financial markets seem to like it. Borrowers and lenders pay close attention to a central bank's level of independence because the potential for inflation rises when big-spending governments have liberal access to central bank vaults and their ability to create new money. As a result, the more independent a central bank is from the government, the lower the expected inflation rate and smaller the risk premium for expected inflation volatility—which financial markets incorporate into a nation's nominal interest rate.

Taxes and Other Sources of Government Revenues

Technically speaking, "government spending" and "taxation" include *all* levels of government (e.g., national, state, provincial, cantonal, and local). Nevertheless, most macroeconomic discussions of fiscal policy focus only on national governments. For countries where state and local governments account for large portions of total government spending and transfer payments, or a large part of the nations' tax revenues (e.g., Argentina, Brazil, and Switzerland), this national focus could be misplaced.

Government Tax Revenues

Typically, national governments receive most of their revenues from income tax payments by individuals and companies, as well as from payroll taxes, which include social insurance and retirement receipts. Some funding also comes from tariffs and user fees.

Government Spending and Transfers

The popular press is peppered with examples of *seemingly* outlandish and wasteful government spending. Consider the U.S. government's half-million dollar grant to study how cocaine affects the sexual behavior of Japanese

quails, its $3 million grant to watch hamster fights, and more than $600,000 spent to digitize memorabilia of the band The Grateful Dead.[1] There are also examples of $435 hammers, $544 spark plug connectors, and multimillion-dollar bridges to nowhere.[2]

The majority of government expenditures is for rather mundane and less sensational items, grouped under major categories such as health and human services (e.g., Medicare), defense, social security, income security, net interest paid, international affairs, and a broad category called "other."

How much control do governments have over their expenditures? This question may seem rhetorical. After all, if governments don't control their expenditures, then who does? Actually, governments have far less control and power than you might expect, at first. In any year, the vast majority of government expenditures is locked in by legislation that was passed in previous years. Therefore, just a relatively small portion can be altered.

Government Deficits, Surpluses, and Debts

Deficits occur when governments spend more than they earn in tax revenues and fees per period. Surpluses occur when revenues and fees exceed spending. Therefore, deficits and surpluses are flow variables (measured over a period), like a company's operating cash flow statement or income statement. A government's debt is the sum of all its past deficits less what has been repaid. Thus, it is a stock variable (i.e., measured at a point in time), similar to the liabilities on a company's balance sheet.

Deficits need to be financed, and one way to do so is by borrowing. Even though many governments have the constitutional power to create the funds (e.g., to "coin money") needed to finance their deficits, few do because it would increase the nation's money supply, and that responsibility has been given to their central banks.

Deficits can accumulate into sizeable debts. So, it is reasonable to ask, "When should we sound the warning bells? Do these debts eventually have to be repaid? Do they impose burdens on future generations? Can a nation's interest and principal payments become so large that the government is forced to default

1 Marissa Laliberte, "11 Bizarre Things the U.S. Government Actually Spent Money On," *Reader's Digest*, January 22, 2018. https://www.rd.com/culture/wasteful-government-spending-examples/ (accessed September 3, 2019).

2 See Citizens against Government Waste, Homepage, http://cagw.org/ (accessed September 3, 2019).

on its debts?" Let's address these issues by explaining: (1) how governments finance their deficits, (2) who owns their debt securities, (3) if these debts must eventually be repaid, (4) whether government debts are burdens on future generations, (5) why a government's accounting methods may mask its actual performance, and (5) if any national government has ever defaulted on its debts.

How Do Governments Finance Deficits?

To finance the gap between expenditures and tax receipts, governments tap the financial markets by issuing securities with varying maturities. *Treasury bills* have maturities less than or equal to one year, Treasury notes mature between one and ten years, and Treasury bonds mature after ten years (see Table 13.1).

Table 13.1: Types of Maturities of Government Securities.

Security	Maturity
Treasury bills	Less than or equal to one year
Treasury notes	One year to ten years
Treasury bonds	More than ten years

Who Owns a Nation's Government Debt?

Virtually anyone in the world can purchase national government securities. Domestic and foreign individuals, financial intermediaries, investors, companies, nonprofit organizations, governments, agencies, and central banks are all potential buyers of these debt instruments. For the United States, about 70% of the national government's debt is owned internally, with the remaining 30% foreign-owned.[3]

Concerns are sometimes raised when foreign governments and central banks purchase an increasing portion of a government's debt. Can large foreign creditors harm a debtor country by suddenly cutting off lending, dumping its security holdings, and then selling the debtor country's currency? In short, is the adage true that "If you owe someone $100, that's your problem, but if you owe $100 million, that's the lender's problem?"

For example, what would be the economic consequences if China, a large, multi-*trillion* dollar lender to the United States, refused to purchase any more

3 Source: Federal Reserve Bank of St. Louis, Economic Data—https://fred.stlouisfed.org/series/FDHBFIN and https://fred.stlouisfed.org/series/GFDEBTN (accessed August 31, 2019).

U.S. government securities, dumped the ones it held, and then sold all its dollar proceeds in the foreign exchange markets? What powers, if any, would China have over U.S. foreign and domestic policies? Would such an attack limit the effectiveness and flexibility of U.S. fiscal and monetary powers?

There would be both short-term and long-term consequences, and answers to these questions deserve careful consideration. For now, suffice it to say that any victory resulting from a massive foreign offensive against U.S. government securities would likely be Pyrrhic. Significant security sales would cause their prices to crash, burdening the attacker with capital losses on their security investments. Subsequently, massive sales of dollars for euros, Swiss francs, or yuan would result in a rapidly depreciated dollar and added capital losses. For the security owners, it would be like shooting themselves in the left foot and then turning around and shooting the right. Therefore, any successful attack against U.S. government debt by a foreign creditor would need to be measured and implemented strategically over an extended period. To be sure, U.S. interest rates would rise from such an attack, but central bank intervention in the domestic credit and foreign exchange markets could help ease the transition to a new normal.

Do Government Debts Have to Be Repaid?

Most people manage their financial affairs so that they repay all their debts before the end of their lives. Otherwise, they might burden relatives with debts. Do governments eventually have to repay all their liabilities and become debt-free? If not, why should governments be treated differently from the rest of us? Answers to these questions rest on a firm understanding of the difference between the debts of individuals and the debts of governments and companies.

Governments and companies are different from you and me because, theoretically, they can live forever. With unlimited lifetimes, is there any reason to expect or want governments to reduce their debts to zero? The real issue is not whether governments should eventually become debt-free, but whether they have the financial ability to service their debts and whether their expenditures are the best use of a nation's resources.

This conclusion may be easier to understand if we couch the same issue in terms of a profitable company. No one expects multinational companies, like Apple, Alphabet, Honda, Johnson & Johnson, Roche Holding, and Siemens, to reduce their debt levels to zero. Instead, it is taken for granted that these companies' debts will grow with sales and assets. It would be a fatal mistake for a company's management to have the strategic goal of periodically driving debt levels to zero (i.e., having 100% equity) because accomplishing this goal could

mean passing up opportunities to increase shareholder value. Such a strategy could weaken the company and cause unwelcome takeover bids. Successful companies are evaluated by how ably and safely they increase their stockholders' equity and not by how frequently they reduce their debt levels to zero.

Would we really want a debt-free government? Consider the implications and what might be lost. Investors own treasury securities for their safety, reasonable return, and high liquidity. If governments paid off all their debts, security owners would need to find alternative, second-best investment assets for their portfolios. The notion of an interest rate that is free from *credit risk* would need reconsideration.

Moreover, if the government repaid its debts too quickly, the economic consequences could be undesirable. To see why, suppose the U.S. government decided in 2019 to immediately repay the $21.5 trillion debt it owed. Cutting spending would not be enough; so it would either need to increase taxes or print enough money to repurchase the outstanding bills, notes, and bonds. If taxes were raised by $21.5 trillion, a little more than 100% of U.S. annual GDP would flow to the government to repay the debt. On top of that, current expenditures would need funding.

Of the $21.5 trillion in tax revenue, about 70% would flow directly back to U.S. taxpayers, government agencies, trusts, and the Federal Reserve. Foreign and international investors would receive the rest. Therefore, by taxing and repaying all government debts in 2019, the U.S. government could cause one of the most massive redistributions of income in the history of the world. The beneficial effects of this redistribution would be widely debated because it would channel these funds from the average taxpayer to the average Treasury security holder (i.e., investor).

Another way a government (in conjunction with the central bank) could extinguish its debt is by creating enough money to repurchase it. The problem with this solution is the nation's monetary base, money supply, and inflation rate would skyrocket. For example, if the Federal Reserve created enough money in 2019 to repay the government's $21.5 trillion debt, the increase in the U.S. monetary base would exceed 600%, and the U.S. money supply would grow by a multiple of that amount. Rampant inflation might result, and, to the extent that it is unexpected, this inflation could cause significant redistributions of income.

Are Government Debts Burdens on Future Generations?

Many people wonder if increases in government debts will somehow burden future generations. A helpful way to understand this issue is by remembering a familiar accounting tautology, which is: "Assets *must equal* the sum of liabilities

plus stockholders' equity (i.e., net worth)." Businesses measure their success by how fast they increase stockholders' equity. Growing companies may need to borrow to support investments in new physical assets, such as plant, equipment, and tools, as well as financial assets, such as accounts receivable. If they are successful, profits rise, assets grow and appreciate, liabilities are serviced, and stockholders' equity increases.

The same is true of governments in thriving nations. They may also need to borrow to finance investments that will increase the nation's productive capacity. Expenditures for infrastructure, such as roads, bridges, tunnels, communication networks, and educational systems, are good examples of such investments. If governments are successful, the nation's well-being rises with these investments. While the current generation must sacrifice consumption to purchase such investments, the hope is they will bear significantly greater rewards in the future.

Therefore, the critical issue is not whether the government's debt is growing but rather what is done with the borrowed funds. If governments borrow, invest in worthwhile projects, and create assets that will provide the means to service and repay these obligations, then large debts should not be worrisome. One problem is that few countries publish national balance sheets.[4] Therefore, it is a challenge to determine whether a country's net worth (i.e., equity) is rising or falling.

Opportunity Costs and Positive Externalities

Just because government expenditures have beneficial effects on a nation does not mean they should be undertaken. Funds borrowed by governments may raise real interest rates and crowd out private sector expenditures. Therefore, government spending increases a nation's well-being only if the funds are used more wisely than the private sector would have used them.

Governments do not earn profits, so it is difficult (if not impossible) to calculate investment returns on any particular budget item. Moreover, governments often provide goods and services that the marketplace would not otherwise make available in sufficient quantities. Markets tend to underproduce these products because there are externalities that cannot be incorporated into their prices. As a result, it would be a challenge for a private company to earn a profit by producing these products.

4 Australia, Canada, and New Zealand are among the few countries that publish annual balance sheets.

Positive externalities occur when part, or all, of the benefits that one individual enjoys from consuming a good or service spills over to others. Education, vaccines, national defense, law enforcement, pollution abatement, lighthouses, and street signs are just a few examples of products and services whose benefits spill over from those who finance them to those who do not. For instance, it would be impossible to charge some individuals for national defense but not others and then prevent nonpayers from enjoying the benefits of protection. Moreover, the benefits enjoyed by the nonpayers usually do not dilute the benefits or enjoyment of those who pay.

Why Government Accounting May Mask True Performance

To better appreciate the meaning and implications of government deficits, it is helpful to understand the accounting logic behind government and business finances. What counts as a government expense, and what does not count? The answer to this question may be surprising because government budgets are measured on a cash basis, which means their accounting treatment is more like a business's cash flow statement than a profit-and-loss statement. Let's see why this is important.

Suppose a company earns $100 million in annual sales revenues, has operating expenses of $60 million, and, therefore, makes operating profits equal to $40 million. What would happen if everything stayed the same, except the company purchases new machines worth $150 million? How would it account for the $150 million purchase? In a typical profit-and-loss statement, the company would depreciate machines over their estimated life and count only the depreciation as an annual expense. If the life were ten years, then $15 million (i.e., 10% of the $150 million) would count as an annual expense. Therefore, this year's profits would fall from $40 million to $25 million.[5]

By contrast, a cash flow statement would require the company to account for the entire $150 million investment during the year in which it was purchased. Consequently, its $40 million operating profit would turn into a $110 million net cash outflow.[6] Most national governments are required to report, as an expense, the full price of investment goods in the year they are purchased. Using this accounting practice, virtually any "profitable" company in the world that invested heavily in plant and equipment would report losses.

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5 Operating revenues – Operating expenses – Depreciation expenses = $100 million– $60 million – $15 million = $25 million.

6 Operating revenues – Operating expenses – Investment costs = $100 million – $60 million – $150 million = –$110 million

Has Any Government Ever Defaulted on Its Debts?

Governments can and do default on their debts. There have been many occasions when heavily indebted countries defaulted, restructured, or required external assistance to avoid defaulting on their debt obligations. Examples of countries that have experienced sovereign defaults and debt restructurings since 1990 have included: Angola (1992–2002), Argentina (2002–2005), Brazil (1990), Cameroon (2004), Côte d'Ivoire (2000), Dominica (2003–2005), Dominican Republic (2005), Ecuador (2000 and 2008), Gabon (1999–2005), Greece (twice in 2012 and 2015), Grenada (2004–2005), Indonesia (2000 and 2002), Iran (1992), Kenya (2000), Liberia (1989 and 2006), Madagascar (2002), Morocco (2000), Myanmar (2002), Nigeria (2001 and 2004), Paraguay (2003), Russia (1991 and 1998), Rwanda (1995), Sierra Leone (1997–1998), South Africa (1993), Sudan (1991), Surinam (2001–2002), Venezuela (2004), and Zimbabwe (2000 and 2006).[7]

Borrowing Foreign Currencies to Finance Deficits

If governments borrow by issuing securities denominated in *foreign currencies*, then their default risks increase because repayment depends on them acquiring currencies that they cannot print or capture by taxing. The only way to repay these debts is by earning the funds or borrowing them from willing lenders.

Borrowing the Domestic Currency to Finance a Deficit

Even when a government's debt is denominated entirely in the domestic currency, default is still possible. Most nations give their central banks the power to control the nation's money supply. As a result, governments often do not have direct authority to print or create the funds needed to repay outstanding debts. Desperate governments could try (and have tried) to change their central banks' mandates, but this can be difficult and problematic to do quickly.

Today, abrupt changes such as these are even less likely due to the international trend toward increasing central banks' independence. Therefore, it is unrealistic to believe that, just because governments have a constitutional right to print and coin money, they could or would wrestle monetary authority from their central banks and create enough money to avoid defaulting on their debt obligations.

Some observers believe that it is nearly impossible for a government to default on its debts if most (or all) of it is internally held and denominated in the

7 Carmen M. Reinhart and Kenneth S. Rogoff, "The Forgotten History of Domestic Debt," *NBER Working Paper Series*, Working Paper 13946, http://www.nber.org/papers/w13946.pdf (accessed September 3, 2019).

domestic currency, but consider the United States. Each week the U.S. Treasury Department borrows considerable amounts to finance new spending, repay maturing debt, and service outstanding debt. What would happen if obstructive tactics in Congress caused a government shutdown? Under these circumstances, choices would need to be made concerning which bills to pay—or not.

Fiscal Multiplier, Crowding-Out, and Crowding-In

This section explains how fiscal multipliers can amplify government spending and taxation policies. It then goes on to explain how adjustments in the three major macroeconomic markets (i.e., real goods and services, real credit, and foreign exchange markets) directly affect the size of these fiscal multipliers.

Fiscal Multiplier

As was explained in Chapter 11, "Real Goods and Services Markets," any exogenous increase or decrease in aggregate demand has a potential multiplier effect. When the source of this external shock is a discretionary change in government expenditures or tax rate, the amplification effect is called the *fiscal multiplier*.

For example, suppose the central government decides to stimulate economic growth and employment by spending $100 billion more on domestic infrastructure, such as bridges, roads, and tunnels. Assuming no offsetting effects from the credit or foreign exchange markets, GDP would rise by $100 billion, as new final goods and services were produced. Household incomes would increase hand-in-hand with higher production, causing consumer spending to grow, but the expenditures would not stop there. This initial wave of spending would spur others, and the accumulation of these expenditure ripples would build to create the spending multiplier.

Figure 13.1 captures the combined impact that a discretionary increase in government spending and the fiscal multiplier have on a nation's aggregate demand. Notice how the initial change in government spending increases aggregate demand from AD_1 to AD_2, and then the fiscal multiplier amplifies it by moving aggregate demand from AD_2 to AD_3. If the fiscal multiplier were equal to 2.0, then an increase in aggregate demand by $100 billion would raise real GDP by $200 billion.

Factors That Weaken the Fiscal Multiplier

The same forces that weaken the spending multiplier also have the potential to decrease the fiscal multiplier. Let's review them market-by-market.

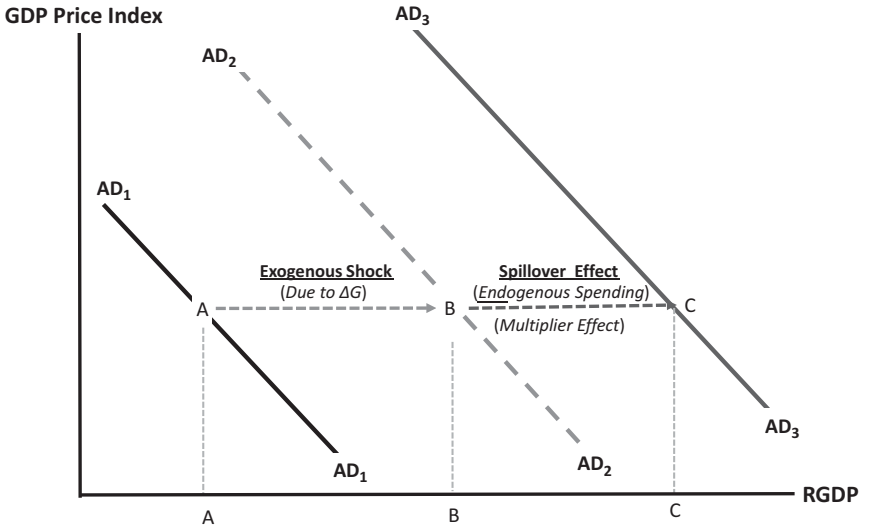

Figure 13.1: Fiscal Multiplier's Effect on Aggregate Demand.

Forces in the Real Goods and Services Market That Weaken the Fiscal Multiplier

Automatic changes in tax revenue, government transfers, and imports are among the dominant forces in the real goods and services market that weaken the fiscal multiplier. To see why, suppose real GDP increased, causing tax revenues to rise automatically, thereby reducing the ability of households to consume more. The increased real income would also cause automatic reductions in government transfer payments, as the unemployed found jobs and had less need for government support. Finally, as real GDP increased, imports would rise, strengthening the demand for foreign (not domestic) goods and services. Together, these automatic adjustments would weaken the fiscal multiplier and dampen (but not reverse) the ultimate effect of the external shock.

Forces in the Real Credit Market That Weaken the Fiscal Multiplier

To finance their deficits, governments borrow in their domestic real credit markets. Their increased demand for funds raises the real interest rate, which lowers the quantity of real credit demanded by other sectors. To understand why, consider Figure 13.2. Assume the government begins with a balanced budget, which means its initial demand for credit equals zero. Therefore, D_1 represents the private sector's demand for real credit, and equilibrium is at Point A, where

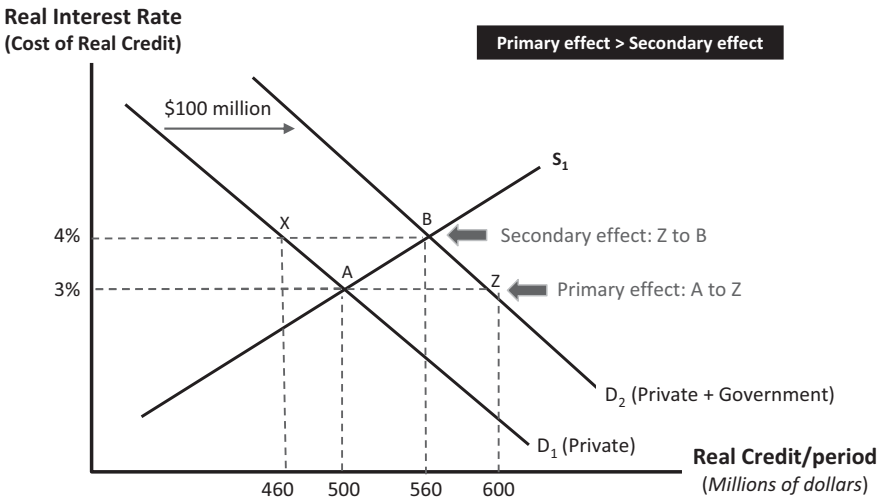

Figure 13.2: Effects of Government Borrowing in the Real Credit Market.

D_1 and S_1 intersect. The real interest rate equals 3%, and the equilibrium quantity of real credit equals $500 million per month.

Now, suppose the government runs a $100 million budget deficit each month, which it finances by borrowing. This borrowing increases the demand for real credit by $100 million, which shifts real credit demand from D_1 to D_2. The rightward shift in demand increases the real interest rate from 3% to 4% and the equilibrium quantity of real credit from $500 million to $560 million per month (i.e., from Point A to B). How the nation moves from equilibrium at $500 million to equilibrium at $560 million is best understood if it is explained in two steps. Let's start on the supply side.

Causes of the Increased Quantity of Real Credit Supplied

The net increase of $60 billion in real credit supplied to the market (i.e., from point A to B, along the real credit supply curve) comes from several different sources, which were covered in Chapter 10, "Real Credit Markets." Let's review them. As the real interest rate increases, household saving rises, supplying fresh funds to the real credit market. A higher real interest rate also increases the quantity of foreign funds supplied to the real credit market. The rising real interest rate also affects interest spreads, thereby providing incentives for investors to adjust their portfolios to take advantage of changes in relative real returns. As individuals and businesses liquidate assets in their portfolios, such as precious metals, stocks, and real estate, and supply the liberated funds to

the real credit market, the M2 money multiplier rises. Furthermore, the money multiplier increases as the public sector's preferences for currency in circulation falls, near money rises, and the banking sector's preferences to hold excess reserves falls.[8] A rising money multiplier increases both the real money supply and quantity of credit supplied to the real credit market.

Causes of the Decreased Quantity of Real Credit Demanded: Crowding-Out

In Figure 13.2, the quantity of real credit supplied and demanded increases by \$60 billion (i.e., from \$500 million to \$560 million), which is \$40 million less than the \$100 million borrowed and spent by the government. What happened to the extra \$40 million in stimulus spending? The answer is, it evaporated due to a reduction in private sector borrowing.

Government demand for real credit increases from D_1 to D_2. If the real interest rate stayed at 3%, the amount of credit demanded would equal \$600 million (i.e., the movement from A to Z in Figure 13.2), but the real interest rate does not remain at 3%. Instead, it rises to 4%, and, as it does, the amount of credit demanded by households, businesses, and foreigners falls by \$40 million, which is the movement from Z to B in Figure 13.2. Typically, household expenditures that are most affected by rising real interest rates are postponable, big-ticket items, such as appliances, automobiles, boats, houses, home improvements, and vacations. Businesses that are most likely to be affected by rising real rates are those that compete in capital-intensive industries or finance large inventories.

Crowding-Out

Crowding-out is the term used to describe the reduction in private borrowing due to the higher real interest rate from greater government borrowing. It is an appropriate term because individuals and businesses must earn positive returns to remain sustainable. In short, they are accountable to bottom lines. Governments are not. Therefore, a rising real interest rate crowds out individuals and businesses, rather than the government, from the real credit market.

As long as the supply of real credit is upward sloping, crowding-out does not entirely offset or reverse the fiscal stimulus. The government's increased demand for credit raises real interest rates and encourages new funds into the

8 Recall from Chapter 8, "Money Creation" that this sentence is referring to the preferred asset ratios. As the real interest rate rises, (CC/D) falls, (ER/D) falls, and (N/D) rises, causing the M2 money multiplier to rise.

market, thereby easing, somewhat, the battle for funds between the government and private sectors. If the supply of real credit were vertical (i.e., perfectly inelastic, see "Crowding-Out: When Is It Complete, Nonexistent, or Partial?" later in this chapter), the struggle for funds would be a zero-sum game with the winners exactly offsetting losers in the competition for funds.

Foreign Exchange Market Effects That Weaken the Fiscal Multiplier

A higher real interest rate increases the quantity of foreign funds supplied to the domestic real credit market, but these flows have a double-edged effect. To invest financially in a country with rising interest rates, foreign investors must first purchase the nation's currency, which puts upward pressure on its international value. As the currency appreciates, exports become more expensive and imports become cheaper, causing net exports to fall. As net exports fall, so does the quantity of goods and services demanded, which weakens the fiscal multiplier.

Factors That Strengthen the Fiscal Multiplier: Crowding-In

Crowding-in is the term used to describe the increase in private investments caused by higher government expenditures for final goods and services and its impact, which strengthens the fiscal multiplier. For instance, it is possible for government expenditures to encourage gross private domestic investment if it enlarges markets, opens new business opportunities, and creates favorable expectations. The construction of a new highway may increase service investments along the road, such as gas stations and restaurants, and provide incentives for businesses to locate near communities that can now be accessed more easily.

Summary of the Fiscal Multiplier

Figure 13.3 captures the effect that government borrowing-and-spending have on a nation's real GDP and GDP Price Index. In the absence of any fiscal multiplier, aggregate demand increases from AD_1 to AD_2. The fiscal multiplier, without any weakening effects, increases aggregate demand from AD_2 to AD_3, but once the weakening forces are considered, aggregate demand falls from AD_3 to AD_4. The net result is an increase in aggregate demand from AD_1 to AD_4.

Government Surpluses

Surpluses occur when governments spend less than they receive in tax revenues and fees. Commonly, surpluses are thought to be contractionary because

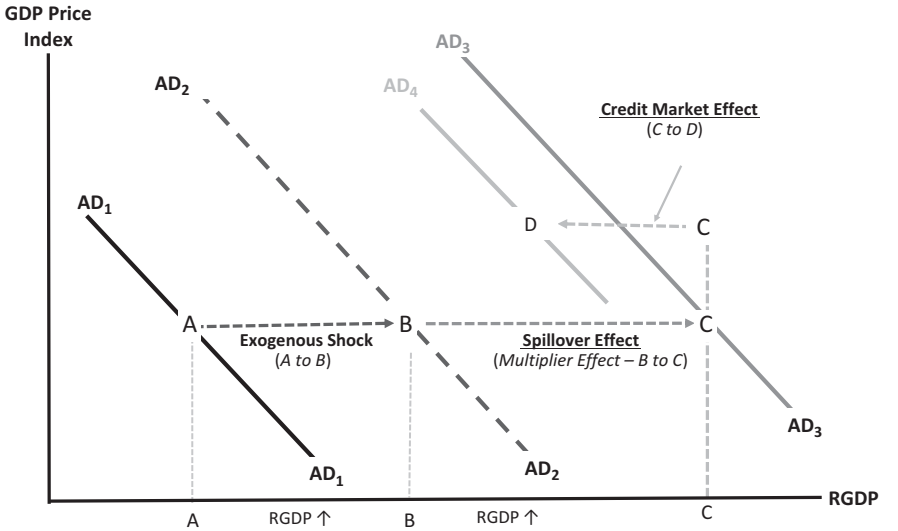

Figure 13.3: Endogenous Changes That Weaken the Fiscal Multiplier.

falling government expenditures and rising taxes reduce aggregate demand. Therefore, when taxes exceed spending, the government is often viewed as taking more away from aggregate demand than it contributes.

As was the case with government budget deficits, economic forces in the three principal macroeconomic markets react to mitigate (but not completely offset) the contractionary impact of these surpluses. In the real goods and services market, as real GDP falls, tax revenues fall, government transfers rise, and imports fall. In the real credit market, the surplus increases the supply of real credit, thereby reducing the real interest rate and stimulating consumption and investment spending (see Figure 13.4). Finally, in the foreign exchange market, a lower real interest rate puts downward pressure on the domestic currency's value (i.e., the exchange rate), which increases net exports. All of these factors help to reduce the contractionary effects of fiscal policy.

Automatic Stabilizers

Automatic stabilizers are the changes in government transfer payments and tax revenues that occur passively with economic activity. The term, *automatic stabilizers*, is richly descriptive because these transfers and tax revenues respond automatically to changing economic conditions and help stabilize fluctuations

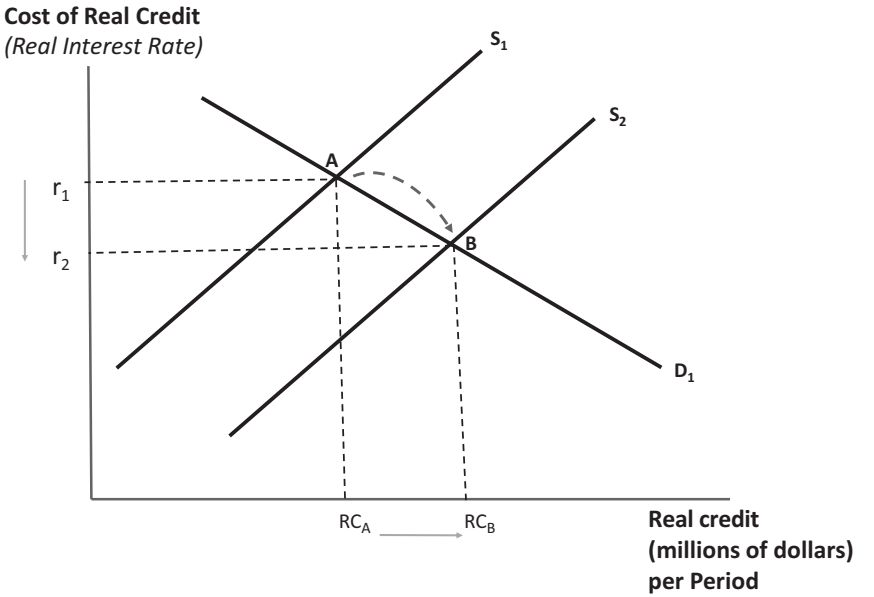

Figure 13.4: Budget Surpluses Increase the Supply of Real Credit.

in both real GDP and the GDP Price Index, which would have occurred without them. It is worthwhile remembering that increases in deficits caused by the automatic stabilizers do not raise aggregate demand, which means they do nothing to move an underperforming nation closer to full employment. Similarly, decreases in these deficits do not move a country farther away from full employment. Instead, they restrain the movement of real GDP.

A moment's reflection will explain why automatic stabilizers act only to restrain economic activity and not as independent sources of economic change. Consider unemployment compensation, which is one of the most important automatic stabilizers. As people lose their jobs, they collect unemployment benefits from the government. To the recipients, these payments are sources of funds, which can be used to support basic needs, but this compensation is usually far less than these individuals earned when they were working. Therefore, unemployment compensation has the effect of cushioning the decline in an unemployed person's income and spending. It is not enough to increase spending to (or above) where it had been before the job loss.

A helpful simile is to think of nondiscretionary changes in government transfers and taxes as if they were giant anchors attached to a seaworthy ship, except in this case, the vessel is the nation's economy. Like a ship's anchor,

the automatic stabilizers inhibit forward or backward movement, but they do not entirely prevent it. Just as the force of a ship's engine, strong winds, or prevailing currents (i.e., all exogenous forces) can overcome the weight and pull of an anchor, strong exogenous economic forces, such as discretionary changes in fiscal policy, monetary policy, or shocks from changes in consumption, investment, and net exports, can overcome the drag of the automatic stabilizers.

The same point can be made with personal income tax revenue, which is another important automatic stabilizer. When GDP falls, people lose their jobs, and tax payments fall. Even though the tax *rate* remains the same, tax *revenues* fall, due to the declining income base. This reduction in tax revenue does not stimulate unemployed individuals' spending from where it would have been if they were fully employed. It only reduces the tax burden to make it commensurate with their ability to pay. Imagine the unfairness, if the unemployed were required to pay the same taxes after they lost their jobs as they paid when they were working.

Fiscal Policy in Action

In the short run, discretionary fiscal policies are most effective when they are used to solve demand-related problems. For example, if a nation was experiencing excessive inflation due to rising aggregate demand, the government could raise the tax rate or reduce its spending to curb overall demand. If the problem was sluggish growth due to tepid demand, the government could increase spending or cut taxes. Suppose a nation was faced with spiraling inflation. Let's see how fiscal policy tools could be used to reduce its inflation rate.

Reducing Discretionary Government Spending

By reducing spending, governments can directly trim aggregate demand and a source of inflation. These cuts in spending could be implemented across the board, or they could be targeted at specific sectors, such as defense, health, or social services.

Cutting government spending is usually controversial because people suffering the cuts take them personally, asking, "Why pick on me when there are so many others who are equally or more deserving?" A second problem with cutting government spending was mentioned earlier in the chapter, namely, that past legislation often locks in expenditures, thereby draining governments of the ability to make significant changes. Furthermore, getting these pieces of legislation passed can be challenging to accomplish in the short term.

Increasing Tax Rates

Raising tax *rates* is another way to reduce a nation's aggregate demand. If they are imposed on household incomes, the reduced disposable (i.e., after-tax) incomes cause personal consumption expenditures to fall. As consumption falls, so does aggregate demand. When higher tax rates are imposed on business profits, gross private domestic investment decreases as companies reduce their real investments. In addition, the reduction in after-tax profits cuts dividends and capital gains that, otherwise, would have flowed to the household sector, again, reducing demand.

Lower consumption and investment expenditures reduce aggregate demand, which lowers production and further reduces household income levels. As household earnings fall, so do their purchases of goods and services, which leads to subsequent rounds of spending cuts and slashed production (i.e., via the fiscal multiplier effect). These cascading rounds of lower demand and income wind their way through the economy until equilibrium is eventually restored at a lower level of GDP. If successful, contractionary fiscal policies result in lower prices and reduced inflation. At the same time, they may also reduce real GDP, causing unemployment to rise.

Lags in Fiscal Policy

There is considerable controversy about the effectiveness of discretionary fiscal policies. Among the main reasons for concern and skepticism are its long and variable lags. Fiscal policies have the same three generic lags as monetary policy, namely, the recognition lag, implementation lag, and impact lag, but the durations of these lags can vary substantially from period to period, and they can be quite different from their monetary counterparts. Let's take a closer look.

Recognition Lag

Government officials have the same level of expertise and access to economic crystal balls as central bankers. They also observe and interpret the same data. Therefore, the time it takes to recognize that a fundamental change in the economy has occurred (i.e., the *recognition* lag) is generally the same for fiscal policy as it is for monetary policy (see Figure 13.5).

Implementation Lag

The *implementation lag* for fiscal policy can vary depending on how controversial the issue to be solved is and the degree of urgency. Time is needed to propose,

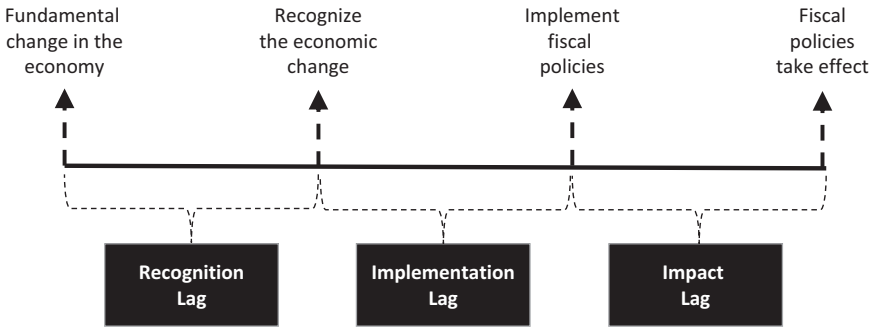

Figure 13.5: Lags in Fiscal Policy.

debate, and finally pass new legislation. Therefore, this lag can be much longer than the implementation lag for monetary policy, which could be as short as one day (see Figure 13.5).

Impact Lag

The *impact lag* is the time needed for a policy to take effect. For fiscal policy, this lag is usually shorter than its monetary policy counterpart because government spending has a substantial direct effect on aggregate demand, and taxation has a strong indirect impact on aggregate demand via consumption expenditures and investment spending (see Figure 13.5).

As a result of these three lags, the delay between when a fundamental change in economic activity occurs and fiscal policies to remedy them take full effect can last months or even years. By that time, the nation's economic environment could completely change. Therefore, it is quite possible for a fiscal policy cure to turn into a fiscal policy toxin by the time it is passed and takes effect. For example, a government might impose contractionary fiscal policies to fight rising inflation, but by the time they take effect, the nation's growth rate has already slowed and these contractionary policies accelerate the decline in economic activity—perhaps inducing a recession.

Monetary Effects of Fiscal Policy

Until now, we have discussed fiscal policy without regard to whether or not it affects a nation's monetary base. This section explains, in brief, why fiscal

policies do not affect a nation's monetary base. *The Rest of the Story* section of this chapter provides a fuller explanation.

In Chapter 9, "Central Banks," we introduced *Guideline #1* to help determine transactions that cause changes in a nation's monetary base. Guideline #1 states: *A nation's monetary base changes only when funds cross our imaginary horizontal line due to a change in the size of the central bank's balance sheet*. Typically, a central bank does this by purchasing or selling government securities or foreign currencies and, also, by increasing or decreasing discount loans to financial intermediaries (see Figure 13.6). When a central bank's balance sheet rises, it is purchasing assets and pushing monetary base into the system. When its balance sheet falls, the central bank is retiring monetary base by exchanging balance sheet assets (above the line) for monetary base (below the line).

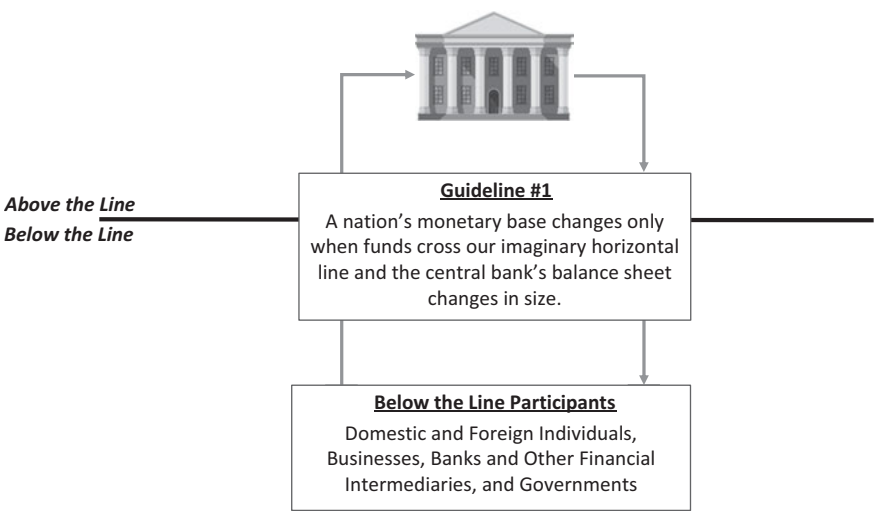

Figure 13.6: Monetary Base Guideline #1. (Imagery used: © MicroOne/Shutterstock)

Governments, individuals, financial intermediaries, and other businesses are all below the line. Therefore, when governments interact with these counterparties by taxing, spending, or borrowing, these transactions do not affect the monetary base.

The Rest of the Story

Putting Government Debt into Perspective

Figure 13.7 shows that between 1968 and 2018, U.S. government debt increased by more than 6,600%, from about $0.321 trillion to about $21.5 trillion. Is this dramatic increase a reason for concern? Let's take a closer look.

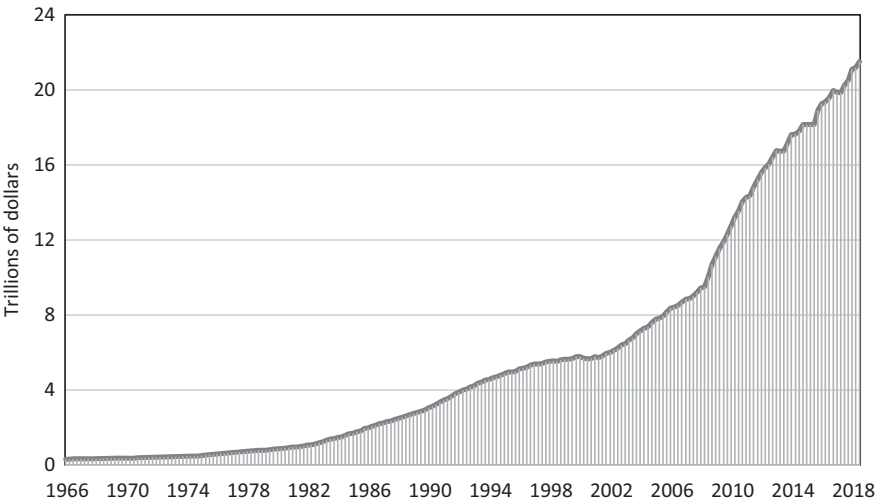

Figure 13.7: Total U.S. Federal Debt, 1968 to 2018.**Source:** Federal Reserve Bank of St. Louis, Economic Data—FRED, https://fred.stlouisfed.org/series/GFDEBTN (accessed September 3, 2019).

If you were asked whether a company's million-dollar debt was large or small, your answer would probably be, "It depends." For a company earning $50,000 a year and possessing few assets, a million-dollar debt is relatively large, but for a company making billions of dollars in annual sales and owning real and financial assets worth billions of dollars, it is relatively small. The same is true for government debts. For this reason, it is helpful to adjust the nominal size of government debt and put it into better perspective.

Adjusting for Price Changes and Population Size

Two ways to improve government debt figures, so they convey information that is more meaningful is to remove the effects of inflation and also consider population

size. If gross nominal debt increases by 10%, but inflation also rises by 10%, then there is no change in its real value. Similarly, a country with 100 million residents can support more debt than a nation with 5 million residents.

Figure 13.8 shows the real per capita debt of the U.S. government between 1966 and 2018. Notice that there was a dramatic increase during these 52 years, but this increase was by about 560% rather than the 6,600% increase in gross nominal debt, which is shown in Figure 13.7.

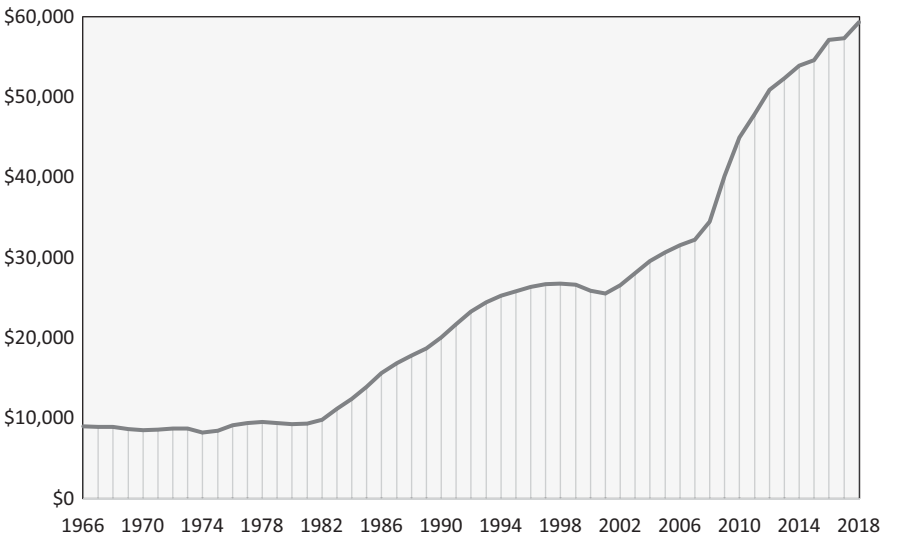

Figure 13.8: U.S. Real Per Capita Government Debt 1966–2018 (2012 Dollars).**Source:** These figures were calculated from three data series at Federal Reserve Bank of St. Louis, Economic Data—FRED, http://research.stlouisfed.org/fred2/. (1) Federal Debt: Total Public, (2) Implicit Price Index, and (3) Population (accessed September 3, 2019).

Debt-to-GDP Ratio

Another way to put government debt into perspective is by comparing it to nominal GDP. Of course, making such a comparison is mixing apples and oranges because debt is a stock concept, and GDP is a flow concept. Nevertheless, it's done all the time. For example, if you apply for a loan, the bank will surely want to know how much you earn and already owe.

Figure 13.9 shows the U.S. federal debt-to-GDP ratios between 1966 and 2018. Notice how this ratio fell from approximately 40% in 1966 to about 32% in 1980.

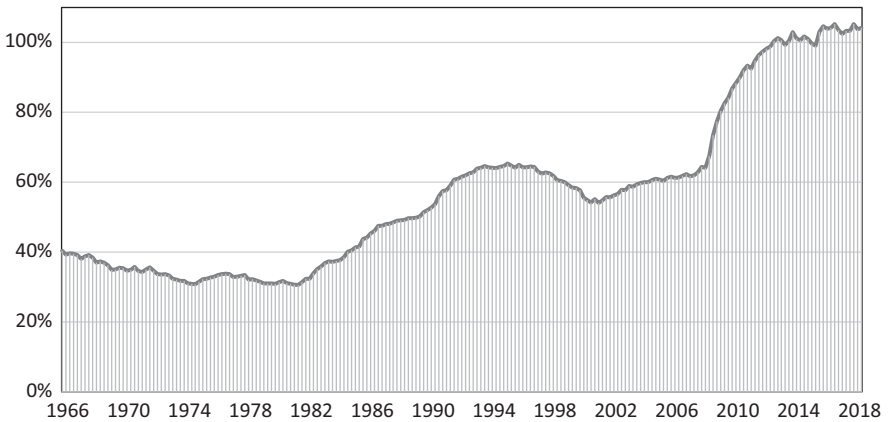

Figure 13.9: U.S. Government Gross Debt-to-GDP Ratio, 1968–2018.**Source:** Federal Reserve Bank of St. Louis, Economic Data—FRED, https://fred.stlouisfed.org/series/GFDEGDQ188S (accessed September 3, 2019).

Then, during the 1980s until the mid-1990s, it gradually increased to about 65%, but since then it has exploded to more than 100% of GDP. This increase has shocked many who wonder if a tipping point has been reached that threatens the sustainability and long-term economic health of the United States.

Many countries report debt-to-GDP ratios. A 60% debt-to-GDP ratio was one of the Maastricht Treaty criteria for EMU membership in 1999.[9] Figure 13.10 shows the debt-to-GDP ratio in 2018 for the United States compared to a sample of other nations in the Organization for Economic Cooperation and Development. It reinforces the view that U.S. debt is creeping to levels generally associated with European countries but is not nearly as high as in Greece or Japan. Furthermore, debt denomination is important. The U.S. government's debt is in U.S. dollars, which its central bank controls. It is not nearly as threatening as countries that have borrowed foreign currencies or currencies over which they have no control, such as Greece, Italy, and Spain with the euro.

9 The debt-to-GDP criterion was *not* met by most of the countries that eventually joined the EMU. Violator countries were admitted because the Maastricht Treaty criteria were divided into strong and weak standards. The 60% debt-to-GDP criterion was a weak standard, which meant that nations only had to show that they were making substantial progress toward meeting this goal. They did not have to achieve it by the time the EMU began in 1999.

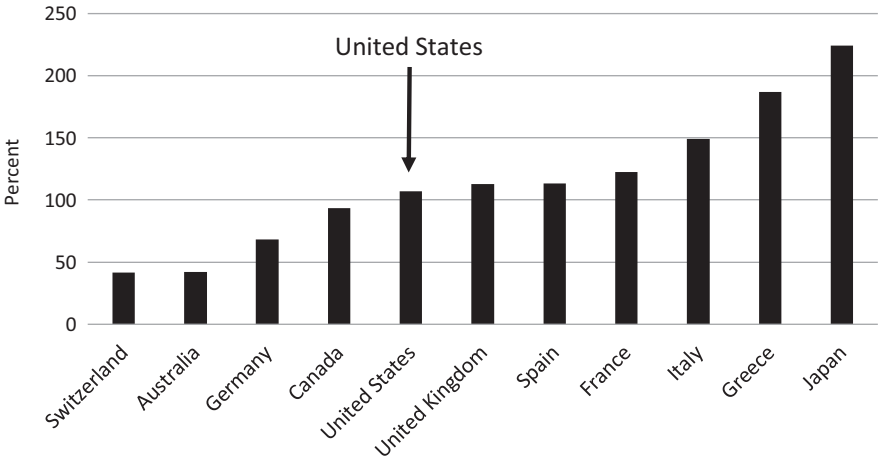

Figure 13.10: Ratio of Government Gross Financial Liabilities-to-GDP for Developed Nations in 2018.**Source:** OECD, OECD.Stat, Economic Outlook No 104 - November 2018. *General government gross financial liabilities, % of nominal GDP, forecast,* https://stats.oecd.org/Index.aspx?QueryId=51644 (accessed September 3, 2019).

A Closer Look at Monetary Effects of Fiscal Policy

This section provides a more detailed explanation of why fiscal policies do not affect a nation's monetary base. In each case, the answer is linked directly to Guideline #1, which says, "A nation's monetary base changes only when funds cross our imaginary horizontal line due to a change in the size of the central bank's balance sheet." Let's consider the monetary effects of taxes, government spending, and deficit borrowing.

Monetary Effects of Taxes

For most of us, taxes are automatically withdrawn from our paychecks and sent to the government each payday. We never see the funds. After we prepare our tax returns at the end of the year, any additional taxes owed are settled by writing checks or making direct transfers from our bank accounts to the Treasury. If we are fortunate enough to receive refunds, government checks or wire transfers arrive at our homes or banks a few weeks later.

Government Tax and Loan Accounts

After we pay our taxes, where do the funds go? Governments have the option of keeping their funds either in financial intermediaries (below the line) or in the central bank (above the line). In general, governments keep most of their funds in tax and loan accounts (T&L) at financial intermediaries, which are below the line. They do so to avoid significant reductions in the monetary base when taxes are paid and to avoid substantial increases when government expenditures are made. Consider how chaotic changes in a nation's monetary base would be if it fell by billions of dollars, euros, or yen whenever the public paid taxes and then increased every time the national government spent these funds. By keeping their funds in financial intermediaries (below the line), a government can avoid this problem.

Figure 13.11 shows an example in which U.S. taxpayers transfer $10 billion to the government. If the government holds these funds in T&L accounts at financial intermediaries (below the line), the government's T&L accounts rise by $10 billion. Simultaneously, the taxpayers' balances at these financial intermediaries decrease by the same amount. As a result, there is a change in the ownership of the deposit liabilities but not in the total amount. The government now owns $10 billion of deposits that were previously owned by taxpayers. Because the reserves of these

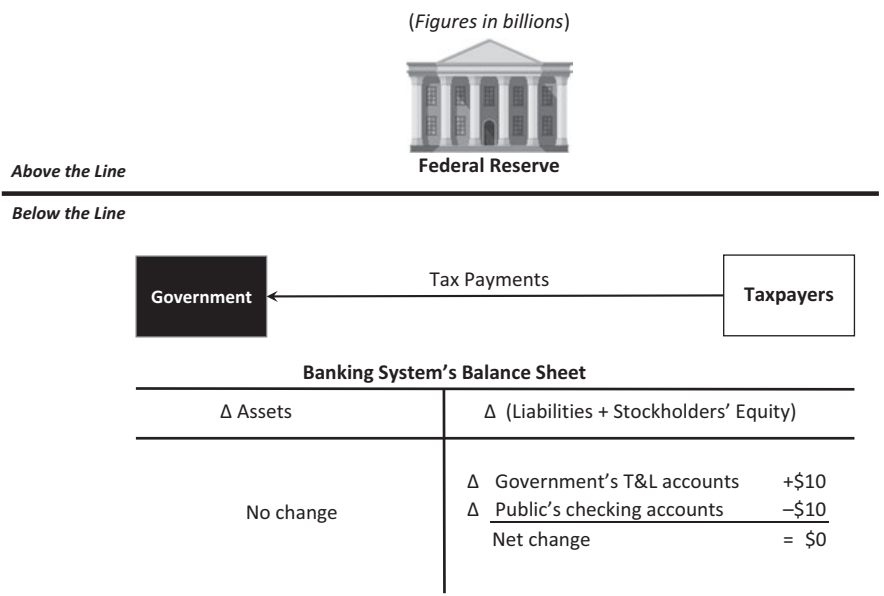

Figure 13.11: Monetary Effects of Government Taxes: ΔMonetary Base = 0. (Imagery used: © MicroOne/Shutterstock)

financial intermediaries and currency in circulation remain the same, the monetary base does not change.[10]

Monetary Effects of Government Spending

As was the case with taxation, government spending does not affect a nation's monetary base. To see why, suppose the government spent $15 billion on a new interstate highway. Figure 13.12 shows that, after the payment cleared, the government's T&L account in the banking system would fall by the same amount that highway contractors' accounts rose. As a result, the reserves of financial intermediaries and the monetary base would remain unchanged.

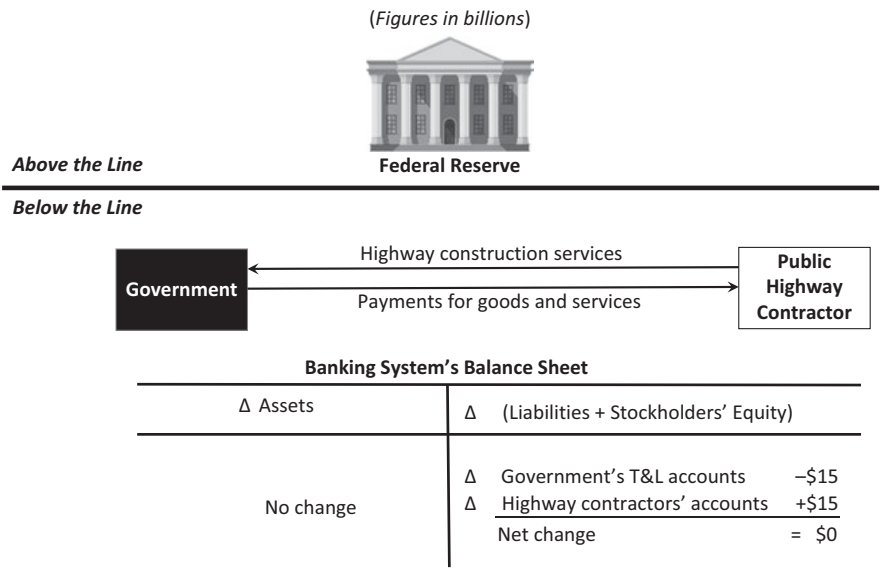

Figure 13.12: Monetary Effects of Government Spending: Δ Monetary Base = 0. (Imagery used: © MicroOne/Shutterstock)

Monetary Effects of Government Borrowing

Figure 13.13 shows why government borrowing does not affect a nation's monetary base. Suppose the government borrowed $20 billion. As a result, the checking

10 The transfer of funds could cause some specific financial intermediaries to lose reserves and others to gain them. This result occurs because the government may hold deposits in financial intermediaries that are different from the average taxpayer. Nevertheless, the banking system, as a whole, gains or loses nothing.

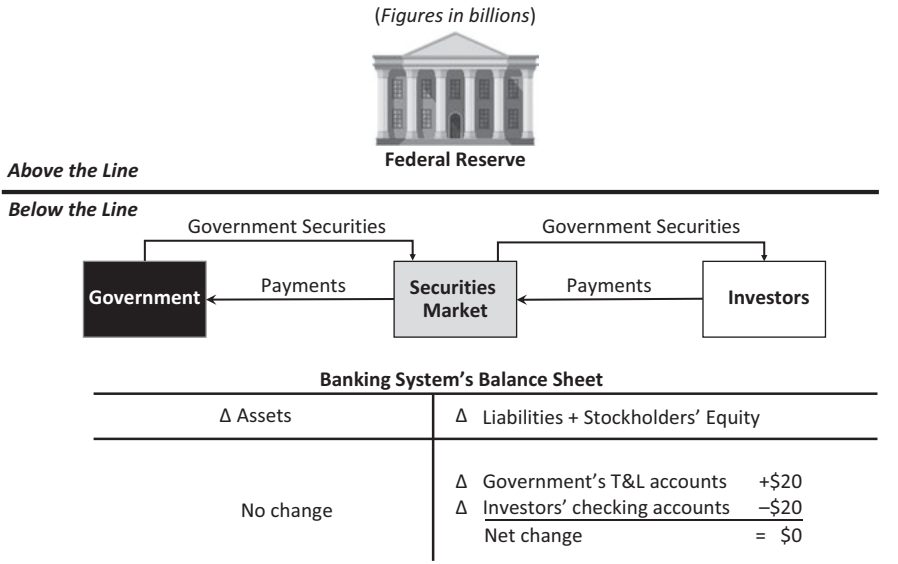

Figure 13.13: Monetary Effects of Government Borrowing: Δ Monetary Base = 0. (Imagery used: © MicroOne/Shutterstock)

accounts of investors, which are below the line, would be transferred to the government's T&L accounts, which are also below the line. There would be no change in banking system reserves and, therefore, no change in the nation's monetary base.

Government Deposits at the Central Bank

Even though governments keep the bulk of their deposits in financial intermediaries (below the line), they can (and do) write checks on and make wire transfers from their central banks. Remember that central banks are the fiscal (i.e., financial) agents of their governments. In this role, they perform financial services, such as tax collection, issuance of new debt, and administration of payments on outstanding debts. Therefore, governments need accounts at the central bank (above the line) for these financial services to be rendered.

To minimize the effects on the monetary base, governments usually transfer funds to the central bank only when they anticipate upcoming payments. These funds remain in the central bank (above the line) only for a short time. Transfers are done with full transparency to the central bank so that temporary changes in the monetary base can be offset, if desired. As a result, the discussions in this book assume that government treasuries hold *all their deposits* in financial intermediaries (below the line).

Figure 13.14 shows how the transfer of $10 billion of government funds to the central bank from financial intermediaries reduces the nation's monetary base by the amount of the transfer because banks' "Deposits at the central bank" (which are below-the-line) fall by $10 billion. These financial intermediaries also lose $10 billion of deposit liabilities to the government (i.e., the Government's Tax and Loan account falls by $10 billion).[11] Keep in mind that this transfer of funds is entirely independent of the public's payment of taxes.

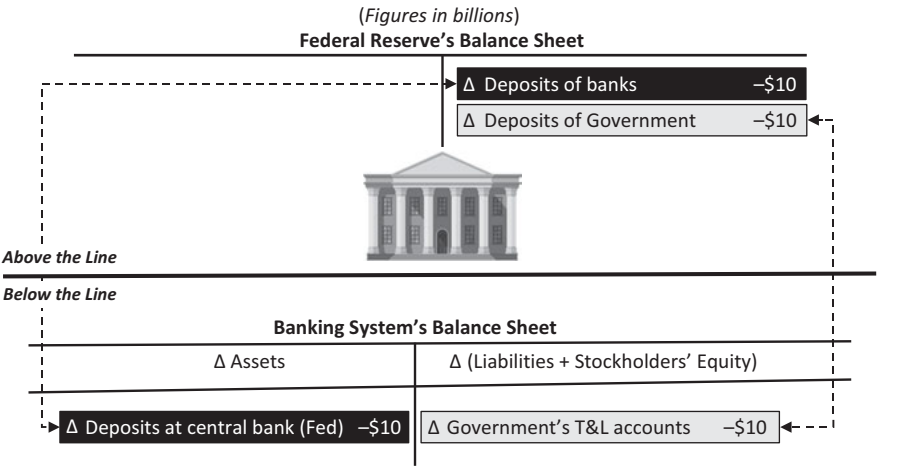

Figure 13.14: Monetary Effects of Government Transfers to the Central Bank. (Imagery used: © MicroOne/Shutterstock)

Greece: Consequences of a Misestimated Fiscal Multiplier

What are the consequences when forecasters get it wrong and misestimate a nation's fiscal multiplier? The eyes of the world were opened to just such a mistake in January 2013, when Olivier Blanchard, chief economist at the International Monetary Fund (IMF), and Daniel Leigh, research economist at the IMF, concluded in a technical econometric paper that the fiscal multiplier applied by policymakers to Greece in 2010 might have been a third its actual size.

Why was this important? Between 2007 and 2010, Greece faced large and growing fiscal deficits, which were caused by a severe domestic and worldwide

11 Notice that this example is one of the few exceptions to our *above-the-line/below-the-line* guideline (which is why it is called a *guideline* and not a *law*) because there is no overall change in the central bank's balance sheet, but the monetary base falls.

economic downturn. The nation's reported deficits also increased when it was discovered that the Greek government had engaged in some creative accounting that resulted in grossly underreported expenditures. Shut out of the private international capital markets and strongly in need of bailout funds, Greece was forced to cut government spending and raise taxes. *Fiscal consolidation* was the term used to describe this dynamic-duo of contractionary policies, which was supposed to bring the nation's budget into closer balance. Unfortunately, fiscal consolidation caused reductions in Greece's real GDP and increases in its unemployment rate that were worse than expected.

Blanchard and Leigh conjectured that forecasters assumed Greece's fiscal multiplier was approximately 0.5, which means a €10 billion reduction in government spending should have reduced aggregate demand by about €5 billion during the subsequent two-to-three-year period. Such a reduction would have raised Greece's unemployment rate marginally but should not have sent it into the stratosphere. By contrast, if the actual multiplier was between 1.0 and 1.5, then the same €10 billion reduction in government spending would have reduced aggregate demand by €10 billion to €15 billion, causing unemployment to increase considerably more than expected.

One of the most important messages from this IMF monograph is that fiscal multipliers vary with time and economic conditions. For economic conditions, they rise when (1) interest rates are at near-zero levels, (2) a nation's economic and financial systems are malfunctioning, and (3) an economy has considerable excess capacity. All of these conditions were present in Greece, which is why its fiscal multiplier was higher than forecasters predicted. Other European nations, such as Spain and Portugal, were also struggling with recession-induced budget deficits, but demands by private creditors, European Monetary Union (EMU) nations, and the IMF to employ contractionary fiscal policies were more moderate for these countries. Might the reason be traced to Greece's experience with fiscal consolidation and its misestimated fiscal multiplier?[12]

Structural Versus Cyclical Deficits and Surpluses

How would you answer this question? "Are fiscal deficits expansionary?" You might be thinking, "How can a budget deficit be anything but expansionary? If

12 Howard Schneider, "An Amazing Mea Culpa from the IMF's Chief Economist on Austerity," *The Washington Post,* January 3, 2013, https://www.washingtonpost.com/news/wonk/wp/2013/01/03/an-amazing-mea-culpa-from-the-imfs-chief-economist-on-austerity/?utm_term=.72ed11d13e91 (accessed September 3, 2019).

a government spends more than it earns in taxes, doesn't the net effect on aggregate demand need to be positive, which is expansionary?" Let's take a closer look and see why the answer is not apparent.

Determining whether a government budget deficit is expansionary, contractionary, or neutral is relatively easy to do once the *actual* deficit is separated into its structural and cyclical components. The actual deficit is measured at the current level of GDP. The *structural* deficit (also called the *full-employment* deficit or *active* deficit) is measured at full employment, and the cyclical deficit is the difference between the two.

Calculating the structural deficit can be done in four steps.

1. Calculate what GDP would be if the nation were at full employment
2. Determine how much the government would earn in tax revenues at the full employment GDP
3. Determine how much government spending and government transfers would be at full employment
4. Subtract from government tax revenues the sum of government spending plus government transfers

A negative number means the structural budget is in deficit, and fiscal policies are expansionary. A positive result means the structural budget is in surplus, and fiscal policies are contractionary. A zero structural budget means fiscal policies are neutral.

Cyclical deficits (also called *passive* deficits) are caused by the automatic stabilizers. As a nation's GDP falls and unemployment rises, tax revenues decrease and transfer payments increase. Therefore, a cyclical budget deficit rises as a nation enters into a recession. Cyclical budget deficits are caused by the automatic stabilizers, which prevent nations from moving further into recessions, but they do nothing to push their economies forward. Similarly, as countries expand, cyclical deficits fall because government tax revenues automatically rise and transfer payments automatically fall. The reduction in cyclical deficits help prevent overheating, but they do nothing to move the country into a recession.

The following three examples might help clarify the differences among actual, structural, and cyclical deficits and the reason structural deficits show whether a nation's fiscal policies are expansionary, contractionary, or neutral.

Current Budget Deficit with a Structural Balanced Budget

Figure 13.15 shows a government that is running an actual budget deficit equal to $72 billion. To determine if its fiscal policies are expansionary, contractionary, or neutral we must determine what the budget would at full employment

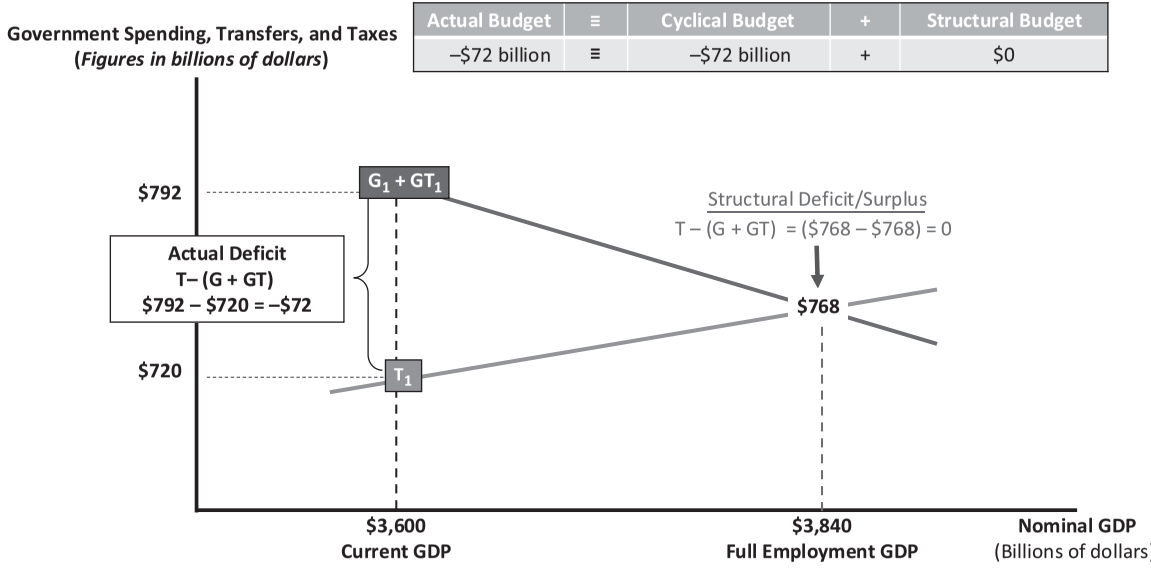

Figure 13.15: Neutral Fiscal Policy: Structural Deficit = 0.

because only there is the cyclical deficit component of the actual deficit removed. Remember that the actual deficit has a cyclical component, and this cyclical component only prevents a nation from sinking further into recession. It does nothing to move a country's economy forward. At full employment, GDP equals $3,840 billion and, at the rate, both government tax revenues and the sum of government spending plus transfer payments equal $768 billion. As a result, the structural budget at full employment is in balance (i.e., equal to zero). Therefore, we can conclude that this government's fiscal policies are neutral. The entire actual deficit has only a cyclical component, caused by the automatic stabilizers, which are not expansionary.

Current Budget Deficit with a Structural Budget Deficit

Only by discretionarily increasing government spending or reducing taxes in Figure 13.15 could the government run a structural budget deficit and fiscal policy become expansionary. Figure 13.16 shows the case where government spending is increased by $10 billion, and taxes are reduced by $20 billion. As a result, the *structural* deficit (i.e., the deficit at full employment) rises from $0 to $30 billion, indicating that fiscal policy is expansionary. At the same time, the current deficit (i.e., at $3,600 billion) rises from $72 billion to $102 billion.

Current Budget Deficit with a Structural Budget Surplus

The previous two examples explained how a nation could have a budget deficit at the current level of GDP and either a balanced budget or budget deficit at the full-employment level of GDP. Figure 13.17 rounds out this discussion by showing the paradoxical case where a nation runs a budget deficit at the current level of GDP but has a surplus at full employment, indicating that fiscal policy is actually contractionary.

As before, suppose the current nominal GDP equals $3,600 billion and fiscal deficit is $72 billion, but this time assume that if the economy were at full employment, changes in government tax revenues and government transfer payments would be enough to create a structural surplus equal to $24 billion. Therefore, fiscal policy appears to be expansionary because the current deficit is $72 billion, but in fact it is contractionary because there the structural budget is in surplus. The reason for this illusion is that the cyclical deficit is equal to $96 billion.

How to Estimate Structural and Cyclical Deficits

There is a simple way to separate a nation's current deficit into its structural and cyclical components. Imagine the following scenario: Suppose a country is

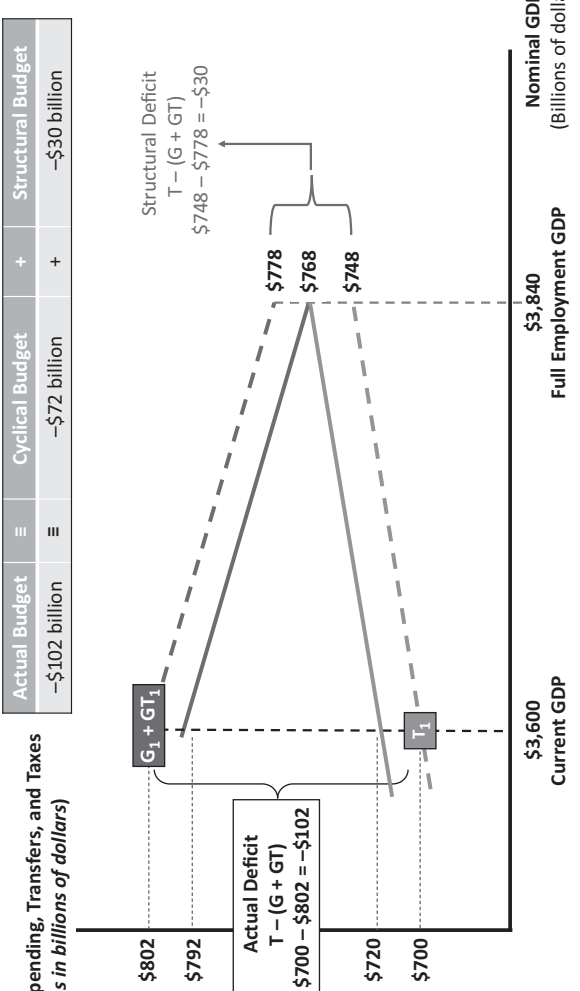

Figure 13.16: Expansionary Fiscal Policy: Structural Deficit = $30 Billion.

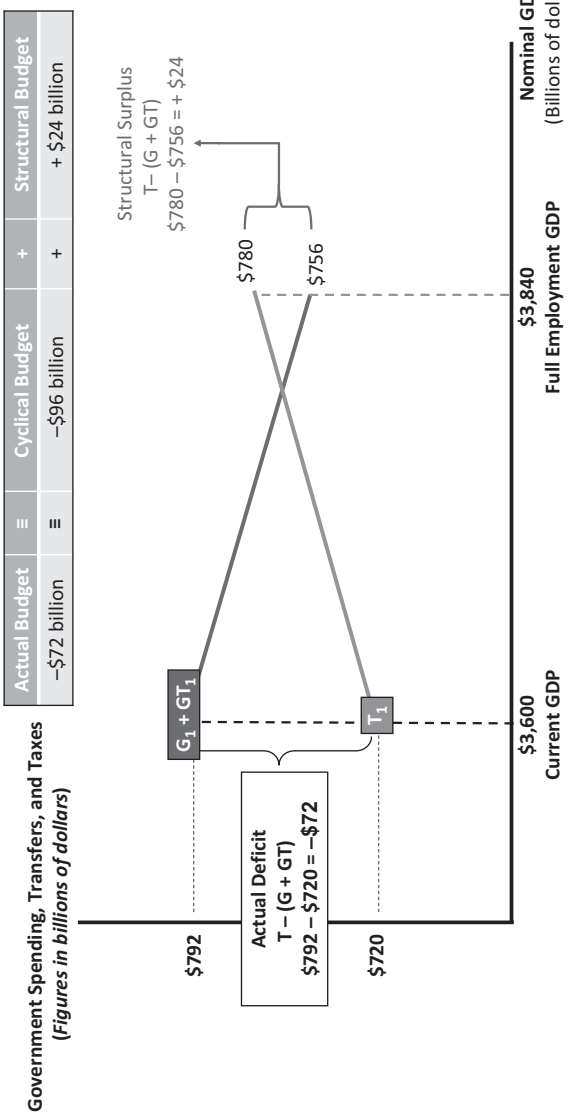

Figure 13.17: Contractionary Fiscal Policy: Structural Deficit < 0 (i.e., Structural Surplus).

in a recession. Unemployment is 10%, which is above the government's 4% goal, and GDP equals $3,600 billion. Due to sluggish economic activity, many people expect the government to stimulate the economy by either reducing taxes or increasing government spending, but conservatives argue that the current deficit of $72 billion is already providing enough stimulus.

Suppose further that:

- There are 100 million people in the labor force, which means 10 million people are unemployed;[13]
- The average tax rate (TX%) is 20%, which means tax revenues (TXR) equal $720 billion;[14]
- Government spending for social welfare programs changes inversely by 10% for every dollar change in nominal GDP; and finally
- The current level of government spending plus transfer payments is $792 billion.

Table 13.2 provides a summary of this information. Due to the recession, the government's current $72 billion deficit is a combination of a structural deficit or

Table 13.2: Assumptions for Calculating the Structural and Cyclical Deficits.

Current	
Nominal GDP	$3,600 billion
Labor Force	100 million people
Unemployment Rate	10%
Number employed = 10% × 100 million people Average Tax Rate Tax Revenues (TXR) = (20% × $3,600 billion)	10 million people 20% $720 billion
Government Spending (G) + Government Transfers (GT)	$792 billion
Budget Deficit [TXR – (G + GT)] at $3,600	–$72 billion
ΔGT/ΔGDP	–10%
Full Employment Rate	4%

13 Number of unemployed ≡ Unemployment rate × labor force = 10% × 100 million = 10 million.
14 TXR = TX% × GDP = 20% × $3,600 billion = $720 billion.

surplus and a cyclical deficit,[15] but how much of it is structural and how much is cyclical?

To determine whether fiscal policy is expansionary or contractionary, we must eliminate the cyclical part. This can be done by calculating what the government's budget would be if the nation were at full employment, because at full employment the cyclical deficit equals zero.

Our task can be accomplished in four easy steps.

Step 1: How many more people would be employed if the nation were at full employment?

If 10% of the labor force is currently unemployed, then there are 10 million unemployed individuals. At full employment, only 4% of the workforce (i.e., 4 million people) would be unemployed. Therefore, 6 million more people would be working at full employment.

Step 2: How much more GDP would be produced at full employment?

If nominal GDP is $3,600 billion, and 90 million people are working, then the average per capita GDP is equal to $40,000.[16] Employing 6 million more people, each producing $40,000 worth of goods and services, would increase GDP by $240 billion.[17]

Step 3: What are the automatic changes in GT and TXR if the nation was at full employment?

An increase in nominal GDP by $240 billion would increase tax revenue by $48 billion[18] and reduce government transfers by $24 billion.[19] Together, these two automatic stabilizers sum to $72 billion, which is the entire deficit at the $3,600 billion GDP level. Therefore, the structural deficit equals zero and cyclical deficit equals $72 billion.

15 Because the nation is in a recession, it could not have a passive surplus. A passive surplus occurs only if the economy is above full employment.

16 $3,600 billion nominal GDP/90 million workers = $40,000/worker.

17 $40,000 per person × 6 million newly employed people = $240 billion.

18 $\Delta TXR = 20\% \times \$240$ billion = $48 billion.

19 $\Delta GT = -10\% \times \$240$ billion = −$24 billion.

Step 4: Interpret the results

With a structural deficit equal to zero, fiscal policy is neutral. Therefore, it would be an illusion to believe that the current deficit of $72 billion is evidence of expansionary fiscal policies.

Crowding-Out: When Is It Complete, Nonexistent, or Partial?

Figure 13.18 shows that, for any increase in government borrowing, the amount of crowding-out depends on the shape of the supply and demand curves in the real credit market.[20] Let's focus on supply. In Frame 1 (upper left corner), the supply of real credit is perfectly elastic (i.e., supply is horizontal), which means any change in demand has no effect on the real interest rate but has a substantial impact on the equilibrium quantity per period.[21] In Frame 2 (upper right corner), the supply is perfectly inelastic (i.e., supply is vertical), which means any change in demand has no effect on the equilibrium quantity of funds supplied and demanded per

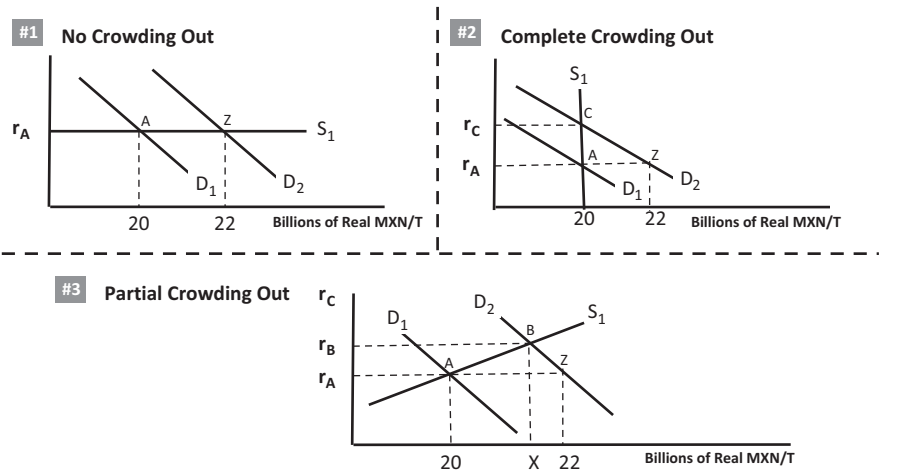

Figure 13.18: Three Possible Crowding-Out Scenarios.

20 More accurately, it depends on the supply and demand interest elasticities.

21 The elasticity of supply for real credit is defined as (%Δ real credit/%Δ real interest rate). If the supply is perfectly elastic, then the elasticity ratio equals infinity, which means any small change in the real interest rate causes an infinite change in the quantity of real credit supplied per period.

period but has a substantial impact on the real interest rate.[22] Finally, in Frame 3 (bottom), the supply is upward sloping, which means the elasticity is somewhere between perfectly inelastic (i.e., zero) and perfectly elastic (i.e., infinity).

Let's assume the Mexican government increases its borrowing and spending by MXN 2 billion (i.e., two billion Mexican pesos). In Frames 1, 2, and 3, the increase in demand by MXN 2 billion is shown as a rightward shift from D_1 to D_2. Given this increase, let's analyze the crowding-out effect in each of the three cases.

Perfectly Elastic Supply of Real Credit (Frame 1)

When the supply of real credit is perfectly elastic (Figure 13.18, Frame 1), changes in the demand for real credit do not affect the nation's real interest rate. As a result, an increase in the government's demand for real credit by MXN 2 billion (i.e., from D_1 to D_2) increases the equilibrium quantity of real peso credit supplied and demanded by the full MXN 2 billion (i.e., from MXN 20 billion to MXN 22 billion). In this case, there is *no* crowding-out because the real interest rate does not rise.

This book treats a perfectly elastic supply of real credit as an exception rather than the rule. One way it might occur was if a nation is in the liquidity trap, for example, after large scale quantitative easing. With enormous amounts of excess liquidity in the banking system, a government could increase borrowing without raising interest rates. A second way is if domestic and foreign sources of credit responded massively to any change in the real interest rate, and there were no impediments to national and global capital flows. Under these circumstances, flows would ensure that the real interest rate remained constant.

Perfectly Inelastic Supply of Real Credit (Frame 2)

With a perfectly inelastic supply, changes in the demand for real credit do not affect the equilibrium quantity because the real interest rate adjusts to nullify any *net* change in the quantity of credit demanded. In Figure 13.18, Frame 2, an increase in the Mexican government's demand for real credit by MXN 2 billion creates an excess demand for funds at r_A equal to MXN 2 billion (i.e., the distance A to Z) because the amount of real credit supplied equals MXN 20 billion and the amount demanded equals MXN 22 billion. As a result, the real interest

22 If the supply is perfectly *in*elastic, then the elasticity ratio equals zero, which means that any change (large or small) in the real interest rate causes no change in the quantity of real credit supplied per period.

rate rises from r_A to r_C, causing real private borrowing by individuals and businesses to fall. At the new equilibrium (i.e., Point C), no additional funds are supplied or demanded in the real credit market. *Complete* crowding-out occurs because the rising real interest rate causes private borrowing to fall by the full amount of government spending increases (i.e., by MXN 2 billion).

This book treats a perfectly inelastic real credit supply as an exception rather than the rule. Perfect inelasticity means that changes in the real interest rate provide no incentive for market participants to adjust the net quantity of real credit they supply to the market.

Upward-Sloping Supply of Real Credit (Frame 3)

Figure 13.18, Frame 3, is the base case for all analyses in this text. When the real credit supply curve is upward sloping, the supply elasticity is between zero and infinity. Therefore, changes in the demand for real credit cause movements of both the real interest rate and equilibrium amount of real credit per period. In Frame 3, the increase in demand by MXN 2 billion (i.e., from D_1 to D_2) causes an excess demand for funds. At r_A, the new quantity demanded equals MXN 22 billion, but the quantity supplied equals only MXN 20 billion. This excess demand raises the real interest rate, which increases the amount of real credit supplied and reduces the amount of real credit demanded (i.e., crowding out private borrowers) until the equilibrium quantity is reached at a point between MXN20 billion and MXN 22 billion (i.e., the point labeled "X" in Figure 13.18).

The private sector bears the brunt of increases in a nation's real interest rate. As it rises, businesses' cost of real credit increases, and consumer budgets are pinched. Consequently, borderline business projects, such as purchases of new machinery and plant modernization, as well as nonessential consumer purchases, such as vacations, dishwashers, renovations, and new cars, are postponed or canceled.

The reason crowding-out is not complete is that new funds are supplied to the real credit market as the real interest rate rises. Notice that an increase in the real interest rate from r_A to r_B causes the amount of real credit supplied to rise from MXN 20 billion to MXN X billion in Figure 13.18. As a result, the government can borrow the MXN 2 billion it needs without taking them away, dollar-for-dollar, from the private sector. In the end, the real interest rate rises from r_A to r_B, but r_B is less than r_C (in Frame 2), where complete crowding-out would occur.

Conclusion

This chapter discussed fiscal policies and the effects they have on economic activity. For managers, fiscal policies can have significant impacts on key economic variables that affect profitability, cash flows, and planning.

Discretionary fiscal policies require the government to pass or authorize new legislation or to change existing legislation, which is why they are exogenous shocks to the real goods and services market. By contrast, nondiscretionary fiscal policies, which are also called *automatic stabilizers*, are endogenous because they are activated passively as a nation's economic conditions change. They can be considered secondary effects. Automatic stabilizers dampen fluctuations in business cycles. The automatic stabilizers are not independent sources of economic expansion or contraction.

The fiscal multiplier amplifies the economic effects of fiscal policies, but this multiplier can be weakened by feedback and spillover effects from the real goods and services, real credit, and foreign exchange markets.

Fiscal policies that are independent from the central bank do not affect a nation's monetary base. We know this because a nation's monetary base changes only when a central bank (above the line) increases or decreases the size of its balance sheet due to transactions with non-central bank counterparties (below the line).

Perspective is needed to evaluate the size of a government's debt properly. This perspective can be gained by adjusting the gross nominal debt for a nation's price changes and population size, as well as comparing it to gross domestic product. It is also useful to know whether national equity is growing and how wisely the government is spending its tax revenue and borrowed funds. Identifying how much a government spends on investment goods is also crucial because investments should provide sources of funds to repay the debts. For this reason, government debts do not necessarily burden future generations. When these debts increase a nation's productive capability, future generations can be the beneficiaries of past generations' debts.

Government deficits can be separated into structural and cyclical components. The cyclical part is caused by the automatic stabilizers, and the structural portion is measured at full employment, which is why it is often called the "full employment" deficit or surplus. A structural deficit means fiscal policy is expansionary, causing an increase in aggregate demand. A structural surplus means fiscal policy is contractionary, causing a decrease in aggregate demand.

Key Points

- Fiscal policy
  - Fiscal policy is the use of discretionary government spending and taxes to achieve macroeconomic, political, or social goals.
  - Fiscal policy is the responsibility of the government and monetary policy is the responsibility of the central bank.
- Government transfers are purely financial transactions. Therefore, they are not directly part of government spending (G) or GDP. Instead, they are classified as consumption when households spend them.
- Many governments have surprisingly little control over the bulk of their annual expenditures because much of it is committed from previous years.
- Deficits, surpluses, and debt
  - Deficits and surpluses are flow variables, and debt is a stock variable.
  - Typically, governments finance their budget deficits by borrowing.
  - Governments borrow by issuing bills, notes, and bonds.
  - Government borrowing increases the demand for real credit, which can increase the real interest rate.
- Automatic stabilizers
  - Government tax revenues and transfer payments are automatic stabilizers because they reduced economic volatility during business cycles.
  - Automatic stabilizers only restrain movements of GDP. They are not independent sources of expansion or contraction.
- Fiscal multiplier
  - The fiscal multiplier amplifies a discretionary change in government spending or taxation.
  - Automatic changes in tax revenue, government transfers, and imports are among the dominant forces in the real goods and services market that weaken the fiscal multiplier.
  - The fiscal multiplier is also weakened if a deficit increases the real interest rate, causing consumption and investment to fall, or raises the international value of a nation's currency, causing a decrease in net exports.
- Crowding-out
  - Crowding-out occurs when government borrowing raises the real interest rate and reduces private borrowing.
  - As long as the supply of real credit is upward sloping, crowding-out will not completely erase the effects of expansionary fiscal policy.
- Lags in fiscal policies
  - Fiscal policies have recognition, implementation, and impact lags.
- Tax payments, government expenditures, and government borrowing do not affect a nation's monetary base because these transactions are all below the line.
- Government debt
  - Real per capita government debt is a better measure than gross nominal debt.
  - Debt-to-GDP ratios also help put government debt into perspective.
  - Changes in a nation's equity are better measures of economic health than changes in the government's debt.

  - Governments and companies are "going concerns" (i.e., currently operating, with the full intention of continuing indefinitely). Therefore, they do not have lifetimes at the end of which they need to repay all their debts.
  - Government debt is not a burden on future generations if the spending is for investments that generate benefits that pay for themselves.
  - Governments can default if they borrow foreign currencies and cannot earn enough foreign exchange revenues to service these debts.
- Structural versus cyclical deficits and surpluses
  - Cyclical deficits are caused by the automatic stabilizers.
  - Structural deficits or surpluses are also called full-employment deficits or surpluses.
  - Structural deficits or surpluses are measured at full employment. They determine whether fiscal policy is expansionary, contractionary, or neutral.
  - Structural deficits are expansionary, structural surpluses are contractionary, and balanced structural budgets are neutral.

Review Questions

1. What is fiscal policy?
2. What is a government budget deficit?
3. Read the following sentence and explain whether the economic logic is correct or incorrect: "If Iceland's government reduces its discretionary spending to balance the budget, then the nation's aggregate demand falls, causing the price index and real GDP to fall. But the reduction in prices causes the nation's aggregate supply to fall, thereby changing prices to a level that could be lower than, equal to, or higher than the original level."
4. Since 2010, Greece has received several bailouts from other European nations and the International Monetary Fund (IMF) in the form of loans with very low interest rates. As a condition for that financial assistance, the IMF, European Central Bank, and the European Commission have demanded that the Greek government impose harsh government austerity measures, such as cuts in government spending and social welfare programs and increases in tax rates. The objective of those measures has been to reduce Greece's budget deficit.
   a. What effect should those austerity measures have had on Greece's real GDP?
   b. If Greece cuts government spending by 10 billion euros (€10 billion), does its budget deficit fall by more or by less than €10 billion?
5. What are "automatic stabilizers"? What effect do they have on the economy? What do they *automatically* stabilize, and how do they *automatically* do it?
6. In 2020, the U.S. federal government's total public debt exceeded $22 trillion, and it was expected to grow much larger during the coming decade.
   a. Many people were (and are) concerned that the government could default on its loans, and the economy could face severe economic consequences. Under what conditions can a government default?
   b. Is the U.S. government's debt a burden on future generations?
   c. Does the U.S. government eventually have to pay off its debt?

7. Explain how it is possible for a federal government's actual budget deficit to grow at the same time that it is discretionarily cutting government spending and raising tax rates.
8. Suppose India pursued a contractionary fiscal policy by raising income tax rates.
   a. How, if at all, will the macroeconomic effects of this policy change the budget deficit/surplus of India? Explain.
   b. Would this policy affect India's monetary base?
   c. Will this policy crowd out private spending?
   d. How will this policy affect India's aggregate supply and aggregate demand curves?
   e. As a businessperson in India, suppose you anticipated the change in fiscal policy. Should you borrow before the policy was implemented or wait until after it changed? Consider only the direct impacts on the credit market.
9. Suppose the Malaysian government's debt increased at a precipitous rate.
   a. Explain the effect that the annual deficits that caused the increase would have on the nation's monetary base and M2 money supply.
   b. Explain these deficits' effects on the real interest rate and nominal interest rate.
   c. Suppose the Malaysian government wanted to pursue expansionary fiscal policy. Explain why separating the structural and cyclical deficits would be important to policymakers.
10. Explain whether you agree or disagree with the following statements:
   a. "Ask any economist, and you will find that excessive government budget deficits are one of the principal causes of a nation's excessive money supply growth."
   b. "Ask any economist, and you will find that, for nations below full employment, budget deficits are sure signs that the government is increasing demand, stimulating economic activity, raising the inflation rate, and moving the economy closer to full employment."
11. Taking into account the crowding out effect, can an increase in government spending have an overall negative effect on the country's aggregate demand? In other words, is it possible for the fiscal multiplier to be negative?
12. Explain the effect that budget surpluses have on a nation's monetary base when they are used to retire a portion of the government's outstanding debt.
13. Suppose Colombia's fiscal deficit was 5% of GDP, and the Colombian economy was growing below capacity. Can we say that Colombia's entire 5% fiscal deficit was increasing aggregate demand and helping the economy grow? Explain.

Discussion Questions

14. Suppose the Chinese government reduced substantially its budget deficit in order to slow the high rate of domestic growth and rising inflation rate. Would the government's policy be more effective if China's investment demand (i.e., demand for gross private domestic investment) was elastic or inelastic with respect to the real interest rate? In your answer, be sure to define what an "elastic" and "inelastic" investment demand means.
15. The strong Swiss franc has caused the Swiss economy to grow at a sluggish rate. Suppose the Swiss government decides to stimulate the domestic economy by spending CHF 50 billion on infrastructure projects, such as bridges, railroad tracks, and

communications. To finance these expenditures, the Swiss government intends to borrow in the domestic capital markets. Use the real credit market and real goods and services market to explain the effects this increase in government spending and borrowing is likely to have on the Swiss economy.

16. Suppose France increases personal income taxes on French residents. Use the real credit market and real goods and services market to explain the effects this policy is likely to have on the French economy.

Chapter 14
Business Cycles

What are business cycles, and why are they important to business managers? What causes them, and who determines when recessions or expansions start and end? After centuries of fluctuating economic activity, have nations gotten better at controlling or predicting business cycles, or are they as frequent, extreme, and fickle as ever?

The Basics

What Are Business Cycles?

Business cycles are *recurring*, *irregular*, and *unsystematic* movements in *real economic activity* around a long-term trend. They are recurring because downturns and upturns in real economic activity have occurred for as far back as history is written, and these cycles will surely continue in the future. Unlike the smooth and symmetric patterns of sound or light waves, business cycles are irregular and appear as jagged, uneven movements around a long-term trend. Business cycles are also unsystematic, which means they are random and difficult (some believe impossible) to predict. A considerable amount of time and effort has been devoted to predicting business cycles. Unfortunately, most of these predictions have been highly inaccurate.

How Are Business Cycles Measured?

Figure 14.1 shows a hypothetical business cycle. A recession occurs when there is a significant contraction in economic activity, which is spread broadly across the economy and lasts for more than a few months. The duration of a recession is from the peak of the business cycle to the trough (i.e., low point).

An expansion is precisely the opposite. It occurs when broad-based economic activity improves significantly and is sustained for more than a few months. The duration of an expansion is from the cycle's trough to its peak. The entire business cycle can be measured from one peak to the next peak, or it can be measured from one trough to the next. In Figure 14.1, the business cycle is measured from peak to peak.

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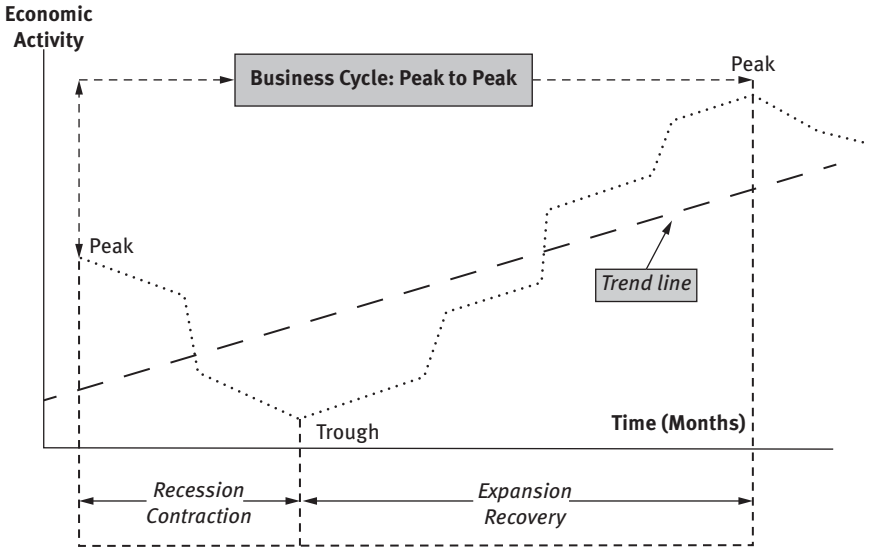

Figure 14.1: Recessions and Expansions During the Business Cycle.

To identify the phases of a business cycle, a nation needs to measure its *real economic activity*, but how is this done? Often, real GDP is used as a proxy. An increase in real GDP means that production is rising, which usually increases employment and improves economic conditions. Declining real GDP implies that the opposite is happening.

The association between real GDP and the business cycle is so strong that the media and many analysts commonly define a recession as a decline in real GDP for at least two consecutive quarters. Even though this definition appeals to common sense, it is only a practical guideline (i.e., unofficial shortcut) and not the way recessions and expansions are *officially* measured or dated.[1]

1 To prove that the two-consecutive-quarters rule is a shortcut or approximation (and not an official rule) for defining recessions, we only need to look at historical records. From 1947 to 2019, the United States suffered 12 recessions. In 10 of them, real GDP fell for at least two consecutive quarters, but two *official* recessions (i.e., from April 1960 to February 1961 and from March 2001 to November 2001) occurred without real GDP falling for two consecutive quarters. There was one downturn in economic activity (from January to July 1947) during which real GDP fell for two consecutive quarters without triggering an *official* recession. To understand who officially dates U.S. recessions, see "Who Measures U.S. Business Cycles?" in *The Rest of the Story* section of this chapter.

Real GDP is just one of several macroeconomic variables used to describe the level of and changes in real economic activity. The problem with real GDP is that it is reported only quarterly, and when it is, initial estimates are often inaccurate, due to incomplete information and revisions of submitted information. The differences between initial GDP estimates and the final reported statistics can be quite large. For these reasons, other economic variables are used, in combination, to measure and date business cycles. These complementary variables provide a fuller reflection of real economic activity and are timelier, with initial estimates that are more accurate than real GDP (more about this later).

What Causes Business Cycles?

There is no single cause of a business cycle. The stimulus could come from the demand or supply side. Furthermore, random shocks that set a nation's economy into a tailspin or that ignite a recovery could be domestic-based or foreign-based, and they could originate in the real, financial, political, or social sectors. Examples of real sector stimuli are natural disasters, drastic increases in the prices of essential resources (e.g., oil), and the worsening of business and consumer expectations. On the financial side, a downward spiral could be set off by the collapse of a banking system, a burst housing bubble, speculative international capital flows, or hyperinflation. The political and social causes of recessions could be escalating social unrest (e.g., riots, terrorism, worker strikes, civil wars, ethnic-, cultural-, or religious turmoil, political instability, corruption, massive bureaucratic failures, or deterioration in the perceived fairness of the political process.

If these shocks were anticipated and could be planned for, then dramatic changes in economic activity might not occur. Problems arise when they come as complete surprises, catching businesses, governments, and consumers unaware. Production and spending patterns adjust as the economy reacts to unexpected jolts, and these adjustments work their way through the markets, causing cumulative changes in economic activity that are larger than the initial shock.

Why Are Business Cycles Important to Managers?

The cash flows of companies whose sales or costs are tied closely to the business cycle are typically more volatile than those that are not. The more volatile

a company's cash flows, the higher its credit risk (i.e., default risk), and as credit risk rises, so do borrowing costs (i.e., cost of real credit).

Cash flows are tied directly to companies' top-line growth (i.e., revenues) and costs. The more sensitive these cash flows are to economic fluctuations, the more critical it is to have an awareness and ability to react quickly to changing business conditions. For example, the durable goods, tourism, and entertainment industries face highly cyclical activity because their sales are postponable during recessions and then recover during expansions.

Procyclical and Countercyclical Variables

Virtually any capital budgeting analysis depends on macroeconomic assumptions about future changes in GDP growth, interest rates, production costs, and exchange rates. Table 14.1 shows the relationship between many important macroeconomic variables and the business cycle. These relationships are as important to someone analyzing a capital budgeting project as they are to analysts required to evaluate and make reasoned public policy decisions based on them.

Procyclical variables, such as consumption, *planned* investment, prices, wages, and short-term nominal interest rates, move in the same direction as the business cycle. Therefore, if an economy is expanding, these variables rise; if it is receding, they fall. Countercyclical variables move in the opposite direction from the business cycle. For instance, increasing economic activity causes unemployment, bankruptcies, and government transfer payments (e.g., for social welfare programs) to fall.[2]

Can Businesses Predict Business Cycles?

How wonderful it would be if there were an accurate and reliable way to forecast major turning points in economic activity. Unfortunately, business cycles are difficult to predict because changes in economic activity can be caused by a vast range and combination of economic variables. For instance, a recession might be triggered by a single shock (e.g., a dramatic increase in oil prices),

2 Chapter 13, "Fiscal Policy" explained how automatic changes in government transfer payments, which are caused by movements in macroeconomic activity, are examples of *automatic stabilizers*. As an economy expands, social welfare needs (e.g., due to a lower unemployment rate) decline, causing government transfer payments to fall. During an economic downturn, just the opposite happens. Unemployment rises, causing government transfer payments for social welfare benefits to increase automatically.

Table 14.1: Procyclical and Countercyclical Macroeconomic Variables.

Market Affected	Procyclical	Countercyclical
Real Goods and Services Market	Consumers – Consumption	

	Businesses
	– Investments in:
	  – Plant and equipment
	  – Machinery and tools
	  – Construction
	  – Planned inventories
	– Capacity utilization
		Businesses
		– Bankruptcies
		– Unplanned inventories

	Governments – Tax revenues	Governments – Transfer payments
	Foreign Sector – Imports	
	Price Indexes – Consumer Price Index – GDP Price Index – Producer Price Index	Labor Market – Unemployment rate
	Labor Market – Employment-to-population ratio – Labor productivity – Real wages	
Real Credit Market	Monetary Aggregates – Money multiplier – Money supply	
	Credit – Short-term nominal Interest rates	

multiple independent shocks (e.g., crop failures and political upheaval), or a string of interconnected and self-perpetuating shocks (e.g., capital flight followed by exchange rate problems, which lead to protectionist legislation). Determining exactly where the next bolt of positive or negative economic energy will come from is not an easy task. The possibility of economic activity

changing due to multiple combinations of factors dramatically increases the chances of faulty forecasts.

Predicting future economic activity, especially turning points,[3] is also problematic because forecasts are usually extrapolations of historical trends, or they are based on historic interrelationships. For the past to predict the future, these historical trends and interrelationships must repeat themselves in pattern and intensity, and this is not always the case.

Many companies and individuals earn healthy livings selling business cycle forecasts. It is easy to see why significant sums would be paid for them if they were accurate. Companies would be willing to pay dearly to know when a nation will slide into its next recession, how long it will stay there, and when it will recover. Often hundreds of millions of dollars, euros, pesos, yen, or yuan are on the line when companies plan to build, borrow, or hire. Accurate business cycle information could make a significant difference in the profitability of any capital budgeting project or medium-term business plan.

Predicting Business Cycles Using Leading Economic Indicators

One popular way to forecast business cycle movements is by using a nation's index of leading economic indicators. The economic variables included in this index are chosen based on their proven economic significance, reliability, consistency, timeliness, and conformity to past business cycles. In other words, they are not selected because economic theory indicates that they should be important but rather because of their past effectiveness at predicting cycles.[4]

The Leading Economic Indicator Index is considered by many to be an economic crystal ball that allows them to see into the future. It is closely watched, published monthly, and reported in many nations.

3 A *turning point* is the date at which expanding economic activity changes to a downturn or when a recession changes to an expansion.

4 See *The Rest of the Story* section entitled "U.S. Index of Leading Economic Indicators" for a review of the indicators that have best predicted U.S. business cycles.

The Rest of the Story

U.S. Business Cycles

Who Measures U.S. Business Cycles?

In the United States, the National Bureau of Economic Research (NBER), a private organization, is responsible for measuring and dating business cycles.[5] The four macroeconomic variables used by the NBER for doing so are the *employment-to-population ratio*, *real personal income*, *volume of sales of the manufacturing and trade sectors*, and *industrial production*. The NBER chose these four economic indicators over many others because they are reported monthly and are economically significant, reliable, consistent, and accurate. Notice that real GDP is not on this list.

U.S. Index of Leading Economic Indicators

In the United States, the Leading Economic Indicator Index is published monthly by the U.S. Conference Board.[6] Table 14.2 shows the 10 indicators included in this index and provides a brief explanation for why they are included. As you read these descriptions, see if the link between each indicator and future economic activity seems logical and appeals to your common sense. Take, for example, building permits for new private housing units (#6 on the list). Before a home is constructed, the builder needs a permit. If permits rise now, it is a good sign that construction jobs will increase in the future.

Despite the care that has gone into constructing the U.S. Leading Economic Indicator Index, its track record of predicting future economic activity is mixed. There have been many times when the index provided valuable, early warnings of impending economic changes, but lead times have averaged between six and nine months, and these lead times have fluctuated rather widely. Moreover, this index has provided plenty of false signals. Like the boy in Aesop's fable who cried wolf too often, the index has warned of recessions that never occurred.[7]

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5 For further information, visit the NBER Web site at www.nber.org/ (accessed September 4, 2019).

6 The Conference Board is a nonprofit institution that creates and disseminates knowledge about management and the marketplace.

7 Analysts use different filters with the leading economic indicators to predict recessions and expansions, such as three consecutive quarters' decline in the leading economic indicators for recessions that are six to nine months away. Others believe that a 1% decline in the index and reductions in at least half the indicators portend a recession.

Table 14.2: U.S. Leading Economic Indicators.

	Indicator	Explanation
1	Average weekly hours, manufacturing	Employers usually adjust work hours before hiring or firing employees.
2	Average weekly initial claims for unemployment insurance	Unemployment claims are generally sensitive to economic activity. This index is inverted, which means an increase in claims implies a worsening of the economy.
3	Manufacturers' new orders, consumer goods and materials	An increase in current new orders suggests greater production later. This inflation-adjusted series focuses on products purchased mainly by consumers.
4	ISM® New orders index	The Institute of Supply Management tracks new order volume for more than 300 U.S. manufacturers. An increase in this index implies rising real GDP and, often, an escalating inflation rate.
5	Manufacturers' new orders, nondefense capital goods excluding aircraft orders	An increase in current orders suggests greater production later. This inflation-adjusted index focuses on products purchased by producers.
6	Building permits, new private housing units	An increase in current building permits implies more construction and construction jobs in the future.
7	Stock prices, 500 common stocks	Higher stock prices imply that investors are bullish (i.e., optimistic) about future business prospects.
8	Leading Credit Index™	This non-price-oriented composite index replaced the money supply (M2) component of Leading Economic Indicator Index in 2012. The Leading Credit Index (LCI) was introduced by the Conference Board to measure financial market forces that most reliably point to economic turning points. It has six components: two of them measure credit quality and risk (i.e., two-year swap rate and three-month LIBOR vs. Treasury bill yield); another two measure the degree of financial market speculation (i.e., margin account balances at brokers/dealers and AAII Investor Sentiment Survey), and the final two components measure credit availability (i.e., Fed Senior Loan Officer Survey and security repurchase agreements).

Table 14.2 (continued)

	Indicator	Explanation
9	Interest rate spread, 10-year Treasury bonds less the federal funds rate	The difference between long-term and short-term interest rates is a reflection of a yield curve's steepness. The yield curve provides information about expected future interest rates.
10	Average consumer expectations for business conditions	This survey index is the only economic indicator that is based totally on expectations.

Source: The Conference Board, "Leading Economic Indicators and Related Composite Indexes," https://www.conference-board.org/data/bcicountry.cfm?cid=1 (accessed August 2, 2019).

Companies with new product, marketing, or investment strategies should keep these variable lead times and false signals firmly in mind—especially if a project's success depends heavily on an early rush of positive cash flows. In general, significant investment decisions should not be based solely on the Leading Economic Indicator Index. If they are, as much flexibility as possible should be built into their design and implementation.

U.S. Business Cycles from 1947 to 2019

Figure 14.2 shows movements in U.S. real GDP between 1947 and 2019. It provides visual confirmation that recessions in the United States have been recurring and irregular. During this 65-year period, output grew at an average rate of about 3%, while the population grew by only 1% per year. It was a period of rising living standards, but the road to prosperity for the United States had some bumpy stretches because the nation experienced 12 recessions.[8]

Are U.S. Business Cycles Short Term?

Business cycles are often characterized as *short-term* movements around a long-term trend, but this raises a definitional issue. From Figure 14.2, it is clear that they twisted around the long-term, upward movement in real GDP, but

8 Since 1857, the United States has experienced 33 recessions. National Bureau of Economic Research, "Business Cycle Expansions and Contractions," www.nber.org/cycles/cyclesmain.html (accessed September 4, 2019).

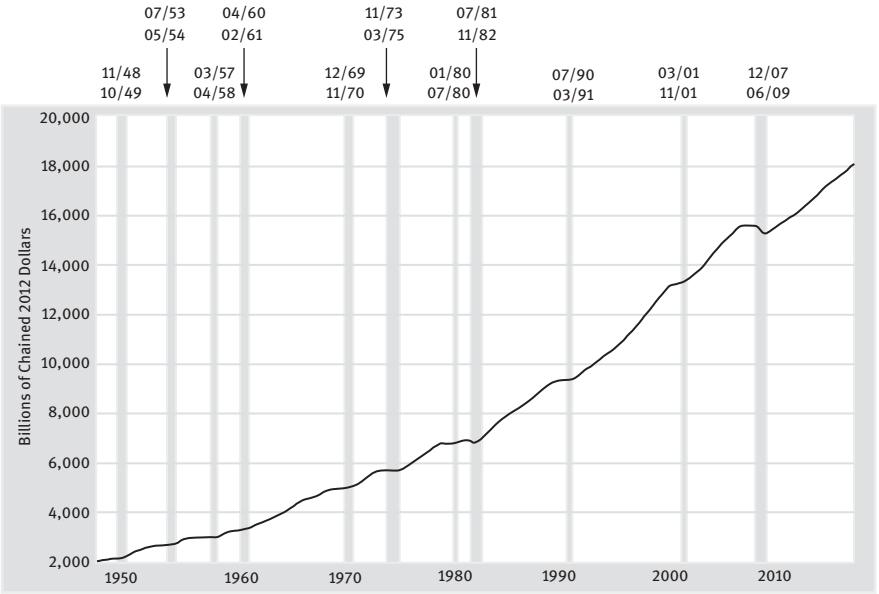

Figure 14.2: U.S. Real GDP (Billions of Dollars): 1947–2019*.
Note: Shaded areas represent U.S. recessions
Source: Federal Reserve Bank of St. Louis, Federal Reserve Economic Data, https://fred.stlouisfed.org/series/GDPC1 (accessed September 4, 2019).

from peak to peak (or from trough to trough), a business cycle can last a decade or more. For instance, between the end of World War II in 1945 and June 2009, which marked the end of the Great Recession, U.S. recessions have lasted, on average, less than a year, but the average expansion has lasted about five years.[9] As a result, the average U.S. business cycle has lasted almost six years. Is this really "short term"?

U.S. Business Cycles Before and After 1982

Table 14.3 shows the peak and trough dates for U.S. business cycles since 1945. Notice that nine of the 12 recessions occurred during the 37 years between 1945 and 1982, and only three occurred during the 27 years from 1982 to 2009.

9 Between 1945 and 2009, peak-to-trough recessions lasted an average of 11.1 months, and trough-to-peak expansions lasted 58.4 months. NBER, "Business Cycle Expansions and Contractions," www.nber.org/cycles/cyclesmain.html (accessed September 4, 2019).

Table 14.3: U.S. Business Cycle Expansions and Contractions: 1945–2019.

Peak	Trough	Contraction	Expansion	Cycle	
Quarterly dates are in parentheses		Peak to Trough	Previous Trough to This Peak	Trough from Previous Trough	Peak from Previous Peak
February 1945 (I)	October 1945 (IV)	8	80	88	93
November 1948 (IV)	October 1949 (IV)	11	37	48	45
July 1953 (II)	May 1954 (II)	10	45	55	56
August 1957 (III)	April 1958 (II)	8	39	47	49
April 1960 (II)	February 1961 (I)	10	24	34	32
December 1969 (IV)	November 1970 (IV)	11	106	117	116
November 1973 (IV)	March 1975 (I)	16	36	52	47
January 1980 (I)	July 1980 (III)	6	58	64	74
July 1981 (III)	November 1982 (IV)	16	12	28	18
July 1990 (III)	March 1991 (I)	8	92	100	108
March 2001 (I)	November 2001 (IV)	8	120	128	128
December 2007 (IV)	June 2009 (II)	18	73	91	81
Average		**11.1**	**58.4**	**69.5**	**68.5**

Source: National Bureau of Economic Research, "Business Cycle Expansions and Contractions," www.nber.org/cycles/cyclesmain.html (accessed September 4, 2019).

Have Nations Learned to Tame Their Business Cycles?

Until the U.S.'s Great Recession, which lasted from December 2007 to June 2009, many people wondered if fundamental changes in the U.S. and global economies

had reduced the likelihood, frequency, and amplitude of business cycles.[10] Many of these *fundamental changes* were thought to be the result of improvements in companies' operational flexibility as they converted fixed costs into variable costs. The implementation and use of just-in-time (JIT) inventory management has been just one example of how companies have been able to trim costs, increase flexibility, and gain efficiencies by reducing their inventory-to-sales ratios. Rather than keeping large inventories on hand, businesses relied more heavily on their suppliers to provide them on an "as-needed" basis.

Implementation of JIT inventory management systems has relied on high levels of communication and responsiveness between customers and suppliers, as well as technological advances in the areas of data warehousing and analysis. With fewer inventories to finance, nonoperating business costs have fallen, and profits have increased. In contrast to the pre-1982 period, when significant changes in businesses' inventories led most U.S. recessions, recessions in the 1982 to 2019 period were not inventory-led. Similarly, companies have increasingly made use of JIT-time labor pools, which is the term used to describe extended workweeks and the hiring of temporary and part-time workers, who earn less than a full menu of full-time benefits, such as health insurance, vacation time, sick days, and dental insurance.[11]

JIT inventory management has helped to stabilize investment demand and, thereby, dampen business cycle activity, but investment spending is not the only component of demand that has become more stable. The volatility of government spending and residential housing investment had also fallen. In addition, management of monetary aggregates and interest yields by the central banks has contributed to more steady demand.[12]

Concurrent with the trend, in most developed nations, toward greater demand stability has been a shift away from goods and toward services. Generally, the demand for services tends to be more stable than the demand for manufactured products. Therefore, the booming services industry may have been part of the reason for reduced business cycle fluctuations in the United States and other nations.

10 See, for instance, William C. Dudley and Edward F. McKelvey, *The Brave New Business Cycle: No Recession in Sight* (New York: U.S. Economic Research, Goldman Sachs, January 1997).

11 Of course, the social costs of this business trend toward using temporary workers have fallen on the backs of workers.

12 Robert J. Gordon, *What Caused the Decline in U.S. Business Cycle Volatility?* NBER Working Paper No. 11777, November 2005, http://www.nber.org/papers/w11777 (accessed September 4, 2019).

Another mitigating factor has been companies' extensive use of risk management tools, such as financial and real derivatives (e.g., forwards, futures, options, and swaps), as well as the development of quantitative risk measures, such as a value-at-risk analysis. The global explosion of derivatives markets allowed companies to partition their risks, hedge those they were unwilling or unable to bear, and keep those they decided to accept. Companies were empowered with the ability to transform their risk-return alternatives from what they had into something closer to what they wanted.[13] As a result, they became less sensitive to changes in many economic variables, such as commodity prices, interest rates, exchange rates, and credit risk.

Businesses have also been disciplined by an increasingly aggressive mergers and acquisitions environment around the world. Poorly run companies have become takeover targets, thereby threatening the jobs of ineffective managers. Successful companies seem to be in a continual process of restructuring, which means they no longer wait for recessions as an opportunity to prune dead wood. Consequently, when recessions occur, there is less need to lay off workers.

Trends toward globalization and financial deregulation may have dampened business cycle fluctuations. Financial deregulation has opened international financial flows among nations and promoted competition among financial intermediaries. It has also allowed interest rates and exchange rates to move more freely with the forces of supply and demand, rather than by central bank or government decree. As a result, global financial systems have become more efficient.

Finally, changes in international trade flows have also been significant. Companies source internationally and increasingly face foreign competitors. The diversification of international suppliers reduces companies' operational vulnerability to single-source vendors, and increases competition, providing strong incentives for suppliers to improve product quality and service. Figure 14.3 summarizes the major forces that have helped to tame business cycles in many countries.

The Great Recession (December 2007 to June 2009) is important, in this regard, mainly because it shattered beliefs that the U.S. business-cycle dragon had been slain. This economic downturn was so deep, lasted so long, affected so many people, and destroyed so much wealth that serious reconsideration

13 For example, by purchasing or selling financial derivatives, a company can hedge an unwanted accounts receivable (i.e., a long exposure), or it can transform this exposure into a more desired payoff profile.

Improve business flexibility
– Change fixed costs to variable costs
– JIT inventories
– JIT labor (e.g., temporary workers)
– Continual restructuring
– Globalization: supply diversification
– Use of risk mitigation techniques and measures
Stabilize macroeconomic demand
– Reduce the volatility of consumption, investment, and net exports
– More stable monetary and fiscal policies
– Shift to demand toward services
Financial deregulation

Figure 14.3: How to Tame Business Cycles.

has been given to the shocks that cause recessions and how these shocks can dominate the business-cycle-mitigating factors discussed in this section. Chapter 21, "Causes, Cures, and Consequences of the Great Recession," is devoted entirely to this extremely costly economic downturn.

Conclusion

Business cycles are *recurring*, *irregular*, and *unsystematic* movements in *real economic activity* around a long-term trend. Their causes can be shifts in domestic or foreign demand or supply. To identify the phases of a business cycle, a nation needs to measure its real economic activity. Procyclical variables move in the same direction as the business cycle, and countercyclical variables move in the opposite direction from the business cycle.

Key Points

- Business cycles are *recurring*, *irregular*, and *unsystematic* movements in *real economic activity* around a long-term trend.
- Business cycles can be caused by domestic-based and foreign-based changes in aggregate supply and aggregate demand.
- To identify the phases of a business cycle, a nation needs to measure its real economic activity.
- The duration of a recession is from the peak of the business cycle to the trough. The duration of an expansion is the trough to the peak.
- Procyclical variables move in the same direction as the business cycle, and countercyclical variables move in the opposite direction from the business cycle.
- Predicting the turning point of a business cycle is very difficult.
- Leading economic indicators are macroeconomic variables that, as a group, have changed prior to past recessions and expansions and are used (by many) to predict future economic changes.
- The National Bureau of Economic Research (NBER) dates U.S. business cycles.
- U.S. leading economic indicators have a mixed record of success at predicting changes in the business cycle.
- The duration and intensity of recessions might be reduced by improved business flexibility, stabilized macroeconomic demand, and financial deregulation.

Review Questions

1. What is a business cycle? How are business cycles measured?
2. Why are business cycles difficult to predict?
3. Is it accurate to say that business cycles are “very short-term fluctuations” in real economic activity around a long-term trend?
4. What is a recession?
5. Indicate whether the following variables are procyclical or countercyclical.
   - Imports
   - Microsoft sales
   - Layoffs
   - Government transfer payments
6. Is it accurate to say that no one knows what causes business cycles (even after they occur)?
7. What is the index of leading economic indicators, and how are the indicators in the index chosen? Is the index a good predictor of future economic activity?

Discussion Question

8. Explain why a company's ability to change its fixed costs to variable costs might be very important for maintaining business profitability during the course of a complete business cycle.

Chapter 15
Foreign Exchange Basics

This chapter discusses how to interpret and use exchange rates. It begins by explaining some basics: What are exchange rates? What is a currency appreciation or depreciation? Is the exchange rate for a currency, such as the dollar price of a euro, the same around the world? What effects, if any, do foreign exchange transactions have on a nation's monetary base and money supply? The next chapter (Chapter 16, "Foreign Exchange Markets") uses these basics to explain how exchange rates are determined and what causes them to change.

The Basics

Exchange Rates

An *exchange rate* is the price of one currency in terms of another currency. For example, if the British pound is worth $2, then $2/£ (or USD2/GBP) is the expression of this exchange rate in dollars per pound.[1]

The Reciprocal Nature of Exchange Rates

The reciprocal of the dollars per pound ($/£) exchange rate is the pounds per dollar (£/$) exchange rate, which means if £1 is worth $2, then $1 must be worth £0.50 (i.e., by inverting $2/£1, we get £1/$2, which equals £0.50/$). The expression for this exchange rate is £0.50/$ (which can be stated as "one-half pound per dollar"). It is important to remember that the currency being valued is always in the denominator. Therefore, $2/£ is the dollar value (or price or cost) of £1, and £0.50/$ is the pound value (or price or cost) of $1.[2]

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1 Every currency has a three-letter abbreviation, such as U.S. dollar (USD), Great Britain pound (GBP), Chinese yuan (CNY), and Malaysian ringgit (MYR). For a complete list, go to easyMarkets, "Currency Acronyms and Abbreviations," https://www.easymarkets.com/int/learn-centre/discover-trading/currency-acronyms-and-abbreviations/ (accessed August 4, 2019).

2 The financial media often reports exchange rates by the ratio that is easiest to understand. For example, the Japanese yen is reported as yen per U.S. dollar (i.e., ¥/$ or JPY/USD) rather than dollars per yen (i.e., $/¥ or USD/JPY) because JPY110/USD is easier to understand than the decimal USD0.009091/JPY. Similarly, for the Colombian peso, it is easier to understand COP3,100/USD than the decimal USD0.0003226/COP. Remember that the currency in the denominator is the one being valued.

https://doi.org/10.1515/9781547401437-015

What Is an Appreciation or Depreciation of a Currency?

An increase in the value of Currency A (e.g., the pound) relative to Currency B (e.g., the dollar) is called an *appreciation* of Currency A relative to Currency B. For example, the pound appreciates when it increases from \$1/£ to \$2/£. A decrease in value of Currency A (e.g., the pound) relative to Currency B (e.g., the dollar) is called a *depreciation* of Currency A with respect to Currency B. For example, the pound depreciates when its value falls from \$2/£ to \$1/£.

An Appreciation of One Currency Means a Depreciation of the Other

There is an unequivocal inverse relationship between the two currencies stated in an exchange rate. If Currency A appreciates relative to Currency B, then Currency B must depreciate relative to Currency A. This result is a mathematical necessity, caused by the reciprocal nature of exchange rates. An example shows why it is so.

Suppose the value of the pound is \$2/£, which means the value of the dollar is £0.50/\$. If the pound changes in value to \$1/£, then its reciprocal must change to £1/\$. Therefore, at the same time the value of the pound depreciates (i.e., falls in value) from \$2 to \$1, the dollar appreciates (i.e., increases in value) from £0.50 to £1. In short, an appreciation of the dollar relative to the pound carries precisely the same meaning as a depreciation of the pound relative to the dollar.

Paying Attention to the Units

Because exchange rates can be expressed in either of two ways (e.g., \$2/£ or £0.50/\$), we must pay particular attention to what is being valued. Accuracy at this fundamental level is crucial because foreign exchange transactions are often huge (in the millions and billions of currency units), and small mistakes can result in significant losses.

It is always a good idea to write down the exchange rate you are using alongside the foreign currency-denominated transactions you are trying to value. Then, multiply the exchange rate times the foreign currency value of the investment or item being purchased or sold, making sure that the proper units cancel out. The cardinal rule is to be careful with the units.

For example, suppose the exchange rate is €0.80/\$ (which is equivalent to \$1.25/€), and you want to buy a German precision machine costing €10 million. As Figure 15.1 shows, writing down the exchange rate next to the product's price and then multiplying the two shows clearly that the dollars per euro (i.e., \$1.25/€) exchange rate must be used because only with this rate will the common

element, the euro, cancel in both the numerator and denominator of the equation terms. Figure 15.1 shows that the answer to the question "How many dollars are needed to purchase a machine costing €10 million?" is "$12.5 million."

$$\frac{\$1.25}{\cancel{€}} \times \frac{\cancel{€}10 \text{ million.}}{\text{Machine}} = \frac{\$12.5 \text{ Million}}{\text{Machine}}$$

Figure 15.1: Correct Alignment of Exchange Rate and Price.

If embarrassing mistakes are made using foreign currencies, they are often made at this level because of carelessness. Let's take the same example as before, but this time, suppose we use the wrong exchange rate (i.e., €0.80/$ instead of $1.25/€). As Figure 15.2 shows, multiplying the machine's price of €10 million times €0.80/$ gives us a nonsensical answer because nothing cancels. Using the incorrect exchange rate, the answer to the question "How many dollars are needed to purchase a machine costing €10 million?" would be "Eight 8 million euros squared per U.S. dollar machine"—which is meaningless.

$$\frac{€\,0.80}{\$} \times \frac{€\,10 \text{ million.}}{\text{Machine}} = \frac{€^2\,8 \text{ Million}}{\$ \times \text{Machine}}$$

Figure 15.2: Incorrect Alignment of Exchange Rate and Price.

The Foreign Exchange Market

The foreign exchange market is a global network of dealers and financial institutions that connects buyers and sellers of international currencies. Participants include market-maker banks, called dealers, institutional investors, hedge funds, proprietary trading firms, small banks, and official financial institutions, such as central banks and supranational organizations, as well as nonfinancial customers, such as individuals, corporations, and governments. Together, they use this worldwide network to communicate their supply and demand needs, transact deals, and settle trades by transferring funds.

Bid and Ask Rates

Foreign exchange is quoted in terms of bid and ask rates[3] which are defined from the bank's point of view. The *bid rate* is the price at which a bank is willing and able *to buy* a currency from a customer, and the *ask rate* is the price at which a bank is willing and able to *sell* a currency to a customer. As Figure 15.3 shows, the bid (buy) rate is always lower than the ask (sell) rate because the bid-ask difference (i.e., the spread) is a bank's gross margin. In effect, banks act like wholesalers or retailers by purchasing commodities (in this case, currencies) at lower prices than they sell them.

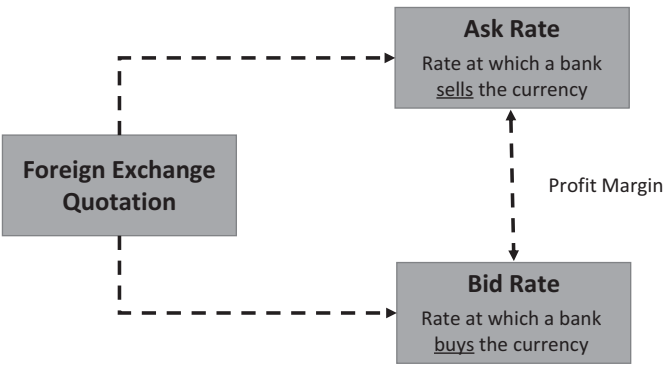

Figure 15.3: Bid and Ask Rates.

Retail and Wholesale Markets for Foreign Exchange

There are two related, but differently priced, markets for foreign currency exchange: the retail market and the wholesale market. The retail market handles relatively small transactions that are conducted by low volume customers, such as small- to moderate-sized companies, individual investors, and tourists. The wholesale market is for large customers with transactions of $1 million or more. About 99% of the total activity in the foreign exchange market is at the wholesale level.

The bid-ask spreads for retail customers are wider than for wholesale customers. One reason for the difference is that small, retail trades have higher per unit costs. For example, the transaction time to execute a €10,000 deal is

3 When to use bid and ask rates can be confusing. *The Rest of the Story* section of this chapter provides two useful tips on how to avoid making mistakes.

basically the same as a €100,000,000 deal. Therefore, the per-unit cost of the larger one is smaller, causing a tighter bid-ask spread. Another reason for the spread differential is the intense competition among banks for customers in the wholesale market. Small spreads on transactions of immense size can provide banks with robust earnings. Furthermore, attracting large customers via foreign exchange transactions can be an entry point for doing other business with them.

Currencies Traded Over the Counter and on Exchanges

Foreign currencies are traded over the counter and on exchanges. *Over the counter* means the transactions are handled using high-speed financial communication lines, such as dedicated computer information systems, telephone, internet, fax, and telex connections. This market is electronic, without a physical location, and without any distinct identity. By contrast, *exchange-traded* currencies are transacted on physical or electronic exchanges that have either a specific physical location or distinct electronic identity.

Foreign exchange markets overlap, with quotes transferred from market to market in a continuous chain. From Wellington, New Zealand, to Singapore and Hong Kong to Tokyo to Zurich to London to New York to Chicago to San Francisco, and finally back to New Zealand, trading activity passes smoothly from time zone to time zone, 24 hours a day. In 2019, the United Kingdom, United States, Hong Kong SAR, Singapore, and Japan accounted for 79% of all foreign exchange trading, with China increasing its trading activity significantly.[4]

Globally Sourced Supply and Demand

Supply and demand in the foreign exchange markets are sourced globally, which means quoted prices do not depend on the inventories of any one participant. For instance, suppose a trader at Credit Suisse in Zurich received a large order from the treasurer at Roche Holding Ltd. in Basel to purchase 500 million U.S. dollars ($500 million) with Swiss francs. Without the international communication network provided by the over-the-counter foreign exchange market, how would the trader price this transaction? Most likely, she

4 Bank for International Settlements, Monetary and Economic Department, "Triennial Central Bank Survey: Foreign Exchange Turnover in April 2019," p. 1 https://www.bis.org/statistics/rpfx19_fx.htm (accessed December 7, 2019).

would price it in the context of both the inventories of dollars owned by Credit Suisse and the other dollar-per-Swiss-franc transactions the trader expected the bank to conduct that day (or shortly). Without the broader, global perspective, this $500 million order could disadvantageously alter the price that Roche Holding had to pay for dollars.

A broader perspective is needed because it is likely that, at the same time Roche Holding was demanding $500 million in Zurich, an equal amount of dollars (or more) was being supplied to the worldwide network by numerous individuals and businesses, conducting a broad variety of relatively small and unrelated transactions. Under these circumstances, the dollars demanded by Roche Holding could be supplied through the network of dealers and financial institutions.

It would not be important how many dollars Credit Suisse owned or how much of the total dollar business was transacted through Credit Suisse. All that would matter was whether Credit Suisse could buy these dollars from other financial institutions and then funnel a total of $500 million to Roche Holding. This networking capability is a major function of the foreign exchange market.

Uniform Prices Worldwide

A key feature of foreign currency markets is that prices are identical in exchange locations that have overlapping business hours. For example, consider the United States and England. When currency traders in New York City (NYC) wake each morning (long before dawn), one of their first calls (often before they get to work) is to London, where it is already 10:00 a.m. or earlier. Upon opening, if exchange rates in NYC were different from those in London, savvy arbitragers,[5] with access to this information, could buy in the inexpensive market and simultaneously sell in the expensive market, quickly earning millions of dollars in riskless profits. Think how easy life would be if riskless profit opportunities were available. You could trade currencies for just a few days and then retire for life.

If currency arbitrage sounds like fun and something you might like to try, be aware that it never happens on a grand scale in foreign exchange markets, and for a simple reason: *everyone* wants to make riskless profits. As a result, any slight differential in exchange rates across the globe triggers enormous flows of funds that quickly erase these discrepancies. Again, consider the magnitude. A "small"

5 Currency arbitragers simultaneously buy and sell currencies to earn riskless profits due to misaligned prices.

transaction in the foreign exchange market is considered to be anything under $1 million, and the market's average *daily* volume on the over-the-counter market in April 2019 was $6.6 trillion.[6] If there was a chance to earn riskless profits, the daily volume would rise dramatically to take advantage of the opportunity. Thousands of foreign exchange traders spend their entire workweek in front of computer screens looking for opportunities to earn just a few "pips"[7] in profits. Earning 10 risk-free pips on a billion-British-pound deal translates into a $1 million gain[8] for doing about 30 seconds of work!

The uniformity of foreign exchange rates across the globe requires virtually perfect information, but this does not mean that everyone who participates in the foreign exchange markets knows precisely what is happening all over the world at every minute of the day. What it means is a core of marginal or peripheral traders buys and sells currencies based on the latest, most up-to-date information, and this information is available to anyone who has the technology, time, and motivation to acquire it.

Size of the Foreign Exchange Market

A major survey, conducted by the Bank for International Settlements (BIS) in 2019, found that worldwide *daily* foreign exchange transactions in the over-the-counter market totaled $6.6 *trillion* (as mentioned above).[9] These transactions were distributed among the six major segments, namely, spot transactions, outright forwards, foreign exchange swaps, currency swaps, options and other products, and exchange-traded derivatives. This text focuses on the spot foreign exchange market, where currencies are purchased for immediate delivery. Of the $6.6 trillion in daily foreign exchange turnover, about $2.0 trillion was conducted in the spot foreign exchange market. *The Rest of the Story* section of this chapter discusses the other major segments.

With transactions valued at $6.6 trillion *per day*, the foreign exchange market is the largest in the world. Two comparisons show why. In 2019, when the BIS survey was conducted, *daily* foreign exchange turnover was almost 104 times

6 Bank for International Settlements, Monetary and Economic Department, "Triennial Central Bank Survey of Foreign Exchange and Over-the-Counter (OTC) Derivatives Markets in 2019: Foreign Exchange Turnover in April 2019," p. 1, https://www.bis.org/statistics/rpfx19_fx.htm (accessed December 7, 2019).

7 One "pip" is worth one-hundredth of one cent, or $0.0001, per unit of foreign currency. Therefore, 100 pips equal 1%.

8 £1,000,000,000 × $0.0001/£ × 10 pips = $1 million

9 Exchange-traded derivative transactions were less than 2% of the total over-the-counter market.

greater than the total number of seconds that had passed since Year 0, and *yearly* foreign exchange volume was more than 78 times larger than U.S. GDP ($21.2 trillion).[10]

A Purely Competitive Market

The foreign exchange market ranks among the most competitive in the world. In fact, it comes as close as any market to the economic definition of *pure competition*. The number of buyers and sellers is so large that no one buyer or seller can influence the price.[11] There is virtually perfect information among a periphery of active traders. Entry into and exit from the market are impediment-free, and currencies are homogeneous. It is hard to imagine products more standardized than currencies because what could be more similar than a dollar (or euro or yen) bill? Even better, what could be more homogeneous than a dollar (or euro or yen) checking account?

The U.S. dollar has been the counterparty currency to about 88% of all international transactions and, for this reason, is often called the world's "vehicle currency."[12] The euro (32.3%) and Japanese yen (16.8%) were the second and third most popular currencies, followed by the British pound (12.8%), Australian dollar (6.8%), Canadian dollar (5%), Swiss franc (5%), and Chinese yuan (4.3%).[13]

Participants in the Foreign Exchange Market

The foreign exchange market is shaped like a pyramid with three major tiers (see Figure 15.4). At the base of the pyramid are nonfinancial customers, such as individuals, businesses, and governments. Foreign exchange dealers and other financial institutions, such as institutional investors, hedge funds, proprietary trading

10 This result is derived by multiplying 252 trading days per year times $6.6 trillion of foreign exchange turnover per day (252 working days/year × $6.6 trillion/day = $1,663.2 trillion/year).

11 Perhaps one major exception is a central bank, which may have the power to move an exchange rate, but even this power has been waning with the increasing size of international capital flows.

12 Because there are two sides to every foreign-exchange transaction, the sum of all market shares equals 200%—not 100%.

13 Bank for International Settlements, Monetary and Economic Department, "Triennial Central Bank Survey of Foreign Exchange and Over-the-Counter (OTC) Derivatives Markets in 2019: Foreign Exchange Turnover in April 2019," p. 1, https://www.bis.org/statistics/rpfx19_fx.htm (accessed December 7, 2019).

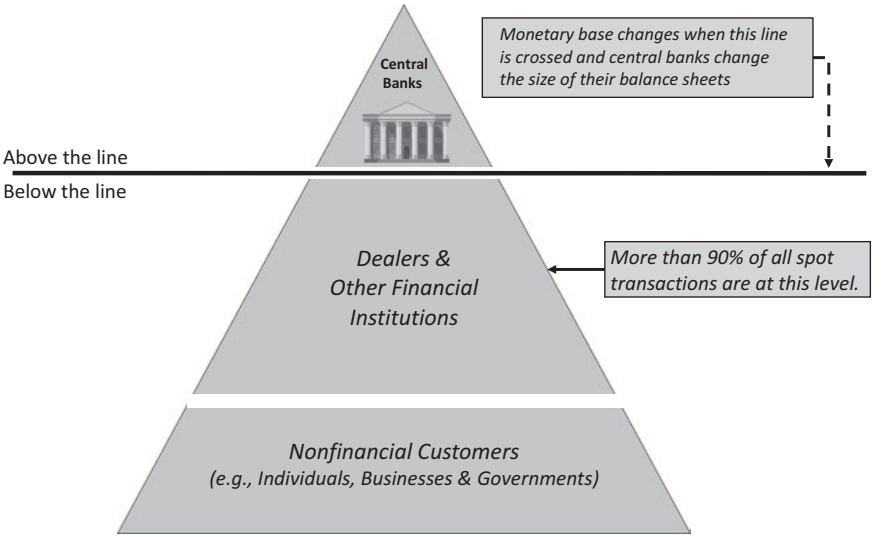

Figure 15.4: Participants in the Foreign Exchange Market. (Imagery used: © MicroOne/ Shutterstock)

firms, and small nondealer banks, comprise the middle tier. Central banks occupy the top layer.

Nonfinancial Customers: Individuals, Businesses, and Governments

Based on the sheer numbers of participants, the foundation of the foreign exchange market is the largest because it is comprised of several hundred thousand individuals, businesses, and governments who want to buy or sell foreign currency. Most people who have traveled to foreign countries are familiar with this tier because, as tourists, they have exchanged one currency (e.g., dollars) for another currency (e.g., euros, pesos, or yen). Unfortunately, our familiarity as tourists with exchange rates is not the most productive way to conceptualize the dynamics of the foreign exchange market because less than 1% of all the transactions in this market involve the physical exchange of one currency for another.

The study of international macroeconomics and finance makes more sense if the foreign exchange market is pictured as an electronically linked, worldwide market, where transactions are settled only via changes in bank accounts (i.e., checking accounts). Erase from your mind the notion that the foreign exchange market is associated with individuals walking into banks and exchanging one physical currency (e.g., dollar bills and coins) for another physical currency (e.g., euro bills and coins). In this global market, currencies are bought, sold, and

efficiently shipped to their destinations by electronically increasing and decreasing participants' bank accounts.

Dealers and Other Financial Institutions

More than 90% of all foreign exchange activity takes place among dealers and other financial institutions, including central banks (see Figure 15.4). A sizable portion of the remaining 10% is transacted between banks and large customers, such as large companies, governments, central banks, sovereign wealth funds, and other official institutions. Because these trades are relatively large, they also require funds to be transferred via bank accounts, rather than the physical exchange of currency.

Interbank trading is a considerable part of daily foreign exchange volume, which is why banks employ numerous currency traders who have little or no contact with business customers (e.g., importers, exporters, tourists, or investors). Instead, these traders try to make small speculative profits throughout the day by purchasing and selling foreign currencies within strict limits imposed by the bank. The life of a currency trader can be very stressful. Burnouts are frequent, and turnover rates are high.

Even though most foreign exchange trading is between dealers and other financial institutions and not done for the direct benefit of commercial (nonfinancial) customers, businesses still derive enormous indirect advantages from the large volume of daily trading. Trading among dealers and other financial institutions ensures that foreign exchange markets are liquid and efficient. It assures customers that large buy or sell orders will not move prices disadvantageously and can be executed in a cost-effective manner.

Some financial institutions specialize in lightly traded currencies, such as the Thai baht, Uruguay peso, and Iraqi dinar. Often, they become market makers in these shallow currency markets because there is not enough volume to support many dealers. *Market makers* are obliged to quote both bid (buy) *and* ask (sell) rates for currencies, thereby giving customers the right to be a buyer or a seller. For this reason, these financial institutions must be careful because, if their prices are not aligned with the competition or if they are misaligned with market fundamentals, such as international interest differentials, they will create profitable arbitrage (i.e., no-risk) opportunities for customers.

Most foreign exchange transactions are done on a bid-ask basis, but some financial institutions act as brokers and offer foreign exchange services for a fee. An example helps to clarify how some financial institutions broker their services. Suppose Bank of America in Boston received a large order to sell dollars and buy Norwegian krone. Bank of America would realize that any delay in

executing the order could result in an unfavorable rate for the customer and damage this business relationship. To reduce the chances of a disadvantageous exchange rate movement, Bank of America might employ a broker, who would use its traders to hit the foreign exchange market all at once and purchase the needed krone. The hope would be that using such tactics would move the price only after the deal was completed. For this service, the broker would charge a fee.

Central Banks

At the peak of the foreign exchange market pyramid in Figure 15.4 are central banks, which select particular banks (below the line) as counterparties to their foreign exchange transactions. Often, the motivation behind central banks' buy and sell orders is to increase or decrease the value of the domestic currency relative to foreign currencies. For instance, if the U.S. Federal Reserve wanted to lower the value of the U.S. dollar relative to the euro, it would sell dollars (buy euros) in the foreign exchange market. If the dollar's value fell from €1/$ to €0.80/$ (i.e., which means the euro rose from $1/€ to $1.25/€), then U.S. goods and services would become less expensive relative to the euro area, and euro-area products would be more expensive relative to the United States. If U.S. and euro-area prices did not change to offset the dollar depreciation, U.S. exports to the euro area would rise, and U.S. imports from the euro area would fall.

Central Bank Transactions and the Monetary Base

Any time a central bank buys or sells foreign currency, its transactions affect the size of the nation's monetary base. This point is crucial in international economics and finance, and it is one we will stress in the remaining chapters of this book. To reinforce this relationship, a horizontal line has been drawn in Figure 15.4, separating central banks from the other tiers.[14] This line is used to remind us of the important relationship between central banks and the monetary base, which we have called Guideline #1. It says: *A nation's monetary base changes only when funds cross our imaginary horizontal line due to a change in the size of the central bank's balance sheet*.

14 Chapter 9, "Central Banks" explains *Guideline #1*, which relates central banks, the monetary base, and the use of this imaginary horizontal line.

Checking Accounts Never Leave the Country

Earlier in the chapter, we learned that large-denomination foreign exchange transactions are carried out by transferring funds from one checking account to another, rather than trading physical currencies (i.e., paper bills and coins). Of the $6.6 trillion worth of daily transactions in the foreign exchange market, the overwhelming majority of them are conducted in this manner. This fact is important and leads us to Guideline #2: *Checking accounts never leave their country of origin*. In combination with Guideline #1, this second guideline makes it easier to understand why foreign exchange transactions do not affect the size of nations' monetary bases or their money supplies, unless a central bank is involved.

Using Guideline #1, "above-the-line/below-the-line," foreign exchange transactions do not affect the monetary base because they are all conducted below the line.[15] They change only the ownership of domestic bank accounts. Therefore, they remain fully accounted for in the balance sheets of domestic banks. As a result, foreign exchange transactions do not affect a central bank's ability to control its domestic monetary base or money supply. An example helps to clarify this critical point.

Suppose the dollar-pound exchange rate was $2/£, and Susan Berkley, a U.S. resident, wanted to exchange $20 million for the equivalent value in British pounds (i.e., £10 million). Susan would not care where her bank got the funds to fill this order, but suppose we were able to trace the transaction and found that the pounds came from Nigel Oxford, an English resident. In this transaction, Berkley is demanding pounds and supplying dollars, while Oxford is supplying pounds and demanding dollars.

Remember that a nation's monetary base includes currency in circulation (i.e., currency outside banks) plus the reserves of financial intermediaries, and the M2 money supply includes currency in circulation, checking accounts, and near money. As Figure 15.5 shows, this foreign exchange transaction transfers $20 million from Berkley's checking account at a U.S. bank (say, Citibank in New York City) to Oxford's checking account at another bank in the United States (say, Wells Fargo in San Francisco). In short, Berkley's U.S. checking account falls by $20 million, and Oxford's U.S. checking account rises by $20 million. Therefore, there is no change in the U.S. M2 money supply, because U.S. financial intermediaries' total checking deposits stay the same.

15 The only exception is when central banks intervene in the foreign exchange markets. Central banks' foreign exchange transactions do change nations' monetary bases and money supplies.

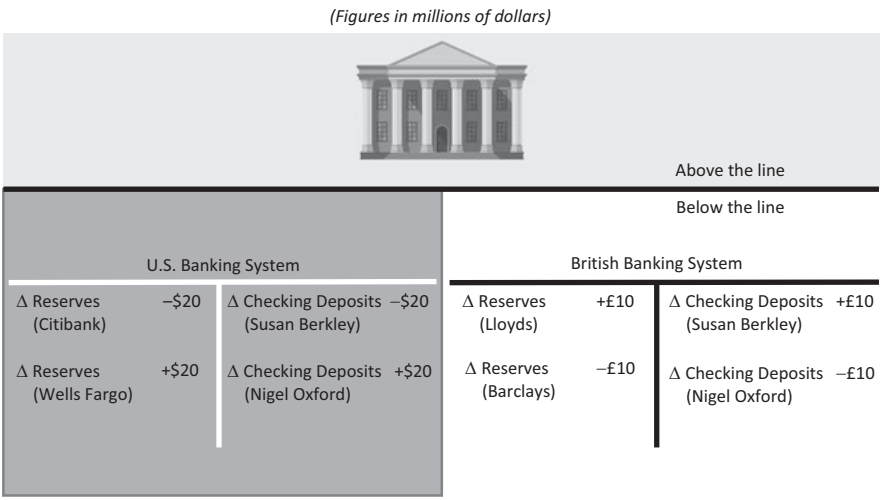

Figure 15.5: Checking Accounts Never Leave the Country. (Imagery used: © MicroOne/ Shutterstock)

Correspondingly, the U.S. monetary base remains constant because total bank reserves do not change. What Citibank loses in reserves, Wells Fargo gains.

Similar transfers occur in England. Oxford loses his £10 million checking account at an English bank (say, Barclays Bank in London), and Berkley receives a £10 million checking account in the bank of her choice in England (say, Lloyds Bank in London). As a result, there is no net change in the U.K. banking system's assets or liabilities and, therefore, no change in the U.K. monetary base or M2 money supply.

International Check Clearing

If you were wondering why U.S. dollar transactions are cleared through the U.S. banking system and pound transactions are cleared through the British banking system, the answer is related mainly to efficiency and cost. In this example, Berkley's and Oxford's transactions had to be cleared, and the most efficient and cost-effective way to handle dollar transactions is to clear them through the U.S. banking system. The cost to clear U.S. dollar transactions through a British-built clearing system (or, more generally, any foreign clearing system) would be prohibitively high relative to the cost in the United States. Similarly, the cost for U.S. banks to clear pound-denominated transactions through a U.S.-built system would be prohibitively expensive relative to the British banking system. In general, foreign banks cannot compete with the more efficient, low-cost

clearing systems that are already in place in a currency's country of origin. In part, the lower costs are driven by economies of scale, but there are also infrastructure and location factors that reduce costs for domestic clearing systems.

A foreign exchange transaction, like the one used in our example between Berkley and Oxford, has the effect of changing the ownership of the nations' checking deposits from domestic owners to foreign owners. Should countries, like the United States and England, be concerned if too many foreigners own domestic checking accounts? For instance, could U.S. monetary authorities lose some control or could the United States be threatened in any way by these accumulations?

The answer depends on where your concerns lie. In general, there is no need for alarm because these checking accounts never leave the country (Guideline #2). Should foreign holders of the dollar-denominated checking accounts suddenly want to get rid of them, they would have to find buyers (i.e., individuals with foreign currencies who wanted to buy dollars), and the dollar buyers would be the new owners of the deposits. Of course, massive sales could reduce the dollar's value, which would affect import and export industries, as well as consumers—who purchase imported products—but they would not drain the United States of money or monetary base, and they would not change the ability of the U.S. central bank to enact discretionary monetary policies.

Spot Foreign Exchange Market

Most media coverage of foreign exchange issues focuses on the *spot markets*, where the currencies are exchanged for immediate ("on the spot") or near-immediate delivery. Spot rates determine how much must be paid to purchase or sell currencies for *current delivery*. Importers, exporters, investors, tourists, speculators, politicians, government officials, and central bankers around the world closely watch movements in the spot market because changes in exchange rates open and close opportunities for trade, investment, travel, political gain, and arbitrage. Political leaders and central bankers are sensitive to these movements because they can have direct and significant effects on important macroeconomic variables, such as GDP growth, unemployment, wages, interest rates, inflation, and wealth.

The spot foreign exchange market handles the day-to-day currency transactions for immediate or near-immediate delivery, but what does "immediate or near-immediate delivery" mean in this context? As tourists, we are familiar with making foreign exchange transactions by walking into a bank with one currency (e.g., U.S. dollars) and walking out with another currency (e.g., Japanese yen).

Such transactions are made *on the spot*, so they are unquestionably a part of the spot market.

The problem is that exchanging physical currencies is a tiny minority of the foreign exchange market's total daily volume. Most foreign exchange transactions are large and involve the transfer of deposits between banks, so settling and clearing them takes time. For this reason, the execution of most spot transactions takes (typically) two working days. Therefore, U.S. importers contracting on Monday to buy spot euros must wait until Wednesday, two working days later, for the funds they are buying to be deposited in their accounts (e.g., in a euro-area bank) and for the funds they are selling to be withdrawn from their accounts (e.g., in a U.S.-based bank). Transactions arranged on Thursday are settled and cleared on the following Monday. The two-day delivery time provides the back offices of banks, as well as the domestic and international clearing and communication systems, with the time needed to fully settle these transactions, by withdrawing funds from the payer's account and depositing them into the payee's account.

The Rest of the Story

Understanding Spot Foreign Exchange Quotations

Figure 15.6 presents an example of the spot foreign exchange quotations you would see in a business publication, such as *The Wall Street Journal*. It shows the late-day value of the British pound in terms of the U.S. dollar on Tuesday, January 8, but the presentation is the same for all the currencies listed in the publication. Column 1 shows the country and its currency, and Column 2 the dollar price of a non-U.S. dollar currency. Column 3 is the reciprocal of Column 2, showing the price of a U.S. dollar in terms of the non-dollar currency. Finally, Column 4 shows the yearly percentage change in the dollar value of the foreign currency listed. Because the news report was available early Tuesday morning (January 8), which is before the trading day began, it reflected the late-day rates

Column 1	*Column 2*	*Column 3*	*Column 4*
	----------Tues----------		**US$ vs. YTD**
Country/Currency	In US$	Per US$	**(% Change)**
UK Pound	1.2500	0.8000	6.0

Figure 15.6: Foreign Exchange Quotes.

from the previous working day, which was Monday, January 7. Foreign exchange rates change continuously throughout the day, so there was no guarantee that the rates reported on Tuesday, January 8, were a good reflection of the average price for the previous day or that they held steady overnight.

Summarizing Figure 15.6, the closing price for the U.K. pound (Column 1) on January 7 was $1.2500 (i.e., $1.2500/£—Column 2), which means one dollar cost 0.80 pounds (i.e., £1/$1.2500 = £0.8000/$—Column 3). Finally, the yearly percentage change in the dollar value of the pound was 6.0%, which means the pound appreciated. If Column 4 had been a negative value, it would mean the pound had depreciated.

Buying and Selling Foreign Exchange: Bid and Ask Rates

In "The Basics," we learned that banks quote buy (bid) and sell (ask) rates, and these rates are defined from the perspective of the bank (see Figure 15.3). The *bid rate* is the price at which a bank is willing and able to *buy* a currency from a customer, and the *ask rate* is the price at which a bank is willing and able to *sell* a currency to a customer. The difference between these two rates is the bank's gross margin.

Even though the difference between the bid and ask rates is slender for wholesale transactions (amounting to a small fraction of 1%), choosing the wrong rate can make a meaningful difference, given the massive size of foreign exchange transactions. This section explains the problem many people encounter with bid and ask rates, clarifies which rate should be used, and provides some tips on how to avoid making mistakes.

Anyone using foreign exchange markets must understand fully when to use the bid rate and when to use the ask rate. The choice may seem easy, but first appearances can be deceiving. To understand why, consider the foreign exchange market for dollars and Malaysian ringgits (MYR). Suppose a customer called his bank to purchase Malaysian ringgits. In terms of the Malaysian ringgit market, this customer would be demanding ringgits, and the bank would be supplying them, but looking at the same transaction in terms of the dollar market, the bank would be demanding dollars and the customer would be supplying them.

In other words, the role of supplier and demander is reversed by switching from the ringgit perspective to the dollar perspective. The customer, who demands ringgits in the ringgit market, becomes the supplier of dollars in the dollar market, and the bank that supplies ringgits in the ringgit market becomes the dollar demander in the dollar market. From these relationships, we can

conclude that a bank's ask rate for ringgits must be precisely equal to the inverse of its bid rate for dollars (and vice versa). An example helps clarify this point.

Suppose the bid and ask rates for the Malaysian ringgit is \$0.20/MYR and \$0.25/MYR, respectively. A bid rate of \$0.20/MYR means that banks are willing and able to *buy* ringgits from customers for \$0.20 per ringgit, but if banks are willing and able to buy a ringgit for \$0.20, then they must be willing and able to sell each U.S. dollar for MYR 5 (i.e., MYR 1/\$0.20 = MYR 5/\$). Therefore, if \$0.20/MYR is the bid rate for a ringgit, then its reciprocal, MYR 5/\$, is the ask rate for a dollar. These relationships are summarized in Figure 15.7. The takeaway is every foreign exchange transaction involves the purchase of one currency and the sale of another.

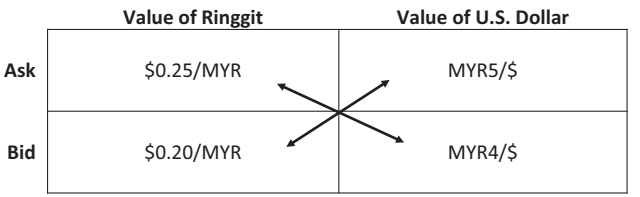

Figure 15.7: Bid-Ask Quotes for Dollars per Ringgit and Ringgits per Dollar.

In a similar sense, an ask rate of \$0.25/MYR means that banks are willing and able to sell a ringgit for \$0.25, which means they are willing and able to buy \$1 for MYR 4 (MYR 1/\$0.25 = MYR 4/\$). Therefore, the ask rate for a ringgit (i.e., \$0.25/MYR) is precisely equal to the inverse of the bid rate for a dollar (i.e., MYR 4/\$).

Understanding that the bid rate for ringgits is the inverse of the ask rate for dollars (and vice versa) still leaves us with the decision concerning which rate to use. To get a sense for the problem, let's use the bid and ask rates in Figure 15.7 and determine which rate should be used for each of the following transactions.

- Transaction 1: Microsoft, the U.S.-based software company, uses its Malaysian ringgit earnings to *purchase* \$100 million.
- Transaction 2: International Malaysian Company (IMC), the Malaysian-based oil and gas company, uses its worldwide dollar earnings to *purchase* MYR 200 million.
- Transaction 3: IMC *sells* \$100 million of its cash assets (i.e., portfolio investments) for ringgits to build a new factory in Malaysia.

– Transaction 4: Microsoft borrows MYR 200 million and then *sells* the ringgits in the foreign exchange market for dollars to acquire a medium-sized U.S. software company.

There are two helpful ways to understand whether the bid rate or ask rate should be used. The choice is left to the reader depending on your relative comfort level with the two methods.

Method 1: Put the Currency You Want to Buy or Sell in the Denominator

One way to guard against using the wrong exchange rate is always to make sure the currency you want to buy or sell is in the denominator. Then choose the bid rate if the bank is purchasing the currency in the denominator from you (i.e., you are selling the currency in the denominator to the bank), and choose the ask rate if the bank is selling the currency in the denominator to you (i.e., you are buying the currency in the denominator from the bank).

Transactions 1 and 3 are examples of deals in which customers want to buy or sell dollars. In Transaction 1, Microsoft is buying (demanding) dollars. In Transaction 3, IMC is selling (supplying) dollars. Therefore, the bid and ask exchange rates applicable to these transactions are ones that have the dollar in the denominator. In this form, it is easier to determine the proper exchange rate to use. In Transaction 1, Microsoft buys $100 million. Therefore, the company would use the ask rate (i.e., MYR 5/$) because it is the rate at which banks sell dollars to their customers. At the ask rate of MYR 5/$, Microsoft would spend MYR 500 million for the $100 million.[16]

In Transaction 3, IMC sells $100 million. Therefore, the correct exchange rate to use is the bid rate (MYR 4/$) because it is the rate at which banks buy dollars from their customers. At a rate of MYR 4/$, IMC would receive MYR 400 million for its $100 million.[17]

In Transactions 2 and 4, the bank customers buy or sell ringgits. In Transaction 2, IMC buys ringgits, and in Transaction 4, Microsoft sells ringgits. Therefore, the relevant bid and ask exchange rates are the ones that have the ringgit in the denominator. In Transaction 2, IMC buys MYR 200 million. Therefore, the appropriate exchange rate is the ask rate (i.e., $0.25/MYR) because this is the rate at which banks sell ringgits to their customers. To purchase MYR 200 million at $0.25/MYR means IMC spends $50 million.[18]

16 MYR 5/$ × $100 million = MYR 500 million
17 MYR 4/$ × $100 million = MYR 400 million
18 $0.25/MYR × MYR 200 million = $50 million

In Transaction 4, Microsoft's loan of MYR 200 million was outside the foreign exchange market because currencies were not exchanged, but the company's conversion afterward of ringgits to dollars was transacted in the foreign exchange market. For this transaction, Microsoft uses the bid rate ($0.20/MYR) because it is the rate at which banks buy ringgits from their customers. Therefore, the sale of MYR 200 million generates dollar proceeds equal to $40 million for Microsoft.[19]

Method 2: Of the Two Rates, You Will Always Get the Bad One

Putting the currency you want to buy or sell into the denominator is a reliable way to get the correct answer, but sometimes this method is problematic because it means dealing with some inconvenient fractions. On January 8, suppose the U.S. dollar was worth 3,296 Colombian pesos (COP). If the bid and ask rates for a dollar in terms of Colombian pesos were COP 3,280/$ and COP 3,310/$, respectively, their reciprocals (i.e., the bid-ask rates for Colombian pesos in terms of dollars) would be $0.000302/COP and $0.000305/COP, respectively—and that is after rounding.

To avoid using inconvenient fractions such as ones for Colombian pesos and to provide another way of checking the soundness of your reasoning, a second way to determine which exchange rate to use is to forget about the terms *bid* and *ask* and simply to ask yourself one question: "Which of the two rates is to my disadvantage?" Once this question is answered, the choice of exchange rates is clear. You will always get the disadvantageous rate, and the bank will always get the advantageous one.

Let's start by using the bid and ask rates for dollars (i.e., MYR 4/$ and MYR 5/$, respectively) to address Transactions 1 to 4.

- In Transaction 1, Microsoft buys $100 million with ringgits. Which rate is more disadvantageous to Microsoft? At MYR 5/$, the company would pay MYR 500 million;[20] at MYR 4/$, it would pay only MYR 400 million.[21] Therefore, the rate Microsoft will get is MYR 5/$.
- In Transaction 2, IMC purchases MYR 200 million with dollars. Is the bid rate or the ask rate more disadvantageous to IMC? At MYR 4/$, the company would have to spend $50 million;[22] at MYR 5/$, it would have to

19 $0.20/MYR × MYR 200 million = $40 million
20 $100 million × MYR 5/$ = MYR 500 million
21 $100 million × MYR 4/$ = MYR 400 million
22 MYR 200 million/MYR 4/$ = $50 million

spend $40 million.[23] Therefore, the rate IMC will get is MYR 4/$ because it is the disadvantageous one.
- In Transaction 3, IMC sells $100 million for ringgits. At the bid rate of MYR 4/$, IMC would receive MYR 400 million;[24] at the ask rate of MYR 5/$, it would receive MYR 500 million.[25] Therefore, IMC would get the bid rate because it is the disadvantageous one.
- In Transaction 4, Microsoft sells MYR 200 million for dollars. At the ask rate (MYR 5/$), Microsoft would receive $40 million;[26] at the bid rate (MYR 4/$), it would receive $50 million.[27] Therefore, Microsoft would get the ask rate because it is the disadvantageous one.

An excellent way to check your understanding of bid and ask rates is to go back through Transactions 1 to 4 and answer them using Method 2, but this time, instead of framing your answers in terms of bid and ask rates for the U.S. dollar (i.e., MYR 4/$ and MYR 5/$, respectively), frame them in terms of bid and ask rates for the ringgit (i.e., $0.20/MYR and $0.25/MYR, respectively).

The Major Segments of the Foreign Exchange Market

There are six major segments of the over-the-counter foreign exchange market, namely, spot transactions, outright forwards, foreign exchange swaps, currency swaps, and options and other products. In addition, there are exchange-traded derivatives. Over-the-counter trades are executed on an electronic network of numerous dealers and customers and done primarily by reducing the checking accounts of payers and increasing the checking accounts of payees. Let's briefly review each one.

Spot Transactions (30% of the OTC Market)

The *spot market* is for buying and selling currency "on the spot." Usually, the actual delivery of currencies occurs two business days after the transaction.

23 MYR 200 million/MYR 5/$ = $40 million
24 $100 million × MYR 4/$ = MYR 400 million
25 $100 million × MYR 5/$ = MYR 500 million
26 MYR 200 million/MYR 5/$ = $40 million
27 MYR 200 million/MYR 4/$ = $50 million

Outright Forwards (15% of the OTC Market)

Outright forwards are contractual obligations to deliver a specified amount of a currency on a predetermined future date in return for another currency of equivalent value. The price (or equivalency value) between the two currency units (e.g., U.S. dollars per Swiss franc) to be exchanged in the future is agreed on now, but delivery is delayed until a specified date in the future. Outright forward transactions are done primarily through banks. The contract terms (e.g., size and delivery date) are negotiable. This market exists mainly to handle non-speculative trade and investment transactions.

Foreign Exchange Swaps (49% of the OTC Market)

The *foreign exchange swap market* involves two simultaneous transactions: the purchase (or sale) of a fixed amount of currency at one date (for example in the spot market) and simultaneously a reverse transaction that locks in the price to reverse the deal on a specific day in the future. Therefore, if you buy yen with dollars on January 8 in the spot market, you simultaneously fix a price to convert the yen back into dollars at a fixed time in the future, such as three months later on April 8. Swap transactions are done primarily through banks, and their contract terms are negotiable. The swap market is large and liquid because it offers a convenient way for banks to hedge their foreign exchange exposures and for international investors and borrowers to reduce or eliminate their foreign exchange risks. Speculators also use the foreign exchange swap market when they want to bet on the exchange rate differential between two (value) dates.

Currency Swaps (2% of the OTC Market)

In the *currency swap market*, contracts commit two counterparties to exchange streams of interest payments in different currencies for an agreed period, such as two years. At maturity, the principal amounts are exchanged at a currency rate determined when the deal was transacted.

Options and Other Products (4% of the OTC Market)

Options give buyers the right, but not the obligation, to buy or sell currency at a price (called the *strike price*) agreed upon now but with delivery delayed until or before a specified expiration date in the future. To gain a right with no obligation, option buyers must pay a fee, called the option "premium." *Call* options give buyers the right, but not the obligation, *to purchase* a currency at a price agreed on now for future delivery, and *put* options give buyers the right, but not the obligation, *to sell* a currency at a price agreed on now for future delivery. By

contrast, *sellers* of options *acquire obligations* and not rights. If buyers of currency options exercise their option rights, sellers must buy or sell foreign exchange at the negotiated strike price. An exercised call option requires the option seller (writer) to sell currency at the agreed-on strike price. An exercised put option requires the option seller to buy currency at the agreed-on strike price. *Other products* include hybrid instruments, such as differential swaps, that do not fit neatly into any of the aforementioned markets.

Exchange-Traded Derivatives (2% Relative to the Total OTC Market)

Futures, futures on options, and some options are traded on exchanges. Futures are similar in function to forward transactions because they are contractual obligations to deliver a specified amount of a currency on a predetermined future date in return for another currency of equivalent value. The main differences are that futures contracts are exchange-traded, executed through brokers or electronically, and have terms (e.g., size and delivery dates) that are standardized.

In general, the difference between a futures contract and a forward contract is like the difference between buying clothes off the rack and buying them custom-tailored. For a price, the forward market will tailor your contract to whatever terms you want. In the futures market, if the terms are not precisely to your liking, you can either accept them or not transact the deal. For instance, consider settlement dates and contract amounts. The Swiss franc futures contract that is traded on the Chicago Mercantile Exchange is CHF 125,000 in size and matures on a particular day during the months of March, June, September, and December—just four times a year! Forward contracts can have almost any maturity (e.g., 101 days in the future) and be nearly any size (e.g., CHF 98,567). They are fit to meet an individual customer's specific needs. Most activity in the futures markets is speculative.

Conclusion

The foreign exchange market is one of the largest and most competitive markets in the world. This global network of dealers and financial institutions connects buyers and sellers of international currencies. Trades are done either over the counter or on exchanges. Supply and demand are globally sourced, and prices are uniform worldwide. Business managers should have a firm understanding of how to use the spot markets in foreign exchange. Just as understanding a foreign language permits us to translate foreign words into more familiar native

expressions, exchange rates allow foreign prices, rates, and returns to be translated into their domestic-currency counterparts.

Foreign currency is traded using bid-ask rates. The bid rate is the price at which a bank will buy a currency from a customer, and the ask rate is the price at which a bank will sell a currency to a customer. Dealers, financial institutions, and exchanges are the veins and arteries through which foreign exchange trades travel to customers, such as institutional investors, hedge funds, proprietary trading firms, nondealer banks, central banks, sovereign wealth funds, corporations, and individuals. Because more than 99% of all foreign exchange transactions are large ($1 million and more), it is most helpful to think of the foreign exchange market as a global, electronic market where currency exchange only takes place by debiting and crediting checking accounts. This leads to us to Guideline #2 in this text: *Checking accounts never leave the country*. This guideline is helpful because it fights against the belief that foreign exchange transactions directly change a nation's monetary base and money supply—they do not.

Key Points

- An exchange rate is the price of Currency A in terms of Currency B.
- The currency being valued is always in the denominator.
- Currency A appreciates relative to Currency B when its value rises relative to Currency B. Currency A depreciates relative to Currency B when its value falls relative to Currency B.
- Using the correct exchange rate means making sure the proper units cancel out when multiplying the exchange rate times the transaction amount.
- The foreign exchange market is a global network of dealers and financial institutions connecting buyers and sellers of currencies.
- The bid rate is the rate at which banks buy foreign currency from customers, and the ask rate is the rate at which banks sell foreign currency to customers.
- The retail market handles relatively small transactions, and the wholesale market handles large transactions (usually $1 million or more).
- Foreign currencies are traded over the counter and on exchanges.
- The foreign exchange market is open for trading 24 hours a day, every working day of the year.
- The supply of and demand for foreign exchange are globally sourced.
- Competition and arbitrage ensure that foreign exchange rates are uniform worldwide.
- The foreign exchange market is close to perfectly competitive, with many buyers and sellers, easy entry and exit from the market, near-perfect information, and homogeneous products.
- Arbitragers earn profits by finding tiny imperfections in foreign exchange markets and eliminating them. They purchase a currency that is slightly undervalued (e.g., offered by Trader A), thereby raising its price, and simultaneously sell this currency at the higher

price (e.g., to Trader B), thereby lowering the price (and vice versa). The result is a fairly priced currency.
- The U.S. dollar is the dominant currency in the foreign exchange markets.
- Dealers, institutional investors, hedge funds, proprietary trading firms, small nondealer banks, businesses, governments, and individuals are participants in the foreign exchange market.
- Approximately 90% of all foreign exchange transactions are among dealers and other financial intermediaries.
- Any time a central bank buys or sells foreign exchange and alters the size of its balance sheet, the nation's monetary base changes. Central bank purchases of a foreign currency increase the nation's monetary base, and central bank sales of a foreign currency reduce it.
- *Guideline #2: Checking accounts never leave the country of origin.*
- Foreign exchange transactions (by anyone other than central banks) do not affect nations' money supplies or monetary bases.
- Spot market transactions are for immediate or near-immediate delivery. Typically, there is a two day settlement period.
- One way to avoid calculation mistakes is to put the currency you want to purchase or sell in the denominator.
- There are only two rates of foreign exchange (i.e., a bid rate and an ask rate); remember that you (the bank's customer) will always get the disadvantageous one.
- Six major parts of the foreign exchange market are the spot market, forward market, swap market, currency swap market, options and other products market, and, finally, the exchange-traded derivatives market.

Review Questions

1. In terms of the yen–peso exchange rate, is it always true that if the peso rises in value, the yen must fall in value?
2. Is the foreign exchange market a good example of pure competition, or is the market imperfectly competitive? Explain.
3. Suppose Sue Flay, a U.S. investor, purchases British pounds worth $1.25 million in the foreign exchange market. What effect does this transaction have on the U.S. and British monetary bases and M2 money supplies? Assume the spot exchange rate is $1.25/£, the pound floats against the dollar, and the transaction is sufficiently small so that the exchange rate does not change.
4. Due to the falling U.S. dollar, suppose Japanese investors purchase U.S. real estate at bargain prices. Suppose further that Japanese banks lend yen and then borrowers convert them into U.S. dollars and pay for the real estate. Explain what effect these transactions would have, if any, on the Japanese and U.S. monetary bases.
5. Given the information in the following table, what exchange rates should be used (i.e., bid or ask) if you convert $1 million into euros, and then convert the euros into yuan, yuan into yen, and finally the yen into dollars? If you do these conversions, how many dollars will you end up owning?

Exchange Rate	Bid Rate	Ask Rate
Yuan per euro	CNY7.72/EUR	CNY7.94/EUR
Dollar per euro	USD1.11/EUR	USD1.12/EUR
Yen per dollar	JPY106.58/USD	JPY106.52/USD
Yen per yuan	JPY15.39/CNY	JPY15.42/CNY

6. Using the table that follows, calculate (showing all the exchange rates you use) how many dollars you end with if you (1) convert USD1,000 to Swiss francs, (2) Swiss francs to euros, (3) euros to pounds, and (4) pounds to U.S. dollars.

Exchange Rate	Bid Rate	Ask Rate
Dollar–Pound	USD1.22/GBP	USD1.24/GBP
Swiss francs–euro	CHF 1.09/EUR	CHF1.11/EUR
Swiss francs–dollar	CHF 0.98/USD	CHF 1.00/USD
Pounds–euro	GBP0.91/EUR	GBP0.93/EUR

Discussion Question

7. What is the forward exchange market? Explain how an Italian exporter, who is due to receive 30 million Japanese yen (¥30 million) in 90 days, could use the forward market to reduce risk.

Chapter 16
Foreign Exchange Markets

Effective business managers should be very familiar with foreign exchange markets and understand how to proactively adjust their positions and transactions to expected changes in international currency values. This chapter discusses combinations of four different types of exchange rates (bilateral, effective, nominal, and real) and the economic forces that cause them to fluctuate. Understanding these cause-and-effect relationships is vital for making informed decisions about foreign trade and investment opportunities.

Attention is also paid to the spectrum of different exchange rate regimes that countries adopt. Why do some nations allow their currencies to fluctuate (i.e., float) freely, while others fix them to the currency of another nation or a basket of foreign currencies? Put differently, what is it about foreign exchange markets that convinces some central banks to fix their exchange rates when they would not consider setting the prices of commodities or financial assets? In short, what's so special about exchange rates?

The Basics

Measuring a Currency's Value

The value of a nation's currency can be measured relative to a single foreign currency or relative to a basket of foreign currencies. Single currency measures are called *bilateral* exchange rates, and basket-based measures are called *effective* exchange rates.

A nation's currency can also be measured with or without taking into consideration differences in domestic and foreign price levels. Measures that ignore relative international prices are called *nominal* exchange rates, and those that account for them are called *real* exchange rates.

Figure 16.1 shows the four alternative exchange rate measures that result from the bilateral-versus-effective and nominal-versus-real distinctions. They are the nominal bilateral, nominal effective, real bilateral, and real effective exchange rates. Let's see what they mean and when to use them.

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	Nominal Exchange Rate	Real Exchange Rate
Bilateral Exchange Rate	Nominal bilateral	Real bilateral
Effective Exchange Rate	Nominal effective	Real effective

Figure 16.1: Four Primary Exchange Rate Measures.

Bilateral Versus Effective Exchange Rates

A *bilateral exchange rate* is the value of one currency in terms of another currency (discussed in Chapter 15, "Foreign Exchange Basics"). Therefore, dollars per euro ($/€ or USD/EUR), euros per pound (€/£ or EUR/GBP), and yen per Swiss franc (¥/CHF or JPY/CHF) are all examples of bilateral exchange rates.[1]

These rates are needed to translate prices, costs, earnings, assets, and liabilities denominated in one currency into their equivalents denominated in another currency. At the same time, they link just two currencies. Therefore, bilateral exchange rates are not useful tools for answering questions about whether the average value of a nation's currency has changed for better or worse. For this, we need effective exchange rates.

To understand better when effective exchange rates play a role, suppose a newspaper had the following headline: "U.S. Dollar Rises on International Markets," but after reading the accompanying article, you found that the dollar rose only against the Canadian dollar, euro-area euro, Mexican peso, and Japanese yen. At the same time, it fell against the Swiss franc, British pound, Thai baht, and Indian rupee. Before questioning the accuracy of the article's title, keep in mind that Canada, the euro area, Mexico, and Japan are major U.S. trading partners. Therefore, the headline was probably referring to the dollar's weighted-average value, which means it was referring to the dollar's *effective exchange rate*.

Choosing Weights for the Effective Exchange Rate

Selecting the proper weight for each foreign currency in the effective exchange rate pool is important. The more significant the currency, the higher its weight—but there is a decision to make. When calculating weights for the U.S. dollar's effective exchange rate, should they be based on trade the United States does with *all* its trading partners or just its *major* trading partners? Should the trade flows be measured in terms of exports, imports, or the sum

1 Every currency has a three-letter abbreviation. See Currency System::Support::Currency Codes at https://currencysystem.com/codes/ (Accessed August 7, 2019).

of both imports and exports? Instead of using trade flows as the basis for the weights, should the effective exchange rate be based on other measures, such as international capital flows or global supply and demand elasticities? The answer is that each of these weighting methods can be and is used.

The variety of potential alternatives may seem bewildering and a bit disconcerting, but the purpose for calculating a meaningful effective exchange rate is the same, namely, to provide information on the average value of a nation's currency. For the most part, reported effective exchange rates use trade flows as the basis for their weights.

Nominal Versus Real Exchange Rates

Newspapers, magazines, and television reports are filled with stories about exchange rates and the economic effects of their movements. Most of these reports focus on *nominal exchange* rates because they are highly visible. Nominal exchange rates are the ones quoted to customers by bank tellers and foreign exchange dealers around the world and the ones we use to translate foreign prices into domestic prices.

The problem with nominal exchange rates is that they do not convey enough meaningful information to determine whether nations' international competitive positions have changed because they ignore the effects of relative international price differences. For this reason, serious economic and financial analyses usually focus on real exchange rates rather than nominal ones.

The *real exchange rate* is calculated by adjusting the nominal exchange rate for relative international price differences. For example, take two countries and two currencies, Country A with Currency A and Country B with Currency B. Their real exchange rate is equal to the nominal exchange rate (NER), in terms of Currency B units per Currency A, times the domestic price (Currency A) of Country A's tradable basket of goods and services,[2] divided by the domestic price (Currency B) of Country B's tradable basket of goods and services (see Figure 16.2).

Care must be taken whenever real exchange rates are calculated because the currency units used to measure the nominal exchange rate and prices of tradable baskets must be aligned correctly for the real exchange rate to make sense. If the nominal exchange rate is expressed in units of Currency B per unit of Currency A, then the price of Country A's tradable basket, denominated in terms of Currency A, must be put in the numerator. Two examples help clarify this point.

2 A tradable basket is a representative sample of a nation's exported goods and services.

$$\text{Real Exchange Rate} \equiv \text{RER} \equiv \frac{\text{NER}_{(B/A)} \times P^A}{P^B}$$

where,

- $\text{NER}_{(B/A)}$ ≡ Spot nominal exchange rate stated in units of Currency B per unit of Currency A
- Price^A ≡ Price of Country A's tradable basket of goods and services denominated in terms of Currency A,
- Price^B ≡ Price of Country B's tradable basket of goods and services denominated in terms of Currency A

Figure 16.2: Real Exchange Rate.

Example 1

Suppose the nominal exchange rate equals \$1.25/€, the price of a tradable basket of euro area (EA) goods and services is €2,000, and the price of the United States' tradable basket is \$1,250. Under these circumstances, Currency A is the euro, and Country A is the euro area; Currency B is the dollar, and Country B is the United States. Because the nominal exchange rate is expressed as dollars per euro (\$1.25/€), the euro price of the euro area's basket must be put in the numerator of the real exchange rate. In this way, the common (euro) term cancels, and the numerator becomes \$2,500.[3] Notice, in Figure 16.3, how the numerator equals \$2,500 per euro area's tradable basket and the denominator equals \$1,250 per U.S. tradable basket. The dollar signs cancel and the real exchange rate tells us that two tradable baskets of U.S. goods and services are equal to one euro-area-tradable basket (see Figure 16.3). In short, the euro area tradable basket is twice as expensive as one U.S. tradable basket.

Example 2

Alternatively, if the exchange rate is expressed as euros per dollar (i.e., €0.80/\$),[4] then the dollar price of the U.S. tradable basket must be put in the numerator, so the common (dollar) element cancels. Notice how the numerator equals €1,000 per U.S. tradable basket, and the denominator equals €2,000 per euro area tradable basket. Therefore, the real exchange rate equals 0.50 euro-area baskets per one U.S. tradable basket. In short, U.S. prices are half the euro area's prices for the tradable baskets (see Figure 16.3).

Interpreting Real Exchange Rates

Real exchange rates have no currency denomination (i.e., they are not stated in terms of Currency A or Currency B). If a real exchange rate equals 1.0, then the

3 Notice how the common euro term cancels in the numerator and denominator: (\$1.25/€ × €1,000) = \$1,250

4 The inverse of €1/\$1.25 equals €0.80/\$.

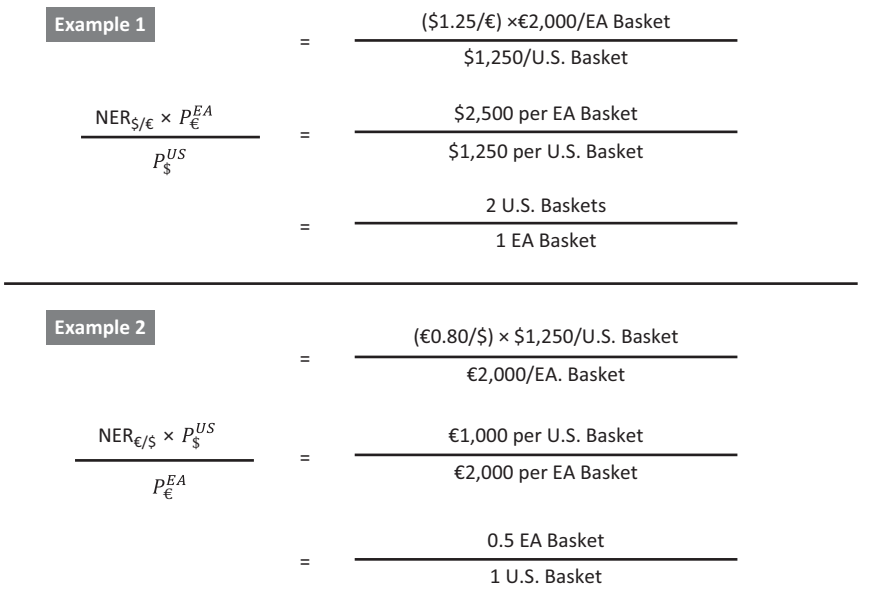

Figure 16.3: Calculating and Interpreting the Real Exchange Rate.

average price of the tradable market basket is the same in both countries, and there should be no opportunities, on average, for international arbitrage.

What does it mean when the real exchange rate is greater than or less than 1.0? If the real exchange rate is greater than 1.0, then the exchange rate-adjusted price of the numerator country's tradable basket is higher than the price of the denominator country's basket. In our example, if the nominal exchange rate is expressed as dollars per euro ($/€) and the real exchange rate equals 1.15, then the dollar-denominated price of the euro area's basket is 15% higher than the dollar-denominated price of the U.S. basket.[5] As a result, there should be arbitrage opportunities to purchase goods in the United States and sell them in the euro area. Over time, one would expect the competitive unevenness to disappear as the euro depreciates, euro-area prices fall, and U.S. prices rise.

A real exchange rate less than 1.0 has the opposite meaning. If the nominal exchange rate is expressed as dollars per euro ($/€) and the real exchange rate equals 0.90, then the dollar-denominated price of the euro area's basket is 10%

5 By contrast, if the nominal exchange rate is expressed as euros per dollar (€/$) and the real exchange rate equals 1.15, then the euro-denominated price of the U.S. basket is 15% higher than the euro-denominated price of the euro area's basket.

lower than the dollar-denominated price of the U.S. basket.[6] As a result, there should be arbitrage opportunities to purchase goods in the euro area and sell them in the United States. Under these circumstances, one would expect the dollar value of the euro to appreciate, euro area prices to rise, and U.S. prices to fall.[7]

Purchasing Power Parity

Purchasing power parity (*PPP*) exists when the real exchange rate equals 1.0. At that rate, the price of Country B's tradable basket equals the exchange rate-adjusted price of Country A's tradable basket.[8] Exchange rates tend to move toward their PPP levels because, if they did not, arbitragers should be able to make riskless profits by purchasing goods in the relatively cheap market and selling them in the relatively expensive one. Normally, convergence to PPP takes place over relatively long periods. Therefore, we will not deal with PPP in this chapter. Instead, we will save this discussion for Chapter 23, "Long-Term Inflation, Exchange Rates, and Unemployment," where long-term economic analysis (e.g., business scenario planning) is addressed.

For now, we will focus our attention on developing a set of tools that can be used by business managers to conduct short-term country analyses and improve their analytical business reports, such as budgets and business plans. In the short run, real exchange rates can be quite different from 1.0. While they may approach PPP in the long run, a broad array of factors other than international price differences, such as relative international incomes and interest rates, also play significant roles in determining the exchange rate.

Nominal Versus Real Exchange Rates: An Example

Given a choice between using real or nominal exchange rates in economic or financial analyses, it is usually wise to choose real exchange rates. An example helps clarify why this is the case.

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6 By contrast, if the nominal exchange rate is expressed as euros per dollar (€/$) and the real exchange rate equals 0.90, then the euro-denominated price of the U.S. basket is 10% lower than the euro-denominated price of the euro area's basket.

7 From 1994 to 2019, the US real effective exchange rate varied from about 0.95 to 1.30, China's varied from about 0.66 to 1.30, and Brazil's varied from about 0.40 to 1.10.

8 PPP exists when P^B = NER (B/A) × P^A, where P^A and P^B are the average price levels in Country A and Country B, respectively, and NER (B/A) is the nominal value of Country A's currency in terms of Country B's currency.

Suppose the value of the Swiss franc (CHF) rises from $1.00/CHF to $1.02/CHF, which is a 2% appreciation of the Swiss franc. What would you expect to happen to U.S. imports from Switzerland and U.S. exports to Switzerland? You might be tempted to say that U.S. imports from Switzerland should fall because Swiss goods and services, on average, are 2% more expensive to U.S. residents. Similarly, you might conclude that U.S. exports to Switzerland should rise because U.S. goods and services are now (about) 2% cheaper to Swiss residents. After all, Swiss franc holders would now receive 2% more dollars for each Swiss franc.

These answers would be correct if Swiss prices and U.S. prices remained the same, but that is not always the case. Changes in domestic or foreign prices can offset, reverse, or reinforce movements in nominal exchange rates. For this reason, real exchange rates, which consider nominal exchange rates *and* relative international prices, are used.

Table 16.1 summarizes three cases in which relative international prices and the nominal exchange rate change by different amounts. Notice that the change in nominal exchange rate (Column 2) is the same, from the Base Case to Cases #1 to #3, but incentives differ.

Table 16.1: Real Versus Nominal Exchange Rates.

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
			(Col. 2 × Col 3)		$\frac{Col.\ 4}{Col.\ 5}$
	Nominal Exchange Rate	Swiss Franc Price of Swiss Basket	Dollar Price of Swiss Basket	Dollar Price of U.S. Basket	Real Exchange Rate
Base Case	$1.00/CHF	CHF 1,000	$ 1,000	$ 1,000	$\frac{\$1,000}{\$1,000} = 1.000$
Case 1	$1.02/CHF	CHF 1,000	$ 1,020	$ 1,020	$\frac{\$1,020}{\$1,020} = 1.000$
Case 2	$1.02/CHF	CHF 980.40	$ 1,000	$ 1,000	$\frac{\$1,000}{\$1,000} = 1.000$
Case 3	$1.02/CHF	CHF 995	$ 1,014.90	$ 1,010	$\frac{\$1,014.90}{\$1,010} = 1.005$

Base Case

The base case assumes the nominal exchange rate is equal to $1.00 per Swiss franc (see Column 2 in the row labeled “Base Case”), and the price for

Switzerland's tradable basket is equal to CHF 1,000 (Column 3).[9] Therefore, the dollar price of Switzerland's basket equals $1,000 (Column 4).[10] For this initial case, assume the price of the U.S. tradable basket is also equal to $1,000 (Column 5).

From this initial position, let's assume that the nominal exchange rate changes from $1.00 to $1.02. In Cases 1 and 2, the real exchange rate (Column 6) does not change from 1.0 (i.e., the base case) because fluctuations in U.S. or Swiss prices offset the nominal exchange rate movement. Only in Case 3 does the real exchange rate change. Let's look closer at the examples in Table 16.1 to gain a better understanding of the real exchange rate.

Case 1: Swiss Franc Appreciates, and U.S. Prices Rise to Offset It

If the Swiss franc appreciates from $1.00/CHF to $1.02/CHF (Column 2, "Case 1"), and Swiss prices remain the same, then the dollar cost of the Swiss basket rises from $1,000 to $1,020 (Column 4).[11] If U.S. producers do not react to the higher Swiss prices and keep theirs the same, the United States gains a competitive advantage over Switzerland, but notice that in Case 1, this does not happen. The potential competitive advantage the United States might have gained is erased by U.S. producers raising their prices by 2% from $1,000 to $1,020 (Column 5).

Despite the Swiss franc's appreciation (i.e., the dollar's depreciation), U.S. prices change to offset the exchange rate movement. The real exchange rate (Column 6) shows instantly that no competitive advantage has been gained or lost by either country because it started at 1.0 (base case) and ended at 1.0.

Case 2: Swiss Franc Appreciates, and Swiss Prices Fall to Offset It

In Case 2 (see Table 16.1, "Case 2"), the value of the Swiss franc rises from $1.00/CHF to $1.02/CHF. This time, though, suppose that Swiss producers react to the appreciated Swiss franc (and the potential loss of U.S. business) by lowering the average price level of their tradable basket from CHF 1,000 to CHF 980.40. As a result, the dollar cost of Switzerland's basket (Column 4) remains the same, which means the Swiss franc's appreciation causes no net change in Switzerland's competitive advantage relative to the United States. Again, the real exchange rate communicates this conclusion immediately because it begins at 1.0 (base case) and ends at 1.0.

Case 3: A Change in the Real Exchange Rate

In Case 3 (see Table 16.1, "Case 3"), the value of the Swiss franc rises from $1.00/CHF to $1.02/CHF, but this time the price of Switzerland's basket of tradable products falls from CHF 1,000 to CHF 995 (Column 2), and U.S. prices rise from $1,000 to $1,010 (Column 5). As a result, the real exchange rate changes from 1.0 to 1.005, which means the competitive position

9 From 2017 to 2019, the average price of a Swiss franc was approximately $1.

10 Column 4 = Column 2 × Column 3. Therefore, ($1.00/CHF) × CHF 1,000 = $1,000

11 $1.02/CHF × CHF 1,000 = $1,020

of the United States relative to Switzerland improves as a net result of changes in relative prices and changes in the nominal exchange rate.

The combination of an appreciating Swiss franc and falling Swiss prices cause the dollar price of Switzerland's basket to rise from \$1,000 to \$1,014.90 (Column 4), which is about 0.5% higher than the price of the U.S. basket (\$1,010), but we already knew this by looking at Column 6. An increase in the real exchange rate from 1.000 to 1.005 means that the dollar price of the Swiss tradable basket of goods and services is now 0.5% higher than the dollar price of the U.S. basket. In short, Swiss goods and services, on average, have become 0.5% more expensive than U.S. goods and services.

Percentage Changes in Real Exchange Rates

Real exchange rates are frequently used in economic analyses, so it is vital to understand them, but analysts are often more concerned about *changes* in real exchange rates than they are about their *levels*. Figure 16.4 shows that the percentage change in the real exchange rate is (approximately) equal to the percentage change in the nominal value of Currency A (in terms of Currency B units) plus the percentage change in prices (i.e., inflation rate) of Country A's tradable basket minus the percentage change in prices (i.e., inflation rate) of Country B's tradable basket. This approximation is most accurate when the changes in prices and exchange rates are very small. Nevertheless, the elements in this equation and their relationship to each other are useful for conveying the key factors that cause real exchange rates to change, which are percentage movements in the nominal exchange rate and relative international inflation rates.

$$\textbf{Real Exchange Rate} \equiv \textbf{RER} \equiv \frac{\textbf{NER}_{(B/A)} \times \textbf{P}^{A}}{\textbf{P}^{B}}$$

$$\%\Delta\ \textbf{Real Exchange Rate} \equiv \%\Delta\ \textbf{RER} \cong \%\Delta\ \textbf{NER}_{(B/A)} + \%\Delta\ \textbf{P}^{A} - \%\Delta\ \textbf{P}^{B}$$

where,

- $\%\Delta\ \text{NER}_{(B/A)} \equiv$ Percentage change in the spot nominal exchange rate stated in units of Currency B per unit of Currency A
- $\%\Delta\ \text{Price}^{A} \equiv$ Percentage change in the price of County A's tradable basket of goods and services denominated in terms of Currency A
- $\%\Delta\ \text{Price}^{B} \equiv$ Percentage change in the price of County B's tradable basket of goods and services denominated in terms of Currency B

Figure 16.4: Percentage Change in the Real Exchange Rate.

Table 16.2 uses the same figures as Table 16.1, but it restates them in terms of percentage changes. Notice how the real exchange rate does not change in

Table 16.2: Percentage Changes: Nominal Exchange Rates, Inflation Rates, and Real Exchange Rates.

	%Δ Nominal Exchange Rate	+	%Δ CHF Price of Swiss Basket	–	%Δ Dollar Price of U.S. Basket	≅	%Δ Real Exchange rate
Case 1	+2%	+	0%	–	+2%	≅	0%
Case 2	+2%	+	– 2%	–	0%	≅	0%
Case 3	+2%	+	– 0.5%	–	+1%	≅	+0.5%

Cases 1 and 2, but it rises by 0.5% in Case 3. As a result, the conclusions in Table 16.2 are identical to the findings in Table 16.1.

Review of Exchange Rate Measures

Table 16.3 distinguishes and defines the various combinations of bilateral, effective, nominal, and real exchange rates.

Table 16.3: Review of Exchange Rate Measures.

Exchange Rate	Nominal	Real
Bilateral	The **nominal bilateral** exchange rate is the value of one currency in terms of another currency.	The **real bilateral** exchange rate is the value of a tradable basket of one country's goods and services denominated in tradable baskets of another country's goods and services.
Effective	The **nominal effective** exchange rate is the weighted-average value of a currency relative to many foreign currencies.	The **real effective** exchange rate is the weighted-average value of a tradable basket of one country's goods and services relative to tradable baskets of many foreign countries' goods and services.

Figure 16.5 profiles the nominal effective exchange rate and the real effective exchange rate for the United States from 1994 to 2019.[12] Notice that, during this

12 The data are weighted average exchange rates for the U.S. dollar relative to a large group of major U.S. trading partners. The index weights reflect U.S. export shares relative to import shares. For details on the construction of these weights, see Board of Governors of the U.S. Federal Reserve System, Currency Weights, http://www.federalreserve.gov/releases/h10/weights/default.htm (accessed August 7, 2019).

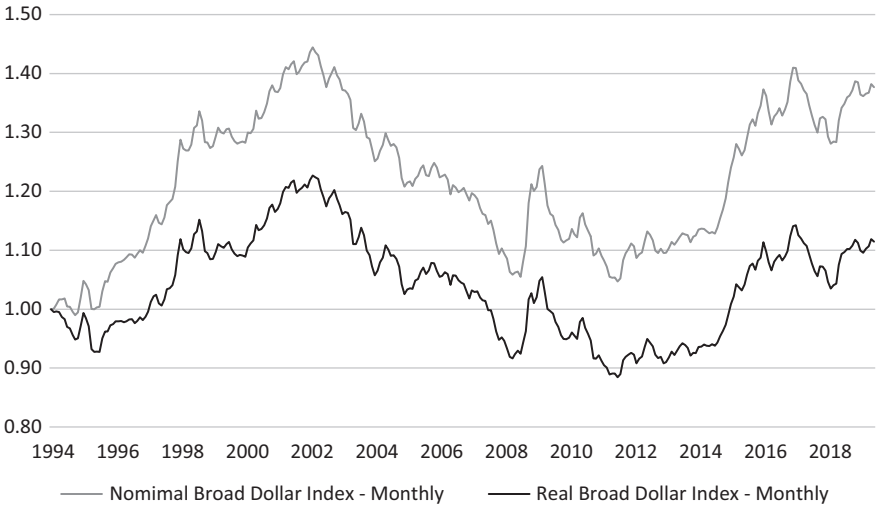


Figure 16.5: Nominal and Real Effective Dollar Exchange Rates—Broad Index of Currencies, 1994–2019.
Source: Federal Reserve Board, Foreign Exchange Rates, https://www.federalreserve.gov/releases/h10/summary/default.htm (Accessed August 7, 2019)

period, the real and nominal effective exchange rates for the dollar tracked each other rather closely (i.e., a correlation above 90%), with the real exchange rate having a lower overall average and volatility. This close correlation is not always the case. For some countries and over longer periods of time, the real and nominal exchange rates can vary considerably.

How Are Exchange Rates Determined?

In January 2019, the U.S. dollar was worth approximately 110 Japanese yen, 670 Chilean pesos, 1,120 South Korean wons, 1,510 Lebanese pounds, and 14,090 Indonesian rupiahs. At the same time, it was worth only about 0.88 euros, 0.76 British pounds, 0.30 Kuwaiti dinars, and 0.00029 bitcoins. Why do exchange rates differ so much? What determines a currency's international value? Does a dollar costing 0.30 currency units in one case and 14,090 units in another imply something important about the nations' economic health?

The forces of supply and demand determine exchange rates, and they reflect the actions of all participants in the currency markets. The common element among these groups is that they are willing and able to exchange one currency for another currency.

Some Supply and Demand Basics

To understand how exchange rates are determined and why they change, it is essential to have some supply and demand basics firmly in mind. To focus our discussion, let's consider only the dollar-Swiss franc foreign exchange market because the same principles apply to the foreign exchange market for any two currencies.

Figure 16.6 shows foreign exchange supply and demand curves. Prices (i.e., exchange rates) are on the vertical axis, and quantities per period (i.e., the quantities of foreign exchange per period) are on the horizontal axis. The supply curve is upward sloping, and the demand curve is downward sloping.

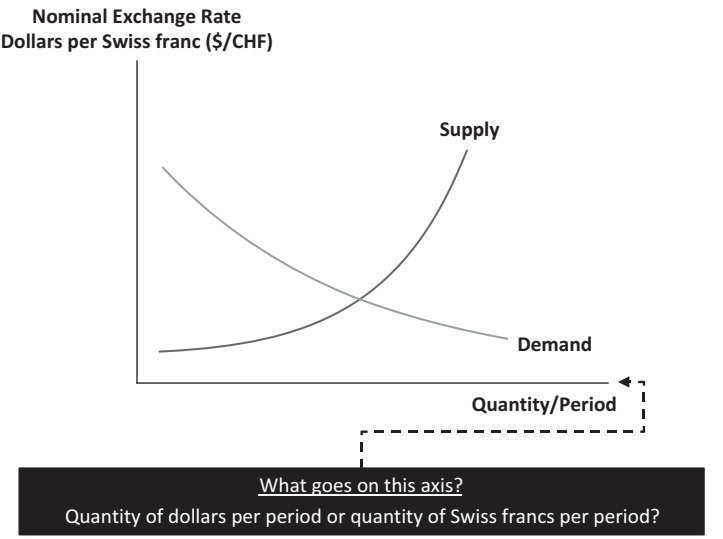


Figure 16.6: Supply and Demand in the Foreign Exchange Market: What Goes on the Horizontal Axis?

When first learning to analyze foreign exchange markets, many people have problems determining what currency belongs on the horizontal axis. For example, if the exchange rate is expressed as the number of dollars per Swiss franc ($/CHF), as it is in Figure 16.6, then should the quantity of dollars per period or the quantity of Swiss francs per period be put on the horizontal axis? To U.S. residents, a Swiss franc is the "foreign" currency; to Swiss residents, a dollar is the "foreign" currency; and to anyone else (e.g., European Union, Asian, and Middle Eastern residents), both currencies are "foreign." Correctly determining what to put on the horizontal axis is crucial because, if it is mislabeled, any graphical supply and demand analyses will produce answers that conflict with economic logic, common sense, and factual evidence.

One easy way to solve this labeling problem is to recast the question in a context that is familiar—a setting in which the answer is crystal-clear. Once the transparent setting is in mind, it can be transferred to the foreign exchange market. For example, Figure 16.7 shows the market for apples. Notice that the vertical axis is stated in terms of dollars per pound of apples, and the equilibrium price is $1 per pound of apples. When the price (on the vertical axis) is stated in terms of dollars per pound of apples, then the market being analyzed is the apple market (not the dollar market), and pounds of apples per period belong on the horizontal axis.

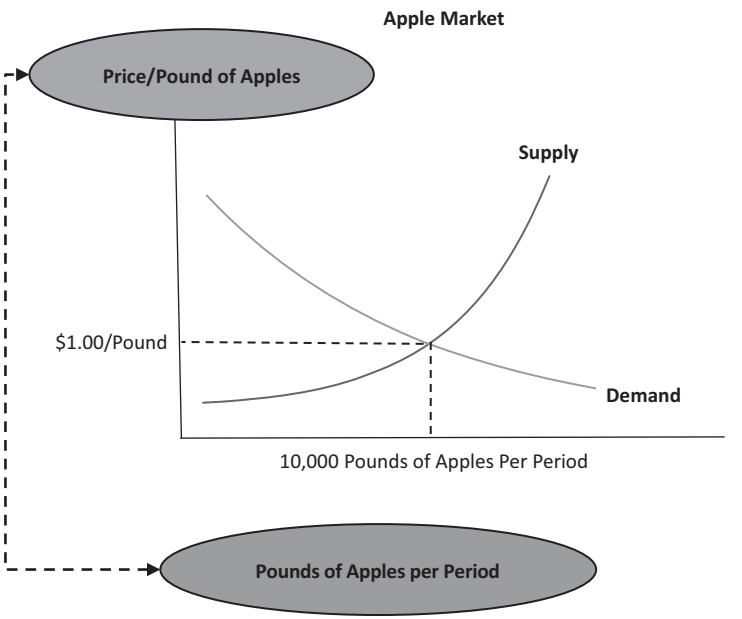


Figure 16.7: Putting Supply and Demand into a Familiar Context.

If the exchange rate is stated in terms of dollars per Swiss franc, then the Swiss franc market is being analyzed. Therefore, Swiss francs per period must be placed on the horizontal axis (see Figure 16.8 – left side). By contrast, if the exchange rate is stated in terms of Swiss francs per dollar (as it is on the right side of Figure 16.8), then the market being analyzed is the dollar market. Therefore, dollars per period (e.g., per week) should be placed on the horizontal axis.

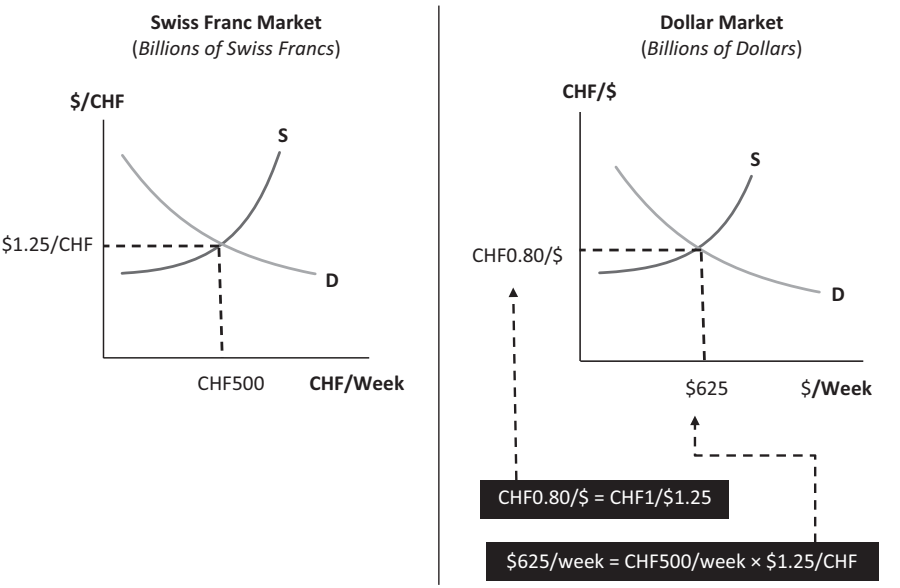


Figure 16.8: Swiss Franc and Dollar Foreign Exchange Markets.

The foreign exchange market can be analyzed using the Swiss franc market (the left side of Figure 16.8) *or* the dollar market (the right side of Figure 16.8). It does not have to be analyzed both ways because these markets are mirror images of one another. We know this because, if the equilibrium value of the Swiss franc is $1.25/CHF, then the equilibrium value of the dollar must be CHF 0.80/$ because the reciprocal of $1.25/CHF is CHF 0.80/$. Similarly, if the equilibrium quantity of Swiss francs per week is CHF 500 billion, then the equilibrium quantity of dollars per week must be $625 billion because CHF 500 billion × $1.25/CHF = $625 billion.

The value of the Swiss franc is determined by the supply and demand for Swiss francs per period, but who demands Swiss francs and who supplies

them to the foreign exchange markets? The next two sections answer these questions.

Foreign Currency Demand

Swiss francs are demanded in the foreign exchange market for many reasons and by many participants. Let's briefly review the major participants and their motivations for using this market (see Figure 16.9).

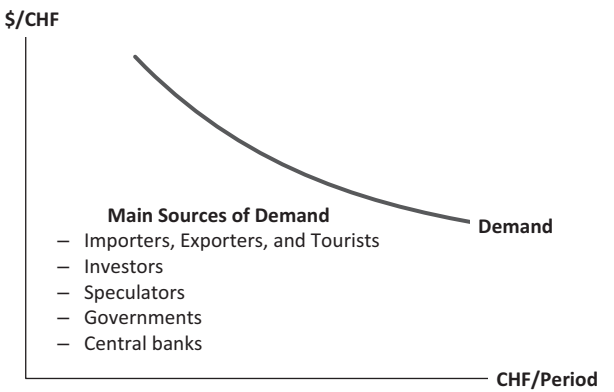


Figure 16.9: Major Groups That Demand Swiss Francs in the Dollar–Swiss Franc Market.

Importers, Exporters, and Tourists

U.S. importers and tourists demand Swiss francs to pay for Swiss-made goods and services. Swiss exporters also demand Swiss francs when they are paid in U.S. dollars but wish to own Swiss francs.

Investors and Speculators

Investors are pension funds, insurance companies, mutual funds, hedge funds, banks, proprietary trading firms, and individuals who purchase Swiss-franc-denominated financial instruments (i.e., debt and equity instruments). They are also companies that build factories and make acquisitions in Switzerland. *Speculators* are like investors but have higher-than-average tolerances for risk. All of these participants are active in foreign exchange markets on two different levels—first, when they buy Swiss francs to make their initial investments and, second, when they repatriate their earnings and principal, by converting Swiss francs back into dollars.

Governments and Central Banks

The U.S. government purchases Swiss francs with dollars to support international activities such as those related to its embassies and consulates in Switzerland, as well as to make gifts, aid, and relief payments in Swiss francs. The U.S. and Swiss central banks (i.e., the Federal Reserve and Swiss National Bank) demand Swiss francs when they want to increase the Swiss franc's value relative to the dollar.

Others

Other demand-side participants in the Swiss franc foreign exchange market are U.S. residents who demand Swiss francs to make transfers, such as gifts and charitable contributions. Swiss individuals who receive dollar royalties and incomes, as well as Swiss companies that earn dollar license fees, also demand Swiss francs in the foreign exchange market.

Why Is the Demand for Foreign Exchange Downward Sloping?

As Figure 16.9 shows, there is an inverse relationship between the Swiss franc's value and the quantity of Swiss francs demanded each period. Because the exchange rate is expressed as dollars per Swiss franc, this relationship can be most easily understood by considering how a change in the exchange rate affects U.S. importers. When U.S. importers purchase Swiss goods, they must consider two prices: the price to buy a Swiss franc (i.e., the exchange rate) and the Swiss-franc–denominated purchase price of Swiss products. If either price rises, the effective cost of Swiss products increases. Higher Swiss franc currency value makes all Swiss goods and services more expensive to U.S. residents and, therefore, reduces the amount demanded per period.

Foreign Currency Supply

Swiss francs are supplied to the foreign exchange market by groups similar to those that demand them. As you read the list of Swiss franc suppliers, you will notice that anyone supplying Swiss francs to the (dollar-Swiss franc) foreign exchange market is simultaneously demanding dollars. We will discuss this point in more detail later in this chapter. The major suppliers of Swiss francs in the foreign exchange market are presented in Figure 16.10 and described in the following sections.

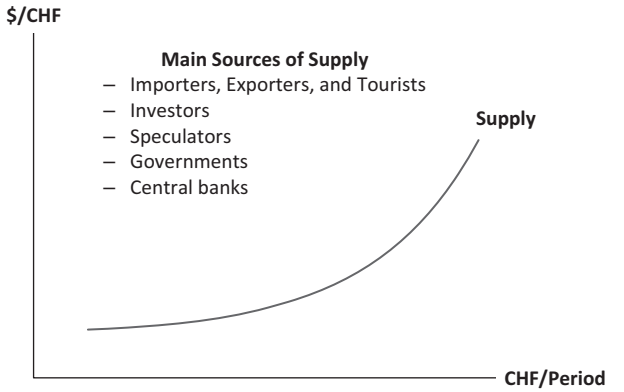


Figure 16.10: Major Groups That Supply Swiss Francs to the Dollar–Swiss Franc Market.

Importers, Exporters, and Tourists

Swiss importers and tourists supply Swiss francs to the foreign exchange market to purchase dollars and, after that, buy U.S. goods and services. U.S. exporters supply Swiss francs to the foreign exchange market when they are paid in Swiss francs but want to own U.S. dollars.

Investors and Speculators

Swiss financial investors and Swiss companies supply Swiss francs to the foreign exchange market to purchase dollars for financial investments and direct investments in the United States. U.S. individuals and companies supply Swiss francs to the foreign exchange market when they convert their Swiss-franc–denominated principal and earnings (e.g., profits, interest, and dividends) into dollars. Finally, investors and speculators supply Swiss francs to the foreign exchange market when they liquidate their Swiss-franc–denominated assets and convert them into dollars.

Governments and Central Banks

The Swiss government supplies Swiss francs to the foreign exchange market (i.e., demands U.S. dollars) to support its embassies and consulates in the United States, as well as to make gifts, aid, and relief payments in U.S. dollars. The U.S. Federal Reserve and Swiss National Bank supply Swiss francs to the foreign exchange market when they want to decrease the value of the Swiss franc relative to the dollar.

Others

Other suppliers of Swiss francs in the foreign exchange market include Swiss residents who supply Swiss francs to make dollar-denominated transfers, such as gifts and charitable contributions. U.S. individuals who receive Swiss franc royalties and incomes, as well as U.S. companies that earn Swiss franc license fees also supply Swiss francs to the foreign exchange market when they want these returns in U.S. dollars.

Why Is the Supply of Foreign Exchange Upward Sloping?

Figure 16.10 shows the positive relationship between the nominal exchange rate and the quantity of Swiss francs supplied to the market. As was the case with the downward-sloping demand curve, an easy way to understand this relationship is by considering how exchange rates affect importers, but this time we will focus on Swiss importers rather than on U.S. importers.

Swiss importers also consider two prices when they purchase U.S. goods and services: namely, the price to buy a dollar and the dollar price of U.S. products. If either price changes, the effective cost of the U.S. goods and services changes. An increase in the value of the Swiss franc (which means a decrease in the value of the dollar) makes Swiss imports from the United States less expensive. Therefore, Swiss residents have an incentive to purchase more U.S. products, which means they demand a larger quantity of dollars per period. When more dollars are demanded from the foreign exchange market, a larger quantity of Swiss francs is supplied to get them. Therefore, an increase in the value of the Swiss franc causes an increase in the quantity of Swiss francs supplied per period, which means the Swiss franc supply curve is upward sloping.

Foreign Currency Supply ≠ Monetary Base

When discussing foreign exchange markets, it is essential not to confuse changes in the supply or amount of a currency supplied to the foreign exchange market with changes in a nation's monetary base or money supply. A nation's monetary base changes only if the central bank conducts open market operations, intervenes in the foreign exchange market, or changes its discount loans to banks (Guideline #1). A nation's money supply varies only if the monetary base or money multiplier changes. Unless a central bank is involved, foreign exchange transactions do not affect a nation's monetary base. All that changes are the owners of checking accounts, and (as we learned in the last chapter) these checking accounts never leave the country of issue (Guideline #2).

Swiss Franc Demand Is the Mirror Image of U.S. Dollar Supply

Consider the groups that demand Swiss francs (see Figure 16.9) in the dollar-Swiss franc market. Regardless of whether they are importers, exporters, tourists, investors, speculators, governments, or central bankers, to purchase Swiss francs, they carry out their trades by contacting the foreign exchange desk of their banks, asking for exchange rate quotes, and if the price of Swiss francs is acceptable, purchasing them. By demanding Swiss francs from banks, in the foreign exchange market, they are supplying dollars. As a result, whenever Swiss francs are demanded in the dollar-Swiss franc foreign exchange market, dollars of equivalent value (i.e., the quantity of Swiss francs demanded times the nominal exchange rate) must be supplied to the foreign exchange market.

Figure 16.11 shows that multiplying the Swiss francs demanded per period times the nominal ($/CHF) exchange rate converts them into the equivalent amount of U.S. dollars supplied. Graphically, they are mirror images of one another.[13]

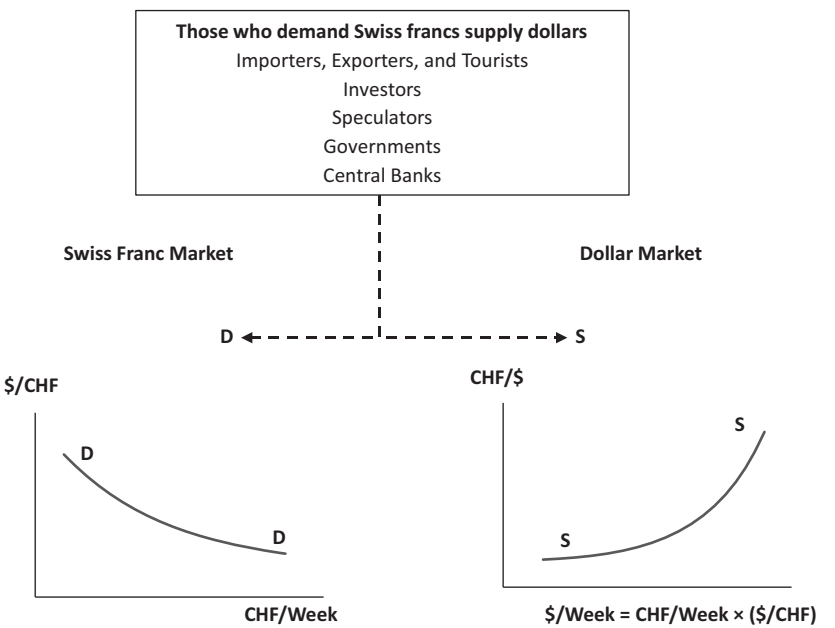


Figure 16.11: Swiss Franc Demand Is a Mirror Image of the Dollar Supply.

13 The demand curve shown in this figure is elastic along all points, which means the percentage change in currency quantity per period is greater than the percentage change in exchange rate.

Similarly, Figure 16.12 shows that multiplying the Swiss francs supplied per period times the nominal ($/CHF) exchange rate converts them into the equivalent amount of U.S. dollars demanded. Graphically, they are mirror images of each other.

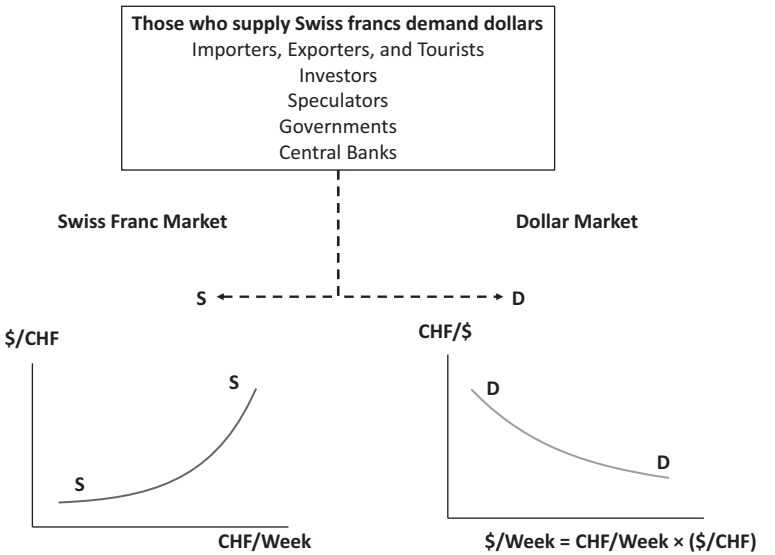


Figure 16.12: Swiss Franc Supply Is a Mirror Image of the Dollar Demand.

A major takeaway from this discussion of bilateral exchange rates is that an increase in the demand for one currency automatically causes an increase in the supply of the other currency. Therefore, an increase in the demand for Swiss francs means an increase in the supply of dollars, and an increase in the supply of Swiss francs implies an increase in the demand for dollars.

Equilibrium Bilateral Nominal Exchange Rate

The equilibrium bilateral nominal exchange rate is the price at which the quantity of Swiss francs demanded per period equals the quantity of Swiss francs supplied per period. In Figure 16.13, this occurs at $1.25/CHF and CHF 500 billion per period.

Nominal, bilateral exchange rates are not good reflections of nations' health, wealth, or productivity. For instance, one cannot say that because the Indonesian

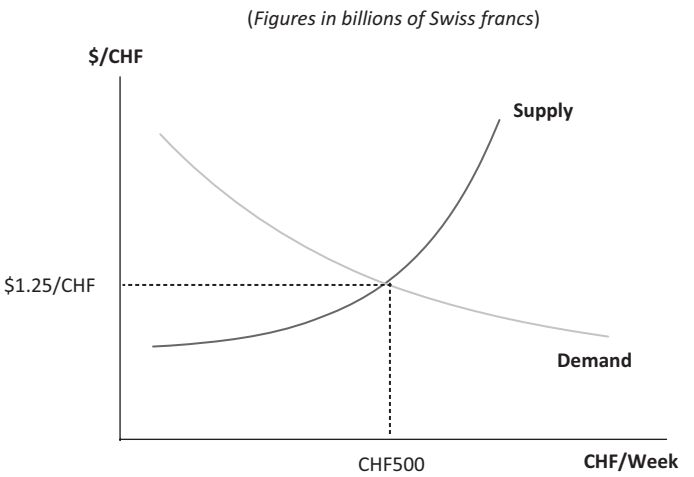


Figure 16.13: Equilibrium Exchange Rate and Quantity of Swiss Francs per Period.

rupiah in January 2019 was worth only $0.000071 and the Kuwaiti dinar was worth $3.30, Kuwait was economically stronger than Indonesia—and clearly not 46,497 times stronger. However, *changes* in the value of a currency are often used as barometers of relative economic conditions in and among nations.

Exchange rates are determined by the supply and demand forces of individuals, businesses, governments, institutional investors, international institutions, and central banks. To understand why exchange rates change, it is vital to identify and explain the factors that influence these participants' behavior.

What Causes Exchange Rates to Change?

Figure 16.14 lists seven major factors that are responsible for most international trade and investment decisions. These factors are also responsible for most nominal exchange rate fluctuations. This section explains the qualitative influence these variables have on participants who supply and demand currencies in foreign exchange markets, and, therefore, how they affect exchange rates. Before we begin, notice that the adjective "relative" precedes each of these seven factors. This qualification is important because exchange rates change only when relative incentives change. It is not enough for the incentives in Nation A to change; they must change relative to other nations.

	Stimulus	Domestic Currency Value
1	Relative domestic prices rise	Depreciate (–)
2	Relative domestic real GDP (i.e., real income) rises	Depreciate (–)
3	Relative domestic real interest rates	Appreciate (+)
4	Relative domestic risks rise	Depreciate (–)
5	Relative domestic tax rates rise	Depreciate (–)
6	Relative domestic expectations rise	
	– Asset returns	Appreciate (+)
	– Exchange rate (Domestic currency value)	Appreciate (+)
7	Central bank purchases of domestic currency rise	Appreciate (+)

Figure 16.14: Major Factors That Affect Nominal Exchange Rates.

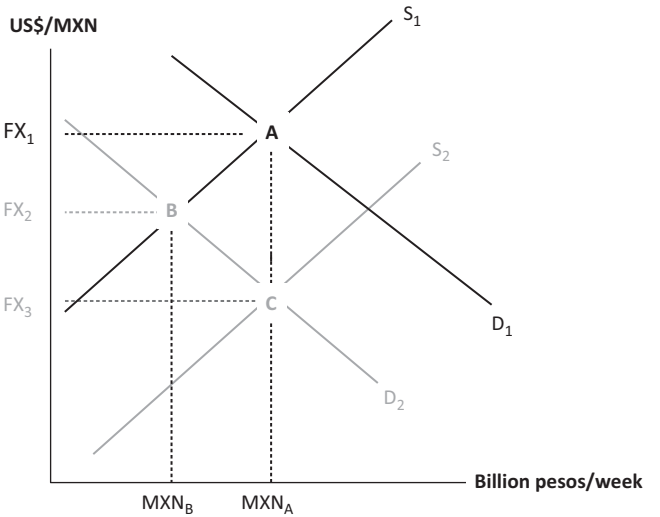
Changes in Relative International Price Levels

Movements in relative international prices are among the most critical factors affecting nations' import and export activities. We can make the following generalization about changes in relative international prices: *Assuming all other variables remain constant, if Nation A's prices rise faster than Nation B's prices, then Nation A's currency should depreciate*. The depreciation occurs because the demand for Nation A's currency falls as residents of Nation B purchase fewer goods and services from Nation A. In addition, the supply of Nation A's currency offered to the foreign exchange market rises as residents of Nation A purchase more goods and services from Nation B. Without further information about the relative shifts of supply and demand, we have no way to determine whether the equilibrium quantity of Currency A per period rises, falls, or stays the same.

Suppose Mexico's prices rose faster than U.S. prices. Mexico's relatively higher prices would reduce the amount of Mexican goods and services demanded by U.S. residents, thereby cutting the demand for pesos. Figure 16.15 shows that a reduction in the demand for pesos from D_1 to D_2 causes the value of the peso to fall from FX_1 to FX_2 (i.e., A to B).

At the same time, relatively higher Mexican prices provide incentives for Mexican consumers to increase their imports of U.S. goods and services, thereby increasing the demand for dollars, but keep in mind that Figure 16.15 shows the Mexican peso market and not the dollar market. Therefore, our analysis must be explained in terms of the supply and demand for Mexican pesos.

Fortunately, this is easy to do because an increase in the demand for dollars is the same as an increase in the supply of pesos offered to the foreign exchange



Mexican inflation rises relative to the United States
Demand for pesos falls
Demand for dollars rises → Supply of pesos rises in the foreign exchange market

Figure 16.15: Effects of an Increase in Mexico's Inflation Rate/Price Level Relative to the United States.

market.[14] Figure 16.15 shows that an increase in the supply of pesos from S_1 to S_2 further reduces the value of the peso from FX_2 to FX_3 (i.e., from B to C).

The equilibrium quantity of pesos also changes with movements in Mexico's prices relative to the United States, but without further information, there is no way to determine the *net* direction of change. When peso demand falls from D_1 to D_2, the equilibrium quantity of pesos per week falls from MXN_A to MXN_B, but when peso supply increases from S_1 to S_2, the equilibrium quantity per week rises. In Figure 16.15, these two changes have been drawn to offset one another so that there is no net change in quantity, but that does not have to be the case. The quantity could rise, fall, or stay the same. The net effect depends on the relative intensity of the supply and demand shifts.

14 The phrase "offered to the foreign exchange market" is added to remind the reader that currency is being supplied to the foreign exchange market, but the nation's monetary base and money supply are not changing.

Changes in Relative International Real GDP

We can make the following generalization about changes in relative international real income levels: *Assuming all other variables remain constant, if Nation A's real GDP rises faster than Nation B's real GDP, then Nation A's currency should depreciate relative to Nation B's currency*. The equilibrium value of Currency A falls because relatively higher real incomes in Nation A cause its residents to purchase more goods and services from Nation B, and the resulting increase in the supply of Currency A in the foreign exchange markets causes its value to fall. The equilibrium quantity per period of Currency A rises as the supply of Currency A in the foreign exchange market increases.

When discussing the effects that relative international incomes have on exchange rates, it is essential to distinguish between changes in nominal GDP and real GDP (i.e., nominal and real income). Nominal GDP can change because of price movements or fluctuations in output. In the last section, we analyzed the effects of changing relative price levels on exchange rates. This section focuses solely on the relationship between relative changes in real GDP and exchange rates.

If Mexico's real GDP rose relative to the United States, the ability of Mexican consumers to purchase U.S. goods and services would rise.[15] As a result, their increased demand for dollars would increase the supply of pesos offered to the foreign exchange market, causing the peso to depreciate. In Figure 16.16, an increase in the supply of pesos in the foreign exchange market from S_1 to S_2 causes the equilibrium value of the peso to fall from FX_1 to FX_2 (i.e., A to B) and the quantity per period to rise from MXN_A to MXN_B billion pesos per week.

Notice in Figure 16.16 that the supply of pesos moved horizontally to the right from A to C, but the equilibrium quantity rose by less than this amount (i.e., from A to B, which means from MXN_A to MXN_B). The reason for this difference is that the falling peso value changed incentives. As the peso depreciated, U.S. importers had more incentive to purchase Mexican products, causing an increase in the quantity of pesos demanded per period, from A to B. Moreover, as the peso depreciated (i.e., the dollar appreciated), Mexican importers had less incentive to purchase U.S. products, causing the quantity of pesos supplied per period to the foreign exchange market to fall (i.e., a movement from C to B). Only if the demand for pesos was perfectly elastic (horizontal) would the change in equilibrium quantity be equal to the initial change in supply (i.e., the distance from MXN_A to MXN_B would equal the distance from A to C).

15 The ability of Mexican consumers to buy all goods and services, including foreign- and Mexican-produced products, would increase, but we are discussing here only transactions that affect the dollar-per-peso exchange rate.

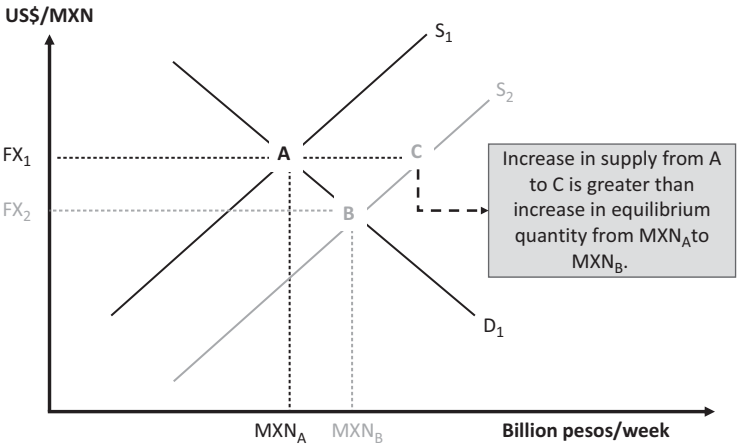


Figure 16.16: Effects of an Increase in Mexico's Real GDP Relative to the United States.

The Skeptics

Many people (let's call them skeptics) find it paradoxical and counterintuitive to conclude that there is an inverse relationship between the value of a country's currency and the nation's rate of economic growth. After all, higher economic growth is generally considered a good thing and currency depreciation is considered (perhaps, unwisely) to be bad. They ask, "Shouldn't higher economic growth appreciate a nation's currency?" In general, the skeptics can be divided into two groups. Let's look more closely at their arguments.

Skeptic #1: Why Doesn't Growth-Stimulate Exports and Appreciate the Currency?

These skeptics wonder why the connections between relative income movements and exchange rates focus solely on imports, with no consideration of exports. In particular, they ask: "If a nation produces more (i.e., if its real GDP rises), then additional goods and services are available for everyone—not just for domestic consumers, businesses, and governments but also for foreigners. Why doesn't some of this increased output find its way abroad, thereby increasing Nation A's exports and increasing the international value of Nation A's currency?"

As tempting as this line of reasoning might be, it should be resisted in short-run analyses of exchange rates. It is true that increased production means that more is available for everyone, but having more to sell does not necessarily mean that foreigners will want to purchase it. To buy more, they need incentives. For example, if greater production in Nation A causes its price level to fall relative to foreign nations, then foreigners have a clear incentive to purchase more of Nation A's goods and services. Here, the motivation to buy is triggered by a change in relative prices, and the effects of changing relative prices were analyzed in the last section.

Skeptic #2: Why Doesn't Growth-Increase Interest Returns and Appreciate the Currency?

These skeptics feel there is a vital missing link between changing economic growth rates and exchange rate fluctuations, which has to do with the real credit markets and varying international investment incentives. They ask, "If Nation A's real GDP rises relative to Nation B, won't Nation A's rising real GDP increase its demand for credit, raise real interest rates, and create incentives that appreciate Nation A's currency? In short, if the *credit-market effects* cause returns on Nation A's interest-earning assets to rise relative to Nation B, won't the demand for Nation A's currency rise, thereby appreciating its value?"

This line of reasoning is very appealing, but drawing on our knowledge in Chapter 10, "Real Credit Markets," we know that changes in real GDP have an uncertain effect on the real interest rate. In the next section of this chapter, the effects of changing real interest rates on a nation's exchange rate are discussed. For now, treat changes in real income by themselves, leaving all other macroeconomic variables constant.

Changes in Relative International Interest Rates

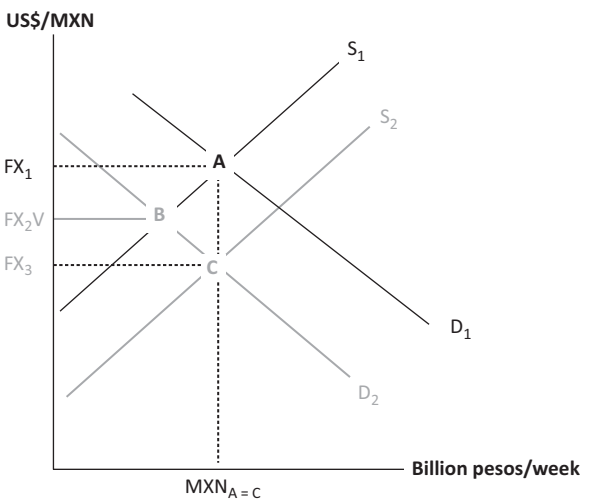
We can make the following generalization about changes in relative real international interest rates and real investment returns: *Assuming all other variables remain constant, if Nation A's real interest rate (or real investment return) falls relative to Nation B's, then Nation A's currency should depreciate.* Depreciation occurs because the demand for Currency A decreases as Nation B purchases fewer interest-earning investment assets in Nation A, and the supply of Nation A's currency in the foreign exchange market rises (i.e., the demand for Currency B increases), as Nation A invests more in Nation B's interest-earning assets. Without further information about the relative shifts of supply and

demand, there is no way to determine whether Currency A's equilibrium quantity per period rises, falls, or stays the same.

Interest rates and investment returns affect both borrowers and lenders/investors. Borrowers and lenders/investors are just two sides of the same coin in the market for financial securities—one group is the payer, and the other is the payee (i.e., receiver). Suppose the Bank of Mexico feared a recession and wanted to stimulate the economy. As a result, it reduced Mexican real interest rates relative to the United States. The relative decrease in Mexican real interest rates would change borrowing and investment incentives between Mexico and the United States. Let's analyze the effect these new incentives would have on the dollar-per-peso exchange market.

Effect of Lower Mexican Real Interest Rates on Lenders/Investors

The reduction in Mexican interest rates makes financial investments in Mexico less attractive, causing U.S. investors' demand for Mexican pesos to fall. A decrease in the demand for pesos causes the value of the peso to fall. Figure 16.17 shows that a decreased demand for pesos, from D_1 to D_2, causes the value of the peso to drop from FX_1 to FX_2 (i.e., from A to B).



Mexican real interest rates fall relative to the United States
Demand for pesos falls
Demand for dollars rises → Supply of pesos rises in the foreign exchange market

Figure 16.17: Effects of Falling Mexican Real Interest Rates Relative to the United States.

Effect of Lower Mexican Real Interest Rates on Borrowers

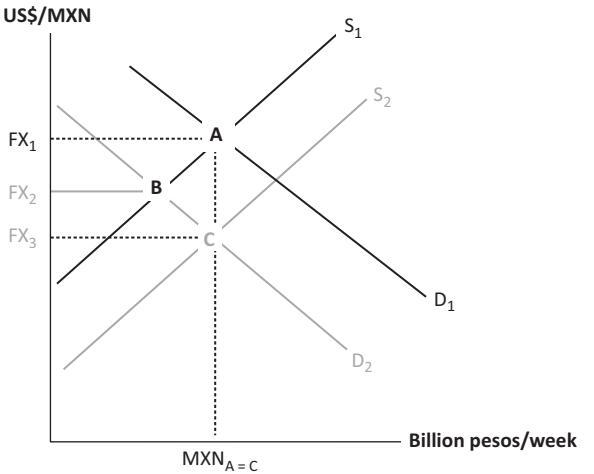
A reduction in Mexico's real interest rates relative to the United States creates incentives to borrow Mexican pesos in the peso credit market, sell the pesos for dollars in the spot foreign exchange market, and invest the funds in the dollar credit market. Due to these transactions, the supply of pesos in the spot foreign exchange market rises as investors demand dollars, and the value of the peso falls (i.e., the value of the dollar increases). Figure 16.17 shows that an increased supply of pesos in the foreign exchange market from S_1 to S_2 causes the value of the peso to fall further from FX_2 to FX_3 (i.e., from B to C). Without further information about the relative shifts of supply and demand, the net change in equilibrium quantity per period cannot be determined.

Effects of Risks, Taxes, and Expectations

We can make the following generalization about changes in relative international risks, taxes, and expectations: *Assuming all other variables remain constant, there is an inverse relationship between the value of Nation A's currency and its relative international risks, taxes, and pessimistic expectations.* As these variables rise, Nation A's currency value falls (and vice versa). This depreciation occurs because the demand for Currency A falls as Nation B invests less in Nation A, and the supply of Currency A rises in the foreign exchange market (i.e., the demand for Nation B's currency rises) as Nation A invests more in Nation B. Without further information about the relative shifts of supply and demand, there is no way to determine whether the equilibrium quantity per period of Currency A rises, falls, or stays the same.

Suppose there was an increase in Mexico's taxes or country risks relative to the United States. What would happen to the value of the peso? U.S. investors would reduce their demand for peso-denominated financial investments (e.g., stocks and bonds) and direct investments (e.g., factories and acquisitions). As a result, the demand for pesos would fall, causing the value of the peso to fall. In Figure 16.18, a decline in peso demand from D_1 to D_2 causes the value of the peso to fall from FX_1 to FX_2 (i.e., from A to B).

Similarly, these changes in Mexico's relative international risks, taxes, or return expectations cause Mexicans to increase their demand for dollar-denominated investments, which are now relatively more attractive. Because of the increased supply of pesos in the foreign exchange market, the dollar value of the peso falls. Figure 16.18 shows that an increased supply of pesos from S_1 to S_2 causes the exchange rate to further fall from FX_2 to FX_3 (i.e., from B to C).



Mexican risk/taxes rise or investment-return expectations fall relative to the U.S
Demand for pesos falls
Demand for dollars rises → Supply of pesos rises in the foreign exchange market

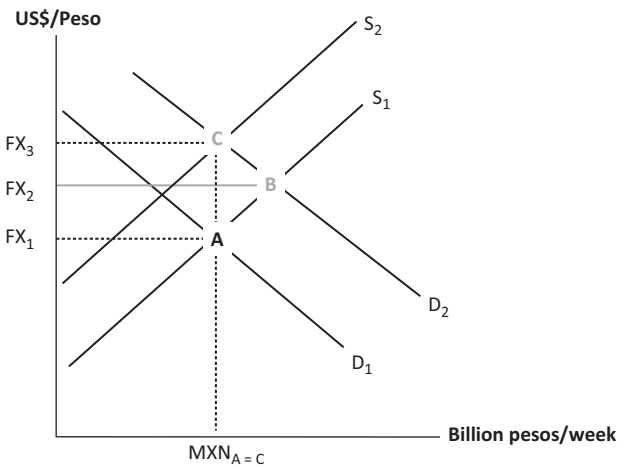
Figure 16.18: Effects of Increasing Mexican Risks or Taxes, or Effects of Unfavorable Mexican Investment Return Expectations Relative to the United States.

Changing expectations about currency values can also have a significant impact on exchange rates. Speculators are significantly influenced by the changing tides of exchange rate expectations, and they can wager their bets with substantial financial resources at their disposal. Because all the previous examples showed reasons for the Mexican peso to depreciate, let's analyze one case in which it appreciates.

Suppose speculators expected the Mexican peso to rise in value during the next six months. To take advantage of this expectation, they could acquire pesos in the spot market, but, if they did, it would be foolish to leave these pesos in noninterest-earning accounts. Therefore, these speculators would look for investment opportunities with the highest rate of return commensurate with the risks they wanted to bear. If they were averse to taking on substantial credit (i.e., default) risks, they could purchase Mexican government securities, or they could invest in safe Mexican bank deposits.

Speculation of this sort is called spot market speculation because the spot market is used to obtain foreign currency exposures (pesos, in this case), and the spot market is used again at the end of the investment period, when the funds are repatriated (i.e., converted back into the original currency at whatever spot rate exists when the investments mature).

Let's review our example. An expected increase in the peso's value during the next six months encourages U.S. speculators to purchase pesos in the spot market, invest them in peso-denominated financial assets, and then wait six months to repatriate the funds. In Figure 16.19, an increased spot demand for pesos from D_1 to D_2 raises the value of the peso from FX_1 to FX_2 (i.e., from A to B).



Expectation of a Mexican peso appreciation relative to the dollar
Demand for pesos rises
Demand for dollars falls→ Supply of pesos falls in the foreign exchange market

Figure 16.19: Effects of an Expected Peso Appreciation Relative to the U.S. Dollar.

At the same time, Mexican speculators would reduce their demand for dollar-denominated assets, which would cause the supply of pesos in the spot foreign exchange market to fall. Figure 16.19 shows that a decline in the supply of pesos from S_1 to S_2 causes the exchange rate (i.e., the dollar value of the peso) to further rise from FX_2 to FX_3 (i.e., from B to C). In six months, when the pesos are repatriated, they will be sold for dollars on the spot market at that time. As a result, these speculators bear considerable risks during the six months that their funds are invested and unhedged because, over such an extended period, the exchange rate could change considerably. Nevertheless, they speculate because the expected gains outweigh the expected losses.

For pure speculators (i.e., those who finance their investments with borrowed funds), another way to profit from the expectation of an appreciating peso is to borrow dollars, convert them to pesos in the spot market, and invest in peso-denominated financial investments for six months. Again, the increased demand for pesos in the spot market would increase the value of the peso.

Central Bank Intervention

Central banks can have significant influences on exchange rates. One of the main reasons for them to intervene in foreign exchange markets is to change the international value of their currencies discretionarily.[16] To raise the value of the domestic currency, a central bank purchases it by contacting banks and brokers in the foreign exchange markets (i.e., below our imaginary horizontal line). To do this, the central bank needs to use international currency reserves for these purchases.

For example, if the Bank of Mexico wanted to raise the value of the peso in terms of the dollar, it would need to own or have access to dollars to purchase the pesos. If it did not hold sufficient amounts of dollars, but had ready supplies of other foreign currencies, like euros, pounds, yen, or Swiss francs, the central bank could sell these currencies for U.S. dollars and then use the dollars to buy pesos. Alternatively, it could try to borrow dollars from an international institution, like the International Monetary Fund (IMF), or it might try to arrange a currency swap with the U.S. Federal Reserve. If the Bank of Mexico neither owned enough dollars nor had access to them, then it could not intervene directly in the foreign exchange markets. Famous currency depreciations, such as in Mexico (1994), Thailand (1997), and Argentina (2002), were caused by these countries' central banks depleting their foreign currency reserves, which were used to support overvalued currencies.

Figure 16.20 shows the effect of intervention by the Bank of Mexico to raise the value of the peso. An increase in demand from D_1 to D_2 raises the value of the peso from FX_1 to FX_2 (i.e., from A to B), and the equilibrium quantity of pesos rises from MXN_A to MXN_B.

Foreign Exchange Intervention and the Monetary Base

When a central bank intervenes in the foreign exchange market, it changes the domestic monetary base. Suppose the Bank of Mexico intervened to raise the value of the peso. To accomplish this goal, it would sell its dollar reserves and purchase pesos. Figure 16.21 shows that these foreign exchange market purchases remove pesos from Mexican banks' reserves and, thereby, reduce the Mexican monetary base.

The effect of these transactions on the U.S. monetary base depends on where the Bank of Mexico held its dollar reserves. If they were held on deposit at the U.S. U.S. Federal Reserve, then this intervention would raise the U.S. monetary base, as dollars flowed into banks (below the line). If they were already held

16 For nations with relatively undeveloped capital markets, another reason to use the foreign exchange markets is to change their domestic monetary bases.

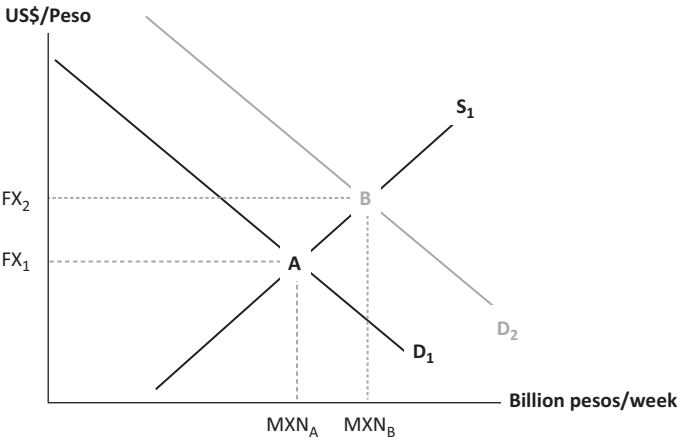


Figure 16.20: Effects of Mexican Central Bank Intervention to Raise the Peso's Value.

in banks (below the line), then the U.S. monetary base would not change. Figure 16.21 shows the effects if the reserves were held at the Fed.

The Rest of the Story

International Exchange Rate Systems

What type of exchange rate system does your home country use? Each year, the International Monetary Fund lists the currency regimes for its 189 member nations.[17] Evident is the diversity of systems, which reflects controversies over the merits and weaknesses of fixed versus flexible exchange rates. The IMF's classification system is based on the member nations' de facto (i.e., actual) arrangements, which may differ from their *de jure* (i.e., officially declared) arrangements. A country is classified primarily by the degree to which its exchange rate is determined by the forces of supply and demand (i.e., flexible or freely floating) as

17 See International Monetary fund, Annual Report on Exchange Arrangements and Exchange Restrictions 2017 at https://www.imf.org/en/Publications/Annual-Report-on-Exchange-Arrangements-and-Exchange-Restrictions/Issues/2018/08/10/Annual-Report-on-Exchange-Arrangements-and-Exchange-Restrictions-2017–44930 (accessed August 7, 2019).

Figure 16.21: Effects of Foreign Exchange Market Intervention on Mexican and U.S. Monetary Bases. (Imagery used: © MicroOne/Shutterstock; © belchonock/123rf)

opposed to official central bank or government intervention or decree (i.e., fixed). The exchange rate system a nation chooses is not etched in stone. Instead, it can vary with changing political and monetary regimes and with varying economic conditions.

Figure 16.22 shows that fixed and flexible exchange are two extremes of the currency regime spectrum, just as black and white are two extremes of the light

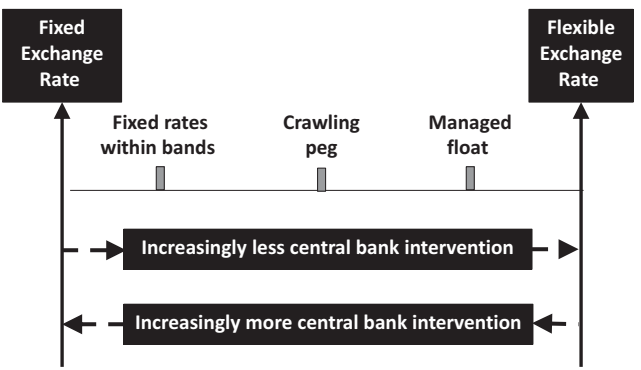


Figure 16.22: Alternative Exchange Rate Systems.

gradient scale. Between these two extremes are shades of gray, where countries differentiate themselves by the degree of central bank intervention in the foreign exchange markets.

Fixed Exchange Rate System

A *fixed exchange rate system* requires the central bank to supply domestic currency to the foreign exchange market whenever its price rises above the officially declared fixed rate and demand it whenever the domestic currency's price falls below it. Usually, nations fix their currencies to a major trading partner's currency or a market basket of currencies.

Fixed Band Exchange Rate System

A *fixed band system* allows a currency's value to fluctuate within a predetermined range. As long as the exchange rate remains within this band, the system performs as if the rate was flexible. But once the top or bottom limit is reached, central bank intervention is needed to keep the exchange rate in place. At this point, the system functions as if the exchange rate was fixed. Adopting a fixed band system allows nations to enjoy some of the benefits and costs of both a fixed and floating exchange rate system. The Bretton Woods System, which lasted from the end of World War II until 1971, is an example of a fixed band system. Similarly, the exchange rate system used by the European Union (EU), as a precursor to the European Monetary Union (EMU), from the early 1970s to the late 1990s was a fixed band system.[18]

Crawling Peg

A *crawling rate system* requires central banks to fix their exchange rates for short periods (e.g., a year) and then to adjust them according to some predetermined formula. Like a fixed band system, it allows nations to enjoy some of the benefits and costs of both fixed and floating rates. Usually, the adjustment formula is based on important economic variables that have changed since the exchange rate was fixed, such as inflation differentials. In general, this formula is nothing more than an economic reality check to make sure the exchange rate stays aligned with economic fundamentals. During the 1990s, Brazil fixed its exchange rate relative to the U.S. dollar and then adjusted this rate annually based on the

18 Today, members of the European Monetary Union (EMU) have a common currency, the euro. One of the criteria for members of the EU and nonmembers that wish to join the EMU is following a fixed band system linked to the euro.

differential between Brazilian and U.S. inflation rates. Today, nations such as Honduras, Nicaragua, and Botswana have chosen crawling peg systems.

Managed Float

Nations that choose a *managed float system* allow their exchange rates to change with the forces of supply and demand, but their central banks intervene when there is a perceived need, such as reducing exchange rate volatility, controlling excessive currency appreciation or depreciation, thwarting the efforts of speculators, or achieving other macroeconomic goals, such as export-led growth.

If the purpose of a managed float is to smooth the peaks and valleys of exchange rate movements, then it is helpful to keep in mind that the central bank is presuming that it knows better than the markets what the nation's long-term equilibrium exchange rate should be. If central banks do not possess superior knowledge about this rate, then intervention might destabilize exchange rates. An example shows how the success or failure of central bank intervention might be evaluated.

In Figure 16.23, suppose that Hungary's long-term equilibrium (euro per forint) exchange rate is FX_1, and the solid line AA represents the normal fluctuation around this equilibrium rate (i.e., the fluctuations that would take place if

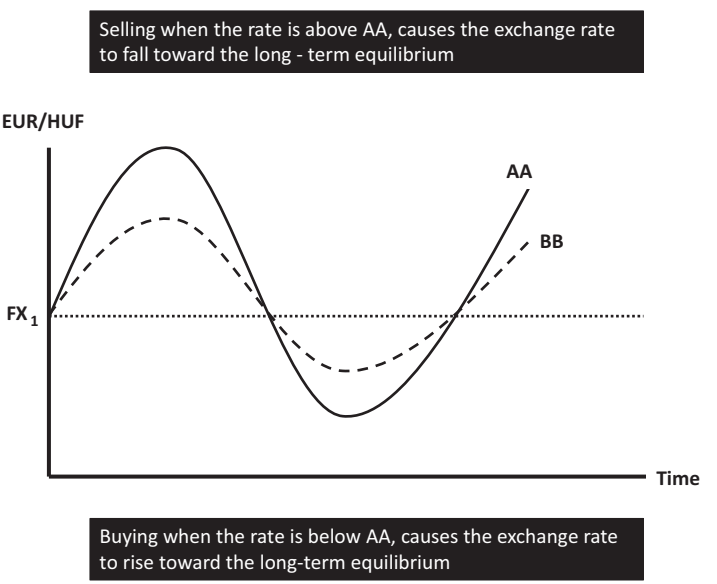


Figure 16.23: Stabilizing Central Bank Intervention.

there were no central bank intervention). If the Bank of Hungary (Magyar Nemzeti Bank) is successful at stabilizing the value of the forint (HUF), then the range of exchange rate fluctuations after its intervention should follow a dotted line like BB, which is less volatile than AA.

One way to test the Bank of Hungary's success at stabilizing the exchange rate is to calculate its profits at the end of each period. If it is genuinely stabilizing the domestic currency's value, then the Bank should have bought forints when they were undervalued (i.e., below BB) and sold them when they were overvalued (i.e., above BB). In doing so, its actions would have raised rates that were too low and lowered those that were too high, and, thereby, earned profits. If the Bank of Hungary earned no profits at the end of each accounting period, then serious questions might be raised regarding whether it possessed superior knowledge about the equilibrium exchange rate and whether its actions stabilized or destabilized exchange rates.

To Fix or Not to Fix, That is the Question

Why do nations choose different currency regimes? Is there an optimal exchange rate system for all countries, or does the ideal system vary from country to country and from period to period? Are there guidelines nations might use in choosing their exchange rate regimes?[19]

Exchange rates are important economic shock absorbers because they reduce the impact that potentially destabilizing foreign influences might have on domestic markets. For instance, if the U.S. dollar was fixed to the euro, and the euro area experienced excessive inflation, demand for lower-priced U.S. goods and services would rise, causing the U.S. inflation rate to rise. A flexible exchange rate system would diffuse the full force of this demand by raising the dollar's value with the increased foreign demand, thereby reducing the incentive for euro-area residents to purchase U.S. goods and services. Flexible exchange rates have the added benefit of empowering central banks with an ability to pursue independent monetary policies without the need to intervene in the foreign exchange markets each

19 See Guillermo A. Calvo and Carmen M. Reinhart, "Fear of Floating," *The Quarterly Journal of Economics*, Volume 117, Issue 2 (2002), pp. 379–408; and Hélène Poirson, "How Do Countries Choose Their Exchange Rate Regime?" *International Monetary Fund, IMF Working Paper* WP/01/46 (2001), http://www.imf.org/external/pubs/ft/wp/2001/wp0146.pdf (accessed August 7, 2019).

time their currency values change—more about this in Chapter 20, "Shocks to Nations with Fixed Exchange Rates."

Despite these advantages, many nations choose to fix their exchange rates relative to a foreign currency or a basket of foreign currencies, and they do so fully convinced that the benefits outweigh the costs. Let's consider some of the major advantages of a fixed exchange rate system. First and foremost, it weakens or abolishes the inflationary tendencies of domestic central bankers and government officials. Inflation causes the value of a nation's currency to fall, which forces its central bank to intervene in the foreign exchange market. Doing so reduces the domestic monetary base and M2 money supply, which decreases the supply of real credit, increases domestic real interest rates, and reduces aggregate demand. In effect, a fixed exchange rate system replaces the lax monetary standards of domestic central bankers with (hopefully) more rigorous foreign ones.

Fixed exchange rates can also enhance the economic impact of a government's fiscal policies. For example, expansionary fiscal policies, such as increases in government spending or reductions in tax rates, which are financed by borrowing, can raise domestic real interest rates. Rising real interest rates appreciate the domestic currency's value, which reduces net exports and weakens the expansionary fiscal policies. If the central bank fixes the exchange rate, then this contractionary feedback effect is eliminated.

By anchoring the value of the domestic currency to a particular foreign currency or mooring it to a basket of foreign currencies, nations can reduce business costs by eliminating the bid-ask spread on foreign currency transactions and removing the need to hedge. It also promotes international price transparency, and, thereby, fosters international trade, investment, and business expansion. This can be especially important for countries that have dominant foreign trading partners.

If a central bank offers credible guarantees, then fixed exchange rates can reduce a significant source of market risk. In effect, a fixed exchange rate system between Mexico and the United States would treat exporters, importers, borrowers, and lenders on both sides of the Rio Grande the same as U.S. residents on opposite sides of the Rocky Mountains.

Fortunately, the currency system a nation chooses is reversible, and many nations have taken advantage of this two-way street. Quite often, countries switching from a fixed rate to a flexible rate system were forced to change. One problem with a fixed exchange rate system is it seems to work best in tranquil economic, political, and social settings, but becomes increasingly problematic and even unsustainable when markets are turbulent and remain that way for extended periods.

If conditions are severe enough, a fixed exchange rate system can eventually collapse, causing systemic changes in prices as the markets disappear and prices spiral with abandon. In these circumstances, exchange rates can easily overshoot their equilibrium levels, causing more significant economic damage than if they were free to fluctuate from the beginning. This happened in Mexico (1994), Thailand (1997), Russia (1998), and Argentina (2002) when their ardent defenses of fixed exchange rate systems failed, due to the magnitude of global supply and demand forces.

As financial markets become larger, more global, and more tightly interconnected, international capital flows can quickly overwhelm the resources of small and even large countries. Real, fundamental economic forces may trigger these flows, but they can just as easily be set off by imagined ones, such as a misinterpreted remark by a central banker or government official.

Even under tranquil conditions, flexible exchange rate proponents find serious flaws in the case for fixed exchange rates. First, they point out that exchange rate movements are just one of many risks business managers must consider. Why is exchange-rate risk more important than price, interest, income, wage, or default risks? Moreover, they argue that reducing exchange rate volatility often serves to increase the volatility of other economic variables, such as interest or price volatility, thereby, causing no *overall* reduction in risk. More troublesome, if fixed exchange rates only mask fundamental economic problems by giving the illusion of stability when none exists, then they may cause more harm than good.

The IMF's list of currency arrangements helps match specific countries with particular exchange rate arrangements, but one crucial piece of information that it does not show is when the exchange rate system chosen by a nation is (or was) a mistake. The choice of regimes matters because selecting the wrong one, sticking with it for too long, and defending it with limited international reserves can have a significant negative impact on a nation's economic health. By contrast, choosing the right exchange rate system is like putting wind in the sails of a clipper ship.

Exchange rate crises have occurred for centuries, and they are likely to reappear for years to come. Spectacular currency collapses occurred immediately following World War I, during the Great Depression, and just after World War II. The collapse of the Bretton Woods System in the early 1970s was just another example of an exchange rate system that eventually fizzled out.

Our search for failed exchange rate systems does not have to go back very far to capture the intrigue of rampant speculation, frustration of bewildered central bankers, and collapse of economic systems. Since the early 1990s, there have been exchange rate disasters of considerable magnitude. For instance, in

1992–1993, speculative attacks against European currencies caused the United Kingdom and Italy to leave the fixed band system. It also forced the Spanish peseta, Irish punt, Portuguese escudo, Swedish krona, and Finnish markka to devalue, pushed Sweden and Ireland to raise overnight interest rates above 500% and 300%, respectively, and led to the temporary imposition of exchange controls in Ireland, Spain, and Portugal.

In 1994, an overvalued Mexican peso led to international reserve losses amounting to billions of dollars, followed by a substantial depreciation of the peso, skyrocketing peso interest rates, and plummeting Mexican economic growth. The "tequila crisis," as it was called, spilled over, spreading contagion to other Latin American nations, as well. The collateral damage it caused to these nations was (and is) often referred to as the "tequila effect."

About two-and-a-half years after the Mexican peso crisis (1997–1998), the "Asian Tiger" crisis broke out, with similar economic effects in nations such as Thailand, Korea, and the Philippines. In 1998, the Russian ruble depreciated, causing shockwaves that were felt worldwide. Indeed, it is likely that the economic events in Russia accelerated the 1999 depreciation of the Brazilian real. In early 2002, the Argentine debt crisis caused an overvalued peso, which had been fixed to the U.S. dollar on a one-to-one basis since 1991, to depreciate substantially. The list of international currency disasters goes on, including more recent examples, such as Iceland (2008–2011), Turkey (2018–2019), and Venezuela (2017–2019).

What Is the European Monetary Union?

In 1999, 11 of the 15 countries belonging to the European Union (EU) became members of the European Monetary Union (EMU).[20] EMU members relinquished independent control over their money supplies to the European Central Bank (ECB), a supranational monetary authority located in Frankfurt, Germany. They also adopted the euro as their common currency, hoping to create a currency of sufficient stature, size, and financial strength to compete with the U.S. dollar.

EMU members also expected to benefit from more transparent prices, economies of scale, the development of mutual economic interests that might defuse

20 Of the original seven European Union nations, only Denmark and the United Kingdom did not adopt the euro. These nations were given opt-out rights because their EU membership predated the euro's introduction.

the potential for future wars, and lower trade, currency conversion, and hedging costs (e.g., no currency bid-ask spreads). Economically weaker nations, such as Greece, Italy, Portugal, and Spain, hoped to reduce inflationary risks and diminish inflationary expectations, thereby, lowering nominal interest rates and spurring economic growth. Of course, there was a significant price to pay for these potential benefits, and this price was the loss of monetary autonomy and the independent ability to stimulate growth via monetary expansion.

From 1999 to 2002, the euro existed only in checking account form, rather than as a physical currency, such as a bill or a coin. During this three-year transition period, member nations' currencies continued to circulate, but they did so at fixed exchange rates—much like pennies, nickels, dimes, quarters, half dollars, and dollars circulate in the United States at fixed exchange rates. In 2002, the EMU member currencies were abolished and replaced by the euro, which made its first appearance that year in physical form.

In 2019, the euro area had 19 members, and an assortment of other countries decided to adopt or fix their currencies to the euro. With more nations waiting in line to join, a looming question was whether any existing members, such as Greece or Italy, might leave. After years of grappling with economic recessions and widespread unrest, significant segments of struggling European nations longed for the days when they had their own currencies and independent central banks that might try to stimulate economic activity.

Should There Be One Global Currency?

Choosing and defending the wrong exchange rate system can cost a nation dearly in terms of lost income, diminished wealth, and sacrificed opportunities. The sources of these losses are often from the non-credible and imprudent decisions of central bankers. As a result, some analysts and policymakers have begun to reconsider the need for each country to have its own domestic currency and central bank. Indeed, some countries have already decided to abolish their currencies, eliminate their central banks, and adopt foreign currencies as their own. Ecuador, El Salvador, and Panama are three examples of nations that have taken the U.S. dollar as their domestic currency. *Dollarization* is the generic name given to the debate that surrounds this issue. It is a discussion that focuses on the advantages and disadvantages countries derive from abolishing their currencies in favor of foreign ones or using a foreign currency (or currencies) in parallel with their own.

Some economists have argued that the process of unifying and globalizing currencies should not stop with just a few countries, but rather should be

extended to the world. As you might imagine, adopting a global currency would have many advantages and disadvantages. Therefore, the real issue is not whether negatives or positives exist but whether the world would derive *net* benefits from such a move.

On the positive side, a global currency would make international prices more transparent, thereby increasing competition. Travel would be easier, and international transactions would be less risky. Foreign exchange dealers and analysts, as well as the battery of experts in corporate treasuries, who deal daily with exchange rate risk, would be freed by the thousands to pursue other, more productive careers. The bid-ask spreads on foreign exchange transactions would be eliminated, making international transactions cheaper.

Consider the magnitudes involved. Daily turnover on the foreign exchange markets is approximately $6.6 trillion, which means that yearly turnover is about $1,663.2 trillion.[21] Assuming an average bid-ask spread of only five basis points,[22] the *annual* saving from a global currency would be worth approximately $832 billion.[23]

On the negative side, countries would lose the ability to respond to changing economic conditions by varying their exchange rates and money supplies. A global central bank would control both of these critical economic variables. Assuming that discretionary exchange rate adjustments and money supply changes can have positive effects on a nation's economic growth and stability (the verdict is still out on this issue), the loss of a central bank and monetary independence could be a considerable sacrifice.

There are also political apprehensions about a global currency. For example, who would run the central bank, and how would it be run? Would its top priority be stable prices or low unemployment? Without the power to create money, the credit ratings of economically weak central governments could fall below the level of many large companies.

A human, emotional factor must also be considered in the debate over a global currency. Many people have the same feelings about their home currencies as they do about their flags, languages, cultures, and systems of measurement. These emotional ties could be significant barriers preventing the adoption of a common global currency.

The world is still quite a distance from adopting a single global currency, but there are signs that it could be moving slowly toward a few dominant currency

21 (252 working days per year) × ($6.6 trillion per day) = $1,663.2 trillion per year.

22 100 basis points equals one percent. Therefore, five basis points are 0.05% or 5/100th of 1%.

23 $1,663.2 trillion/year × 0.0005 = $831.6 billion/year

areas, such as the dollar, euro, yen, and yuan areas). The precedent for currency unification was set in the 1990s, when 11 European Union countries abolished their currencies, created the euro, and founded the European Central Bank.

Conclusion

This chapter discussed bilateral, effective, nominal, and real exchange rates. A bilateral exchange rate is the price of one currency in terms of another currency. An effective exchange rate is the price of one currency in terms of a weighted-average of foreign currencies. A nominal exchange rate has not been adjusted for relative international prices, and a real exchange rate is a nominal exchange rate that has been adjusted for relative international prices. In most macroeconomic analyses, changes in real exchange rates are more important than changes in nominal rates because they show more accurately if and when consumer and business incentives should change.

The forces of supply and demand determine exchange rates. When analyzing exchange rates, it is essential to remember that the currency being valued is always placed on the horizontal axis of the supply and demand curves, and its price is always placed on the vertical axis. It is also vital to keep in mind that exchange rates are reciprocals of each other. Therefore, the supply of Currency A in the foreign exchange market for Currency A is the mirror image of the demand for Currency B in the foreign exchange market for Currency B.

The major participants in the foreign exchange markets are importers, exporters, tourists, investors, speculators, governments, and central banks. The primary factors that affect their behaviors are relative changes in international prices, real GDP, interest rates/investment returns, tax rates, risks, expectations, and central bank intervention.

In general, the international value of Nation A's currency is inversely related to relative (i.e., domestic versus foreign) prices, real GDP, risks, and taxes, as well as central bank purchases of foreign exchange (i.e., sales of the domestic currency) and worsening expectations. By contrast, Nation A's currency value is directly related to relative international interest rates and investment returns, favorable expectations, and central bank sales of foreign currencies (i.e., purchases of the domestic currency).

There are different types of exchange rate regimes, so it is vital for a country to choose the right one. Exchange rate systems can be categorized into four basic types: fixed, fixed band, managed (including the crawling peg), and flexible, which vary by the degree of central bank intervention. We will find in subsequent chapters that the choice of exchange rate system has significant implications for

a nation's ability to manage its own money supply. In Chapter 20, "Shocks to Nations with Fixed Exchange Rates," we will find that a flexible exchange rate regime permits a nation to pursue independent monetary policies, a fixed exchange rate system takes away this independence, and a hybrid system has some of the advantages and disadvantages of both.

Key Points

- Exchange rates
  - A nominal exchange rate translates foreign prices into domestic currency units and domestic prices into foreign currency units.
  - A bilateral exchange rate is the value of one currency relative to a second currency.
  - An effective exchange rate is the price of one currency relative to a weighted basket of foreign currencies.
  - The weights of an effective exchange rate can be based on international trade flows, capital flows, or supply and demand elasticities.
  - Real exchange rates are nominal exchange rates after they have been adjusted for both domestic and international price levels.
  - When calculating real exchange rates, be careful to arrange the terms, so the common currency element cancels.
  - Real exchange rates have no currency denominations.
  - Purchasing power parity exists when the real exchange rate equals 1.0.
  - $\%\Delta RER_{(B/A)} \cong \%\Delta \text{Nominal } FX_{(B/A)} + \%\Delta P_A - \%\Delta P_B$.
- Supply, demand, and equilibrium
  - The forces of supply and demand determine exchange rates.
  - On the horizontal axis is the currency per period that is being analyzed, and on the vertical axis is the price of the currency being analyzed.
  - The main groups that demand and supply foreign exchange are importers, exporters, tourists, investors, speculators, governments, and central banks.
  - Demanding one currency means supplying another currency.
  - Supplying one currency means demanding another currency.
  - There is an inverse relationship between exchange rates and the amount of foreign exchange demanded per period.
  - There is a positive relationship between exchange rates and the amount of foreign exchange supplied per period.
  - The equilibrium exchange rate is the price at which the quantity of foreign currency supplied equals the quantity demanded per period.
- Exchange rate changes
  - Relative increases in a nation's:
    - Price level reduce the value of its currency.
    - Real GDP (real income) reduce the value of its currency.
    - Average real interest rates or real investment returns increase the value of its currency.

- The expectation that a currency will appreciate in the future causes its current price to rise.
- A currency's value falls if the nation's relative risks increase, taxes rise, or if there is deterioration in expectations about investment returns.
- Central bank purchases raise a currency's value and increase the equilibrium quantity per period. Central bank sales lower the value and raise the quantity per period.
- When a central bank purchases its currency, the domestic monetary base falls. Sales of the domestic currency in the foreign exchange market increase the domestic monetary base.

– Fixed exchange rates
  - Fixed exchange rates can
    - Weaken or eliminate the inflationary tendencies of domestic central bankers and government officials.
    - Enhance the effectiveness of fiscal policies.
    - Reduce international transaction costs and risks, as well as make global prices more transparent.
    - Reduce some risks associated with international transactions.
  - Turbulent economic, political, and social conditions can render a fixed exchange rate system problematic and unsustainable.
  - Fixed exchange rates may not reduce *overall* international risks and mask market instability.
– Flexible exchange rates
  - Flexible exchange rates can act like economic shock absorbers.
– Other currency systems
  - A fixed band system permits exchange rates to vary freely within a predetermined range, but once either range limit is reached, it becomes a fixed exchange rate regime.
  - A crawling peg exchange rate system requires central banks to fix their exchange rates for short periods and then to adjust them according to a predetermined formula.
  - Under a managed float, a central bank allows the exchange rate to fluctuate with the forces of supply and demand, but it intervenes when unwanted volatility occurs or there is a perceived need to achieve some macroeconomic goal. One test for whether central bank intervention is stabilizing or destabilizing is to measure its profits on these transactions. Positive earnings imply that stabilization efforts were successful.
– Dollarization is the term given to nations that abolish their domestic currencies and adopt a foreign currency or use a foreign currency in parallel with their own.
– Single global currency
  - Some of the advantages of a global currency are greater transparency, ease of use, better utilization of resources, and reduced transaction costs.
  - Some of the disadvantages of a global currency are the loss of discretionary monetary policy, increased credit risks for some national governments, political uneasiness, and barriers due to emotional ties to the domestic currencies.

Review Questions

1. Is the following statement true or false? Briefly explain. "In the yen–peso foreign exchange market, an increase in the demand for pesos causes an increase in the supply of yen."
2. What is the "real" exchange rate, and why are changes in it more important in macroeconomic analyses than changes in the nominal exchange rate?
3. In the following situations, what happens to Japan's bilateral real exchange rate relative to Korea?
   a. The Japanese yen appreciates relative to the Korean won, the Japanese price index rises, and the Korean price index remains unchanged.
   b. The Japanese yen appreciates relative to the Korean won, the Japanese price index remains unchanged, and the Korean price index rises.
   c. The nominal exchange rate between the Japanese yen and the Korean won remains unchanged, the Japanese price index falls, and the Korean price index remains unchanged.
4. Suppose Sweden decided to fix its *nominal* exchange rate relative to the euro as a precursor to joining the EMU. Under these circumstances, is it possible for Sweden's *real* exchange rate relative to the euro to change?
5. Suppose England's real exchange rate relative to the United States is 1.32. What does this mean? Is there an opportunity to arbitrage the markets? If so, explain how, and if not, explain why not.
6. Using supply and demand analysis, explain the effect each of the following economic changes has on the U.S. dollar value of the Argentine peso. Also, explain the effect each transaction has on the respective countries' monetary bases, assuming the exchange rate is flexible.
   a. A decline in the real interest rate on U.S. dollar securities relative to peso securities.
   b. An increase in Argentina's real GDP relative to the United States.
   c. A decline in the U.S. inflation rate relative to Argentina.
   d. Intervention by the Banco Central de la República Argentina (the central bank of Argentina) to raise the value of the peso in terms of the U.S. dollar.
   e. A growing expectation that Argentina will impose exchange controls on the peso.
7. The sovereign debt crisis in the Eurozone attracted large capital inflows to Switzerland. As a result, from 2009 to 2015 the value of the Swiss franc surged dramatically relative to the euro.
   a. Why was the strong franc a problem for Switzerland? Within Switzerland, who loses from a strong franc? Who benefits?
   b. How would you measure the competitiveness of Swiss firms relative to Eurozone companies?
   c. How would you measure the overall competitiveness of Swiss firms in world markets? *(Not just relative to the Eurozone)*
   d. In order to invest in safer Swiss securities, panicked European investors must first purchase Swiss francs. What effects do large purchases of Swiss francs by European investors have on the Swiss monetary base and money supply?

e. Using a supply and demand diagram for the Swiss franc market, show how capital inflows affect the value of the Swiss franc relative to the euro and the quantity of Swiss francs traded per period. Be very careful when labeling the axes.
f. How did these capital inflows affect interest rates in Switzerland? Show your answer with a supply and demand diagram for the Swiss real credit market.
g. In response to the net capital inflows from the Eurozone, the Swiss National Bank (SNB) decided to limit the franc's meteoric rise by pledging to intervene in foreign exchange markets whenever the Swiss franc appreciated above a certain level. Between 2011 and 2015, this limit was set at €0.83/CHF (CHF1.2/€). If the SNB stood by its pledge, how would it intervene? Show your answer in a supply and demand diagram for the euro-Swiss franc market.
h. How would the central bank interventions mentioned in the previous question affect the Swiss monetary base and money supply?
i. In 2015, the Swiss National Bank allowed the Swiss franc to float freely against the euro. Provide an explanation for why this decision was made.

8. Suppose the Bank of Canada intervened in the foreign exchange market to lower the value of the Canadian dollar relative to the yen. What effect, if any, would this intervention have on Canada's monetary base?
9. Explain whether you agree or disagree with the following statement: "Regardless of whether a nation has a fixed or floating exchange rate system, foreign capital inflows can never cause the receiving country's monetary base to increase."

Discussion Questions

10. What are the major advantages and disadvantages of having a single global currency?
11. Suppose you read the following quote in the financial press: "Japanese financial capital that was flowing to the United States has now begun to return home." What are the implications of these inflows for Japan's M2 money supply, monetary base, real interest rate, value of the yen in terms of the dollar, and economic health?
12. Suppose the Moroccan dirham was tightly managed relative to a euro-dominated basket of currencies. Many business analysts felt the peg was useful for anchoring Morocco's inflation rate. Explain how a fixed exchange rate can anchor a country's inflation rate.
13. Why are fixed exchange rates a problem for any nation coming under intense speculative international pressure to *sell* their currencies? Why are fixed exchange rates a problem for any nation coming under intense speculative international pressure to *buy* their currencies?
14. Explain whether the following statement makes economic sense: "An emerging nation's real exchange rate rises relative to developed nations when its inflation rate rises."
15. Suppose you were an investment portfolio manager located in New York City and were satisfied with the composition of your internationally diversified portfolio until you read that the U.S. money supply was expected to grow rapidly during the next year relative to the euro money supply. What changes might you make to the portfolio? Explain.

16. Does the real exchange rate have meaning only for a country, or can a company derive meaningful benefits from constructing its own real exchange rate? Explain.
17. Suppose the yuan floated relative to the U.S. dollar, and foreign investors became optimistic about financial investments in China. How would the financial capital flows resulting from this optimism affect the dollar value of the yuan? How would it affect China's real interest rate, monetary base, and money supply? Explain.

Chapter 17
Balance of Payments

One of the most openly visible but misunderstood economic reports is the balance of payments (BOP), which provides a wealth of useful information about a nation's economic relations with the rest of the world. This chapter explains how to read and interpret balance of payments statistics and reports. Because countries and international agencies can use whatever methods they wish for their balance of payments reports, this chapter focuses on the collection techniques and reporting methods of the International Monetary Fund (IMF). Using the IMF's balance of payments reports allows us to compare statistics of the IMF's 189 member countries.[1]

The Basics

What Is the Balance of Payments?

The *balance of payments* is a summary of *all transactions* between the residents of one nation and the residents of the rest of the world during a given period. Notice that the balance of payments measures flows, which means it records *changes* in international assets and liabilities, rather than amounts, as well as international revenues and expenses.

The balance of payments includes virtually any legitimate international transaction you can imagine, such as: (1) exports and imports of goods and services, (2) receipts and payments of investment income (e.g., dividends and interest), (3) gifts and aid given and received, (4) purchases and sales of natural resources, (5) debt forgiveness, (6) borrowing and lending, (7) purchases and sales of financial investments, such as stocks and bonds, (8) investments in plant and equipment, and (9) central bank intervention in foreign exchange markets.

1 The IMF publishes a monthly report (since 1948), called *International Financial Statistics*, which contains balance of payments figures and other vital macroeconomic information on its 189 member countries. The IMF database has approximately 32,000 time series and accounts for the vast majority of world trade. See http://www.imf.org/external/data.htm (accessed August 11, 2019).

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Balance of Payments and the Foreign Exchange Market

The balance of payments is *not* a recording of the supply and demand transactions that enter into the foreign exchange market. Instead, it is a much broader measure, including all transactions between domestic and foreign residents. No exchange of currencies needs to take place for a transaction to be part of the balance of payments. Examples of transactions that are in the balance of payments, but not the foreign exchange market, are products sold on credit, tangible gifts, and barter trade.

The following example may help explain why a strict one-to-one relationship does not exist. Suppose a Japanese auto manufacturer sold cars quarterly to an Australian auto dealership. These transactions would be counted in both Japan's and Australia's balance of payments because they are between domestic and foreign residents. If the Japanese manufacturer were willing to accept Australian dollars, rather than Japanese yen, then no foreign exchange transaction would take place. The Australian importer's bank account would fall, and the Japanese exporter's bank account would rise by the same amount in the Australian banking system. Similarly, if the Japanese manufacturer extended the Australian dealership a 90-day trade credit, denominated in yen, (or Australian dollars), then no foreign exchange transaction would occur. The Japanese manufacturer would increase its accounts receivable rather than its yen (or Australian dollar) bank account. Neither of these examples involves an exchange of currencies. Therefore, they had no effect on the foreign exchange market. At the same time, because these transactions were between residents of two countries, they entered into the respective countries' balance of payments.

Major Parts of the Balance of Payments

A balance of payments statement has five major parts (see Figure 17.1), each of which is fully explained below. They are the:

1. Current account (CA)
2. Capital account (KA)
3. Financial account (FA)
4. Net errors and omissions (NEO)
5. Reserves and related items (RRI)

Let's take a more in-depth look at the types of transactions in each of the five balance of payments parts.

Account	Measure
Current Account (CA)	**Net Earnings**
Net Exports of Goods	Product export revenues minus product import costs
Net Exports of Services	Service export revenues minus service import costs
Primary Income	Primary income receipts minus primary income payments
Secondary Income	Secondary income receipts minus secondary income payments
Capital Account (KA)	**Net Earnings**
Financial Account (FA)	**Net Increase in Investments Abroad**
Direct Investments	Changes in domestic direct investments abroad minus changes in foreign direct investments in the domestic country
Portfolio Investments	Changes in domestic portfolio investments abroad minus changes in foreign portfolio investments in the domestic country
Financial Derivatives	Changes in domestic ownership of foreign financial derivative assets minus changes in foreign financial derivative liabilities
Other Investments	Changes in the domestic country's "other investments"in foreign nations minus foreign nations' "other investments"in the domestic country
Net Errors and Omissions (NEO)	If there are no measurement mistakes, then (CA + KA) must equal (FA + RRI). NEO is a balancing number so that (CA + KA + NEO) ≡ (FA + RRI).
Reserves and Related Items (RRI)	**Net Increase in Official Reserves**

Figure 17.1: The Balance of Payments.

Current Account (CA)

The *current account* measures a country's net earnings or net payments from (1) exports and imports of goods and services, (2) primary income, and (3) secondary income, which are all defined below.

Goods

Goods include international purchases and sales of tangible items by consumers, businesses, and governments. These products may be purchased for final use or as inputs.

Services

Services include compensation for internationally traded intangibles. For example, they include payments for tourist and business travel, as well as periodic payments for insurance policies, leases, licenses, franchise and maintenance

agreements, postal deliveries, recreation, royalties, and technical support. Services also include payments for computer software, communication, consulting, financial information, and transportation, as well as periodic payments for the use of intellectual property, such as those related to research and development, patents, trademarks, copyrights, industrial processes and designs, and trade secrets.

Primary Income

Primary income is mostly (1) compensation paid to labor for international services, (2) reinvested corporate profits,[2] (3) net interest and dividends on financial (portfolio) investments,[3] and (4) net income from renting natural resources.

Secondary Income

Secondary income includes international payments and receipts for transfers, aid, donations, and gifts. These are one-sided transactions, in the sense that something of value is given, but nothing of monetary value is received. Most secondary income transfers are funds sent home by migrant (emigrant) workers. Other examples of secondary income transactions are international transfers of government aid, charitable contributions, social security benefits, pensions, and insurance claims. These outlays may be paid in cash or in-kind, and they include taxes on income and wealth. The IMF refers to remittances and transfers as "secondary income" because it represents redistributive payments, as opposed to expenditures for productive assets. The financial press often refers to secondary income as "unilateral transfers" or "unrequited transfers."

Summary: Current Account

The current account has been the center of many political disputes because it is interpreted (often incorrectly) as evidence of job destruction for nations with deficits, which can lead to demands for tariffs and other forms of protection. If earnings from current account transactions exceed expenditures, the current account is positive and said to be in surplus. If the current account is negative, it is in deficit (see Figure 17.2).

2 Reinvested corporate profits are counted as "direct investments" if 10 percent or more of the company is foreign-owned.

3 Capital gains are not included.

Condition	Explanation	
CA > 0	Surplus	The nation is earning more than it is spending.
CA < 0	Deficit	The nation is spending more than it is earning.

Figure 17.2: Current Account Surplus and Deficit.

Capital Account (KA)

The *capital account* includes tangible and intangible current transactions that are not included in the current account. To be included as a capital account transaction, there must be a clear transfer of ownership rights. Among the most prominent capital account transactions are international debt forgiveness,[4] acquisitions, disposals, and changes in ownership rights to (1) natural resources,[5] (2) legal and accounting creations, and (3) marketing assets.[6] "Natural resources" include land, reservoirs, and lakes, as well as fishing-, mineral-, forestry-, and airspace rights. "Legal and accounting creations" include contracts, leases, licenses, and goodwill. "Marketing assets" include brand names, mastheads, trademarks, logos, and domain names, but only when they are sold separately from the companies that own them. Therefore, the independent sale of PepsiCo's domain name to a French beverage company would be included in the capital account.

For most countries, the capital account is insignificant and, therefore, not a focus of attention. When earnings from the capital account exceed expenditures, the capital account is positive, and it is said to be in surplus. If the capital account is negative, it is in deficit.

4 Debt forgiveness is not the same as a debt write-off or debt repudiation. It is a narrower concept that includes only voluntary cancellations of all or part of outstanding debts (i.e., principal, interest arrears, and accrued interest), as opposed to the cancellation of future obligations.

5 A helpful way to distinguish natural resource transactions included in the capital account from those contained in the current account is to remember capital account-related transactions are for assets that stay in the country. For example, the purchase or sale of land-, mineral-, oil-, gas-drilling-, and forestry rights involve assets that remain in the nation after the transaction. By contrast, exports of commodities, such as oil, lumber, and minerals, leave the country, and when they do, they are counted as merchandise exports in the current account.

6 The IMF uses the term "non-produced nonfinancial assets" for "natural resources and related assets."

Be Careful of the Terms "Capital Account" and "Capital Flows"

The word "capital" is often used in the financial press and many academic articles when referring to real and financial cross-border investments, but the IMF uses this term differently. In the IMF's balance of payments accounts, the "capital *account*" refers mainly to debt forgiveness but also includes purchases and sales of natural resources, legal and accounting creations, and marketing assets. Confusion can result when news reports mention international "capital *flows*" or "capital *flight*." In the context of the article or report, usually it is easy to understand what the author or news anchor means. For example, if the spotlight is on international currency speculation or cross-border investments in factories, mergers, or acquisitions, then the word "capital" is referring to the IMF's financial account and not its capital account. The financial account is discussed in the next section.

Financial Account (FA)

The *financial account* measures non-central-bank-related international investments, borrowing, and lending transactions over a period. These transactions exclude changes in central bank assets and liabilities because they are recorded in *reserves and related items*, discussed later in this chapter.

In balance of payments discussions, we must be careful to treat the word "investments" very broadly because it includes changes in foreign ownership of direct company investments (e.g., plant and equipment), bonds, loans, shares, and bank accounts. The financial account has four major parts: *direct investments*, *portfolio investments, financial derivatives*, and *other investments*.

Direct Investments

Direct Investments include purchases and sales of foreign assets that have lasting value, such as the construction of an overseas factory, reinvested foreign earnings, and physical deliveries and receipts of machinery between domestic and foreign affiliates. Direct investments also include purchases of substantial foreign equity interests. The IMF rule defines "substantial" as having ownership of 10% or more of the voting shares. Direct investments can be monetary or in-kind, such as when a company supplies machines to a foreign affiliate. It also includes mergers, acquisitions, divestitures, corporate restructurings, and borrowing to support government-owned or controlled enterprises.

Portfolio Investments

Portfolio Investments include international purchases and sales of debt and equity instruments. These transactions are unlike direct investments because they focus on financial transactions that do not involve changes in controlling business interests. Examples of *debt instruments* are international loans and ownership transfers of interest-earning bills, notes, and bonds. *Equity instruments* reflect changes in foreign holdings of company-issued shares (stocks).

When residents of Country A purchase foreign-issued debt or equity instruments, Country A's financial account records them as "assets," which are positive entries. When these foreign asset holdings fall, they are recorded in the financial account with negative values. Similarly, when foreign residents purchase debt or equity instruments issued by Country A's firms or governments, these securities are liabilities of Country A to foreigners and recorded as negative values. When foreigners reduce their holdings of these securities, Country A's liabilities to foreigners decrease, which is recorded as a positive value.

Financial Derivatives

Financial derivatives have become very popular throughout the world due to their ability to efficiently transform risks and provide low-cost opportunities for highly leveraged speculation. They include mainly forward, futures, option, and swap transactions. The balance of payments counts changes in the *market value* of financial derivatives, instead of changes in their *notional values (explained below)*. The difference between notional and market values is important because the notional value of financial derivatives is measured in trillions of dollars, but changes in the market value of these contracts is only a fraction of that amount.

"Notional value" is the face amount of an underlying asset in a derivative deal. For example, suppose you transact a six-month forward contract to exchange euros for dollars. If the forward price (which is set today) is \$1.25/€ and the amount is €100,000, then, in six months, you will pay \$125,000 and receive €100,000. The *notional value* of this contract is \$125,000, which equals €100,000, but the initial *market value* of this transaction is zero (\$0) because what you agree to pay is exactly equal, in value, to what you will receive. Consequently, nothing would be entered into the balance of payments because this transaction is an exchange of equals. Only when the exchange rate changes does this contract gain or lose value and enter the balance of payments. For example, if the value of the euro rises to \$1.50/€, then you are obligated to pay only \$125,000 for €100,000 that are now worth \$150,000. In short, the *market*

value of your contract has increased from zero to $25,000. This $25,000 gain would enter into the balance of payments.

Other Investments

"Other Investments" is a residual account that measures transactions that are not included in direct investments, portfolio investments, or financial derivatives accounts. At first glance, other Investments may appear to be a relatively unimportant account, but this is hardly the case. It is among the most active and significant in the balance of payments because "other investments" include changes in bank deposits, trade credits, and advances. These transactions are crucial because the balance of payments is a double-entry bookkeeping system that requires two offsetting accounting entries for each transaction.[7] Because at least one side of most transactions is a payment or receipt, the "other investments" account captures and records these payment and receipt sides.

Meaning of a Positive or Negative Financial Account

If the financial account is positive, a nation's residents invested or lent more abroad than they borrowed from foreign residents during a certain period. In short, Country A's foreign asset holdings rose more than the assets that foreign residents held in Country A. If the financial account is negative, then just the opposite is true—domestic individuals, businesses, and governments were net international borrowers (see Figure 17.3). This means the asset holdings of foreign residents in Country A rose, during that period, more than Country A's assets holdings abroad.

Condition	Explanation	
FA > 0	Surplus	The non-central-bank-sector is a net international lender.
FA < 0	Deficit	The non-central-bank-sector is a net international borrower.

Figure 17.3: Financial Account Surplus and Deficit.

7 Double-entry bookkeeping is described in greater detail in *The Rest of the Story*, where examples are provided.

Reserves and Related Items (RRI)

Reserves and related items show net *changes* in a nation's official international reserves, which are assets central banks or government authorities can use to intervene in the foreign exchange markets (see Figure 17.4). These assets are highly liquid and unconditionally available to a central bank for immediate use. Among the most important reserve assets are holdings of convertible foreign currencies (cash and deposits), securities denominated in foreign currencies, gold (called "monetary gold") and other precious metals, special drawing rights (SDRs),[8] a nation's reserve position at the IMF, and borrowing rights from other central banks. Because the balance of payments is a flow measure, only *changes* in the value of a nation's reserve assets are recorded and *not* their levels.

International Reserves include:

- Foreign currencies and deposits
- Foreign currency-denominated securities (debt and equity)
- Monetary gold and other precious metals
- Special drawing rights (SDRs)
- Reserve position at the IMF
- Net borrowing rights from foreign central banks (swap agreements)
- Market value of financial derivatives

Figure 17.4: Components of a Nation's International Reserves.

When reserves and related items are positive, the nation's central bank increased its holdings of international reserve assets, and when it is negative, the nation's official reserves fell (see Figure 17.5).

Condition	Explanation	
RRI > 0	Surplus	The central bank increased its international reserves.
RRI < 0	Deficit	The central bank decreased its international reserves.

Figure 17.5: Reserves and Related Items Surplus and Deficit.

8 In *The Rest of the Story*, the section entitled "What Are SDRs" explains this reserve asset.

Reserves and Related Items and Changes in the Monetary Base

In Chapter 9, "Central Banks," we learned how central banks control and adjust their domestic money supplies. To simplify our analysis, an imaginary horizontal line was drawn across the page, with central banks above the line and everything else below it (see Figure 17.6). We found that a central bank can increase its international reserves by crossing this imaginary horizontal line to purchase foreign currencies, thereby sending domestic monetary base below the line and taking foreign currencies above it. Purchases of foreign exchange by a central bank increase the nation's monetary base, and sales reduce it. In effect, central bank intervention in the foreign exchange markets has monetary effects that are almost identical to open market operations (i.e., the buying and selling of government securities).

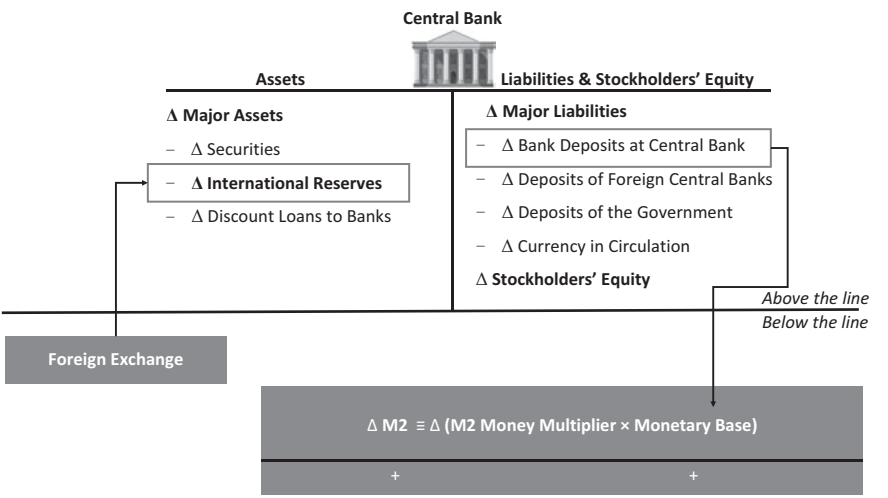


Figure 17.6: Effect of Increasing International Reserve Assets on the Monetary Base. (Imagery used: © MicroOne/Shutterstock)

Suppose the U.S. Federal Reserve held international reserves worth $150 billion and wanted to increase the value of the dollar relative to the euro. If the exchange rate was €1/$ and the Fed purchased $20 billion in the foreign exchange market, it would need to use reserves worth €20 billion. By supplying €20 billion to the foreign exchange market, the Fed would demand $20 billion, thereby increasing the dollar's value relative to the euro (say, to €1.05/$). At the same time, by purchasing these dollars, the Fed would also remove them from the market (i.e., moving them from below the line to above the line), thereby reducing the U.S. monetary base (see Figure 17.7).

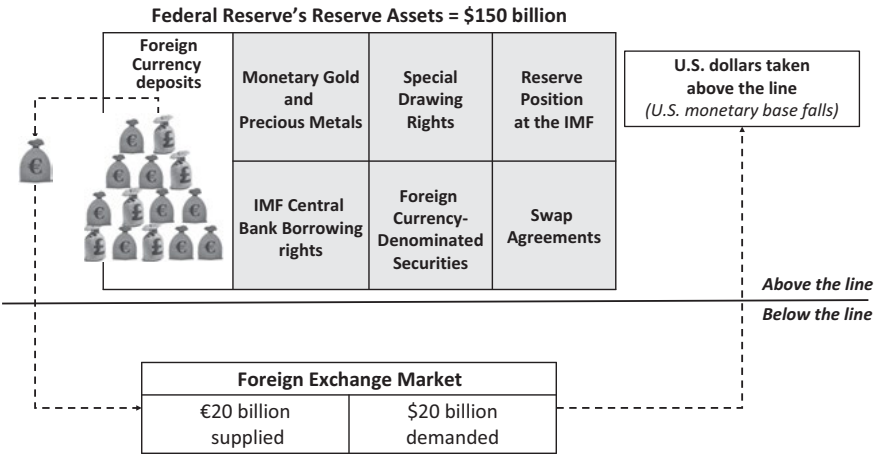


Figure 17.7: Effect of Federal Reserve Intervention in the Euro-Dollar Foreign Exchange Market to Raise the Dollar's Value. (Imagery used: © nerthuz, Milosh Kojadinovich/123rf)

Our example of Federal Reserve intervention in the foreign exchange market highlights four critical points.

1. A nation's ability to raise the international value of its currency by intervening directly in the foreign exchange market is limited by the amount of reserve assets it holds or can access by borrowing.
2. The domestic currency is not included in a nation's official reserves. This is logical because the domestic currency cannot be used in the foreign exchange markets to raise its own value. For example, if the Fed, which has unlimited access to dollars, were to demand dollars in the foreign exchange market with newly created dollars, the transaction would be self-canceling.
3. A central bank can lose a significant portion, and perhaps all, of its reserve assets by supporting an overvalued exchange rate for too long. It is for this reason that reserve assets are represented in Exhibit 17.7 as a mountain of limited size. Every time a central bank intervenes in the foreign exchange market to raise the value of the domestic currency, a portion of its mountain of reserve assets is eroded.
4. Figure 17.7 shows how foreign exchange market intervention by a central bank can affect both the domestic and foreign monetary bases. Before the intervention, suppose the Federal Reserve held its euro reserves as deposits in the European Central Bank (i.e., above the line). Because these funds were above the line, they were not part of the European Monetary Union's (EMU's) monetary base. Their injection into the world economy (below the

line) would increase the EMU's monetary base and money supply. In an ironic twist of roles, the U.S. central bank, in its attempt to change the value of the dollar, would affect both its own monetary base and the monetary base of the EMU.

Net Errors and Omissions (NEO)

Net errors and omissions provides a way to correct for measurement mistakes in the balance of payments.[9] Some international transactions never enter the balance of payments because they are illegal, such as the drug trade, money laundering, and tax evasion. Others are recorded inaccurately due to calculation mistakes, poor data quality, measurement errors, and incomplete figures. The problem is that collection methods are not always correct. If every international transaction were recorded correctly and precisely, accounting principles tell us that (CA + KA) *must equal* (FA + RRI). The next section of this chapter explains why. When international statistics are assembled and sorted, if (CA + KA) does not precisely equal the sum of (FA + RRI), NEO is inserted as a balancing number (i.e., plug number) that makes the two sides equal. Therefore, in balance of payments reports (CA + KA + NEO) must equal (FA + RRI).[10]

Balance of Payments Identity

The *Balance of Payments Identity* is an accounting tautology that is based on a simple fact: *Nations that spend more internationally than they earn must be net global borrowers, and those that earn more internationally than they spend must be net global lenders*. The sum of (CA + KA) represents a nation's net international earnings or expenditures, and the sum of (FA + RRI) represents a nation's net international lending or borrowing. Therefore, if a country is a net international spender, then (CA + KA) is negative, which means it is a net foreign borrower and (FA + RRI) must be negative. By contrast, if the nation is a net international earner, then (CA + KA) is positive, which means it is a net foreign

9 "The Balance of Payments and Double-Entry Bookkeeping" section of *The Rest of the Story* helps to further explain this relationship by using examples of international transactions.

10 In economic discussions, NEO is typically ignored in the *Balance of Payments Identity*, (CA + KA) ≡ (FA + RRI).

investor/lender and the sum of (FA + RRI) must be positive. Therefore, the *Balance of Payments Identity* is (CA + KA) ≡ (FA + RRI).[11]

For example, suppose the U.S. net exports of goods and services equal −$500 billion, and primary income, secondary income, and the capital account equal zero, causing (CA + KA) to equal −$500 billion. These net purchases need to be financed, which means the nation must borrow internationally. If the deficit were financed by non-central-bank entities, such as private individuals, financial institutions, businesses, and governments, then the financial account (FA) would equal −$500 billion. By contrast, if the (CA + KA) deficit were financed by U.S. Federal Reserve (i.e., central bank) intervention in the foreign exchange markets, then its holdings of international reserves would fall, causing reserves and related items (RRI) to equal −$500 billion. Any combination of FA and RRI changes could finance the (CA + KA) deficit, so long as their sum equaled −$500 billion. Figure 17.8 summarizes the major balance of payments sections, their meaning, and the *Balance of Payments Identity*.

Net Export Identity

Because net exports of goods and services (NX) are such a prominent part of most nations' current accounts, eyes turn toward this balance when searching for ways to turn current account deficits into surpluses. Between 2000 and the end of 2018, the United States had a continuous stream of net export deficits. During the same period, Japan and China had uninterrupted surpluses in their net exports. What caused these deficits and surpluses? For nations that wish to reduce such imbalances, what needs to be done? Extensive political and economic attention has focused on *protectionism* (e.g., tariffs, quotas, subsidies, and exchange rate controls) as a means of solving net export problems. Behind many of these discussions has been the persistent notion that, to cure net export deficits, there needs to be a "level international playing field" and, for that to happen, some nations must reduce their trade barriers or, perhaps, others must increase them.

Can protectionist measures play important roles in correcting net export deficits? Let's put this question into a broader perspective that draws on some basic economic principles we have learned about national income accounting. Recall that gross domestic product (GDP) is the market value of all final goods and services produced by a nation during a given period. There are two equally

11 Notice "≡," which means the relationship is an identity.

CA			+	KA	+	NEO	≡	FA			+	RRI
Current Account			**+**	**Capital Account**	**+**	**Net Errors & Omissions**		**Financial Account**			**+**	**Reserves & Related Items**
Exports of goods and services and foreign income receipts minus imports of goods and services and foreign income payments				Capital Account		Balancing number so that (CA + KA + NEO) ≡ (FA + RRI)		Net acquisition of foreign financial assets minus net incurrence of foreign liabilities				Changes in reserve assets
										Foreign-Related Financial Derivatives, net		
									Other Investment, net			
									Portfolio Investment, net			
								Direct Investment, net				Reserves & related items, net
Goods, net	Services, net	Primary Income, net	Secondary Income, net									
International purchases and sales of tangible items by consumers, businesses, and governments			*International payments and receipts for transfers, aid, donations, and gifts*	*Debt forgiveness, acquisitions and disposals of nonproduced nonfinancial assets, such as natural resources, contracts, leases, licenses, and marketing assets (including goodwill)*		*Statistical discrepancy*		*Purchases and sales of foreign assets that have lasting value: Construction of overseas factories, reinvested foreign earnings, and physical deliveries and receipts of machinery between domestic and foreign affiliates. Ownership of 10% or more of foreign companies' voting shares*	*International purchases and sales of equity and debt instruments, with no controlling business interests*	*Changes in bank deposits, trade credits, and advances*	*Changes in the market value of forward, futures, option, and swap transactions*	*Changes in central bank holdings of convertible foreign currency deposits and securities, SDRs, monetary gold, other precious metals, swap arrangements, and IMF borrowing rights*
	Compensation for services, including internationally traded intangibles											
		Compensation to labor for international services, reinvested corporate profits,[12] net interest and dividends on financial (portfolio) investments,[13] and net income from renting natural resources										

Figure 17.8: Balance of Payments Statement and the Balance of Payments Identity.

12 Reinvested corporate profits are counted as "direct investments" if 10 percent or more of the company is foreign-owned.

13 Capital gains are not included.

valid and fruitful ways to define GDP. One is by using the four components of aggregate demand, which are personal consumption expenditures (C), gross private domestic investment (I), government spending on final goods and services (G), and the net export balance on goods and services (NX). Let's call this relationship Condition 1 (see Figure 17.9). Notice that Condition 1 has an equal sign with three bars, which means the relationship is definitional—there is no disagreement about its validity.

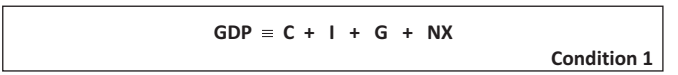


Figure 17.9: Components of GDP: Aggregate Demand Perspective.

Another way to define GDP is by the uses to which the household sector puts its income. We know from our circular-flow discussion in Chapter 2, "Taking an Economic Pulse," that income paid to the household sector can be used for personal consumption expenditures (C), personal saving (S), and taxes (T), where "taxes" equal government tax revenues minus government transfer payments (i.e., T ≡ TXR − GT). Let's call this relationship Condition 2 (see Figure 17.10). Notice, again, that Condition 2 also has an equal sign with three bars, which means the relationship is definitional.

Figure 17.10: Components of GDP: Income Perspective.

By combining Conditions 1 and 2, canceling the like term (i.e., "C"), and rearranging elements, we arrive at the *Net Export Identity*, NX ≡ (S − I) + (T − G), which says a nation's balance on goods and services (NX) must equal the sum of its net private saving/investment, (S − I), plus the net government surplus/deficit, (T − G) (see Figure 17.11).

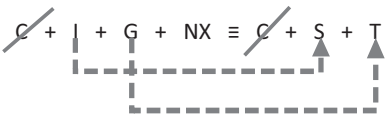
The Net Export Identity is an important relationship in international macroeconomics because it shows what a nation has to do to correct a net export deficit or surplus. To make net exports more positive or less negative, the sum of net private saving/investment plus the net government surplus/deficit must increase. To make it more negative or less positive, the opposite must occur. The Net Export Identity also shows that, if a nation's private sector invests more than it

$$C + I + G + NX \equiv GDP \equiv C + S + T$$

By dropping GDP, we get

$$C + I + G + NX \equiv C + S + T$$

After cancelling like terms and rearranging elements, …



… we arrive at:

$$NX \equiv (S - I) + (T - G)$$

… which means

Balance on goods & services ≡ Net private saving/investment + Government surplus/deficit

Figure 17.11: The Net Export Identity: $NX \equiv (S - I) + (T - G)$.[14]

saves *and* the government sector runs budget deficits, net exports *must be* negative. No amount of political or economic rhetoric can change this basic fact.

In the absence of economic growth, reducing a net export deficit or creating a surplus means finding ways to increase saving (i.e., to reduce consumption expenditures), restrain investment, raise tax revenues, or cut government spending. All of these policies could be problematic because they are contractionary and could drive the nation into a recession. If they do, then why would a government prioritize a reduction in net export deficits over real GDP growth and job creation?

Turning a net export deficit into a surplus (or lowering a net export deficit) is easier in a climate of economic growth because all the components of the net export identity can rise simultaneously. All that is needed for net exports (NX) to become more positive or less negative is to have domestic spending rise more slowly than GDP. In other words, if the sum of C + I + G increases more slowly than GDP, then NX must rise.

14 Actually, deriving the Net Export Identity is a bit more complicated than it might first appear, due to government transfers (GT). Here's why: $RGDP \equiv C + I + G + NX$. Therefore, $NX \equiv RGDP - C - I - G$. Let's define "T" as tax revenues (TXR) minus government transfers (GT), that is $T = TXR - GT$. If we add and subtract T from the underlined relationship above, we get, $NX \equiv RGDP - T - C - I + T - G$. Saving (S) equals disposable income (RGDP − T) minus consumption (C), which means $S \equiv RGDP - T - C$. Therefore, $NX \equiv (S - I) + (T - G)$.

The Net Export Identity gives some interesting additional insights into how a nation might reduce net export deficits. Often, the problem is not an absence of economic solutions, but rather these solutions expose painful decisions and difficult tradeoffs. Moreover, with every answer comes new and, sometimes, unknown problems, which can be perceived as worse than the familiar old ones. Superimposed on all these decisions is a web of vested-interest groups (e.g., unions, consumers, environmentalists, and corporate lobbies) and political logrolling deals that can play significant parts in the political process. This added political dimension complicates already complex economic decisions.

Consider the suggestion that the United States introduce a value-added tax,[15] as a way to turn net exports from a negative to a positive number. Such a tax would encourage saving by discouraging consumption, and if it raised government revenues, the tax might reduce U.S. budget deficits. Therefore, a value-added tax could have a double-barreled positive effect on the U.S. net export deficit, but how would you answer critics who argue that government spending should be cut before a single penny more is paid in taxes? Could you ensure that the value-added tax is fair and does not raise the cost of living disproportionately for low-income earners (i.e., make sure it is not regressive)? Any reasoned change in policy needs to address a multitude of economic, political, and social questions before it can be passed, but it also has to overcome the multiplicity of vested interest groups that are injured or benefited by changes in legislation.

What the Net Export Identity Does Not Say

The Net Export Identity does not say that any country with a budget surplus will necessarily have a surplus in its net exports. From 1989 to 1996 (just before the Asian Tiger crisis), Thailand ran persistent government budget surpluses at the same time that it had net export deficits. Similarly, between 1998 and 2001, the United States had budget surpluses but net export deficits. By contrast, Japan, Germany, and Switzerland have often had budget deficits and net export surpluses. The cause of these different international positions can be traced to disparities in their rates of net private saving/investment relative to net government surplus/deficit. Japan, Germany, and Switzerland had net export surpluses because their net private saving exceeded government

15 A value-added tax is a tax imposed on a product whenever its value increases at each stage between production, distribution, and sale. For individuals, it is a consumption tax rather than a tax on earned income.

budget deficits. Similarly, the United States and Thailand had net export deficits because negative net private saving exceeded their government budget surpluses, or budget deficits reinforced them.

Can Protectionism Cure Net Export Deficits?

Notice that tariffs, quotas, subsidies, and other forms of global protectionism are not mentioned in the Net Export Identity. Their absence is striking only because protectionism is often the first solution offered to improve a nation's net export deficits. This economic tautology shows that a nation's international trade position in goods and services can become positive only if protectionist measures, in some way, cause the sum of net private saving/investment plus the net government surplus/deficit to become positive, which means $(S - I) + (T - G) > 0$.

A simple example illustrates how powerful an understanding of the Net Export Identity can be. In 2016, Donald Trump was elected President of the United States. Campaign speeches before the election, and subsequent policies as President, drew public attention to his belief that persistent U.S. trade deficits had harmed the country. In a tweet, President Trump said: "From Bush 1 [i.e., Mr. Trump was referring to President George H.W. Bush] to present, our Country has lost more than 55,000 factories, 6,000,000 manufacturing jobs and accumulated Trade Deficits of more than 12 Trillion Dollars. Last year we had a Trade Deficit of almost 800 Billion Dollars. Bad Policies & Leadership. Must WIN again!"

Once elected, President Trump imposed tariffs on steel imports from several countries, including allies, like Canada and Mexico. He also imposed an array of tariffs on imports from China and threatened more. His goal was to shrink U.S. deficits for internationally traded *goods*. Nevertheless, let's see what the Net Export Identity, which includes both *goods and services*, adds to this discussion.[16]

The line of reasoning that tariffs and other protectionist policies can reverse trade deficits is appealing because it tastes so good going down, but, when served in the context of the Net Export Identity, it is difficult to digest. For instance, if tariffs reduced U.S. imports from China, then the demand for Chinese

16 Reducing U.S. trade deficits was only one of the Trump Administration's international goals. It also sought to address unfair trade practices, such as the theft of U.S. intellectual property by foreign businesses and governments, and force other nations to provide U.S. companies with equal access to their markets.

yuan would fall, causing the yuan's value, in terms of the dollar, to depreciate and the dollar's value, in terms of yuan, to appreciate. The yuan's depreciation would *stimulate* (not reduce) U.S. purchases of Chinese products. Similarly, the dollar's appreciation would reduce U.S. exports to China. Therefore, it is possible for the reduction in U.S. imports from China, due to higher tariffs, to be offset (partially or fully) by a combination of increased U.S. imports from China, due to the yuan's depreciation, and reduced U.S. exports to China, due to the dollar's appreciation. Furthermore, reductions in China's net exports could lower the nation's GDP or reduce its growth rate, which would reinforce China's decreased demand for exported U.S. products. Again, the benefits that President Trump might have expected to derive from imposing tariffs could be whittled away or entirely offset. Added to this ambiguity are the adverse effects of foreign retaliation, which would further disrupt trading patterns, as well as established and complex global supply chains.

The problem with protectionist arguments is not that they are entirely wrong, but rather they can be myopic. What seems so simple in isolation (e.g., such as the statement, "Tariffs reduce imports and help a nation") turns out to be somewhat nebulous and complicated in a broader context. For this reason, the Net Export Identity is one of the fundamental pillars of international trade theory because it provides the broader framework needed to conceptualize issues dealing with a nation's global trade position.

The Net Export Identity tells us that no protectionist policies will alter a country's net exports, unless they change the sum of net private saving/investment plus the net government surplus/deficit. Tariffs *may have* this effect. For instance, they might discourage some forms of consumption and thereby encourage saving. In addition, tariff revenues might reduce a government budget deficit or add to a government budget surplus, but notice how different this line of reasoning is from the standard line used by tariff advocates, and also notice how it relies on the assumption of non-retaliation by foreign nations.

The Rest of the Story

Balance of Payments Measures

Balance of payments deficits and surpluses refer to particular parts of the entire report. The IMF calculates five official "balances" and the current account. The balances are the: (1) balance on goods, (2) balance on goods and services, (3) balance on goods, services, and primary income, (4) balance on current account and capital account, and (5) balance on current, capital, and

financial account (see Figure 17.12). Notice that the current account is also shown in Figure 17.12, even though it is not an official "balance." The reason for including it is to show how the balance on current and capital account and also the balance on current, capital, and financial account are calculated.

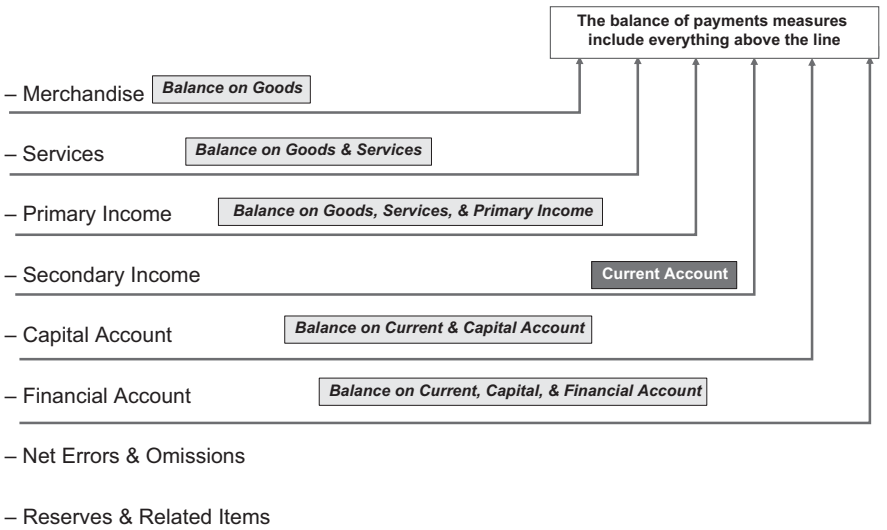


Figure 17.12: Major Balance of Payments Measures.

Balance on Goods

The narrowest balance of payments measure is the balance on goods, which is often called the merchandise trade balance or trade balance, because it includes just imports and exports of tangible merchandise. The trade balance is a highly visible statistic in the media and the focus of many heated (often-misdirected) debates about whether imports take jobs away from the domestic workforce. The main problem with the trade balance is its limited range. As nations have become more service-oriented, the trade balance has become increasingly less relevant because jobs, productivity, and foreign exchange transactions are just as closely tied to international service flows as they are to merchandise transactions.

Balance on Goods and Services

A broader (and better) measure of a nation's international economic position is the balance on goods and services because it includes a nation's imports and

exports of both goods *and* services. The balance on goods and services is commonly used to determine if a country is *paying its own way* or *living beyond its means*.[17]

Recall from the Chapter 2, "Taking an Economic Pulse," that another name for the balance on goods and services is "net exports" (NX), which is one of the four components of a nation's aggregate demand (AD). The other three parts are personal consumption expenditures (C), gross private domestic investment (I), and government spending for final goods and services (G) as shown in Figure 17.9. Due to its close connection to GDP, the balance on goods and services is closely watched by nations and useful for making international comparisons in discussions related to GDP.

Balance on Goods, Services, and Primary Income

As its name indicates, the balance on goods, services, and primary income includes everything in the balance on goods and services account plus net primary income paid or received. Like the balance on goods and services, a deficit in the balance on goods, services, and primary income is often interpreted as a sign that the nation is living beyond its means. Whether such criticisms are warranted usually depends on whether the funds are being spent on self-liquidating investments and productivity-increasing investments or infrastructure. If they are, then the debts incurred to finance these deficits may not be burdens on future generations.

Current Account (CA)

The current account is not an official "balance" in the balance of payments. Instead, it is an "account." Nevertheless, the current account is part of the (1) balance on current and capital account and (2) balance on current, capital, and financial account. The current account includes international exports and imports of goods and services, as well as net primary and net secondary income receipts/payments. This highly visible balance of payments measure was covered in considerable depth earlier in this chapter. The current account is also

17 "Paying its own way" and "living within its means" are expressions that mean the nation is earning more than it is spending. This idiom is often used in the context of families and whether they are spending less than their yearly incomes. The expressions "not paying its own way" and "living beyond its means" are ways of saying the nation (or family) is spending more than it earns.

used as a measure of whether a nation is paying its own way or living beyond its means.[18]

Balance on Current Account and Capital Account

For most countries, the balance on current account and capital account is virtually identical to the current account because the capital account is typically insignificant. If (CA + KA) is positive, then the nation is a net international earner, and these funds are invested abroad, in either the financial account (FA) or reserves and related items (RRI). Similarly, if (CA + KA) is negative, then the nation is a net international spender, and these funds are borrowed or otherwise made available by the financial account (FA) and reserves and related items (RRI).

Balance on Current, Capital, and Financial Account

The balance on current, capital, and financial account deserves special attention due to its direct relationship to the *Balance of Payments Identity* and central bank intervention in the foreign exchange markets. As stated earlier in this chapter, the Balance of Payments Identity tells us that (CA + KA + NEO) must equal (FA + RRI). In short, (CA + KA + NEO) $\equiv$ (FA + RRI). Rearranging terms in the Balance of Payments Identity reveals that that (CA + KA − FA) must equal (RRI − NEO).[19] In the absence of net errors and omissions, the balance on current, capital, and financial account equals reserves and related items (i.e., (CA + KA − FA) = RRI). This result is of particular interest because countries with flexible exchange rates should have reserves and related items equal to zero, which means the balance on current, capital, and financial account equals zero.

Given this fact, it is easy to determine if a nation is on a fixed or flexible exchange rate system and if it is gaining or losing reserves. If a country has a flexible exchange rate, then its reserves and related items equals zero.[20] If it is gaining official reserves, then its reserves and related items is positive, and if the country is losing reserves, then its reserves and related items is negative.

18 Three balance of payments measures are used, commonly, to gauge if a nation is paying its own way. They are the balance on goods and services; balance on goods, services, and primary income; and current account. Which one is best is debatable.

19 We get this result by subtracting FA and NEO from both sides of the Balance of Payments Identity.

20 For nations with flexible exchange rates, small reserves and related items (RRI) amounts could be due to changes in the market value of their reserves, caused by exchange rate movements.

Are Current Account Deficits Harmful or Beneficial?

The current account is one of the most frequently mentioned balance of payments measures, often cited in the news media and used for international comparisons in a wide variety of debates and studies related to employment, growth, and development. It is important to remember that current account deficits must be financed by the financial account plus reserves and related items.[21] Therefore, current account deficits imply rising net international debt levels for nations or the depletion of their central banks' reserve assets. For many countries, both of these effects could have disquieting economic consequences.

For example, the accumulation of financial account deficits could reach levels where international creditors become concerned about the ability of a nation, such as Russia, Turkey, or Venezuela, to repay its obligations. To borrow more, a debtor nation might be burdened with hefty interest premiums to cover the added country risk. Similarly, if a country continually uses its reserve assets to fund deficits, at some point these reserves could be exhausted, thereby extinguishing the nation's ability to finance future deficits in this way.

Many of us interpret deficits as being harmful and surpluses as being beneficial. Therefore, we assume that current account deficits are signs of excessive and unwise spending and nations living beyond their means. The next section shows that these assumptions and conclusions might be incorrect.

Financial Account Deficits May Cause Current Account Deficits

Current account deficits can spark hotly disputed economic and political debates about their causes and effects. Most often, these discussions focus on relative differences in international inflation rates, productivity levels, research and development spending, and educational systems, but they also include arguments over levels of protectionism, reciprocity, and fairness. For most of us, these factors seem logical, but digging a bit below the surface, we find that the actual cause of a current account deficit (CA) may be a deficit in the financial account and reserves and related items (i.e., a FA + RRI deficit).

To see why, let's use the United States as an example. We will simplify our task by assuming there is no central bank intervention (i.e., the United States has a flexible exchange rate), which means reserves and related items equals zero, and we will also assume that the capital account equals zero. As

21 The capital account is typically so small that it can be ignored for most funding discussions of the current account.

a result, our *Balance of Payments Identity* (i.e., CA + KA ≡ FA + RRI), becomes CA ≡ FA.

Suppose international turmoil caused a rush of foreigners to invest in safe U.S. investments. To acquire dollar-denominated U.S. assets, two separate transactions would typically occur. First, foreign investors would purchase U.S. dollars with their own currencies, and the increased demand would raise the dollar's international value. Once purchased, these dollars could then be used to buy the relatively secure U.S. investments. Similarly, U.S. demand for foreign investments would fall, causing the demand for foreign currencies to decrease. The reduced demand for foreign currencies would lower their value relative to the dollar (i.e., increase the dollar's international value).

A more valuable dollar would cause the all-in price of U.S. exports to rise relative to imports. As a result, demand would shift away from U.S.-produced goods and services and toward foreign products. This shift would cause U.S. exports to fall and U.S. imports to rise, which would increase the size of the current account deficit or reduce the surplus. Therefore, the current account would become more negative because of greater foreign investments in the United States, which makes the financial account more negative. Other factors, such as relative rates of inflation and productivity, R&D, educational systems, and protectionism, played no role in this example.

Current Account Deficits Do Not Always Imply a Nation Is Living Beyond Its Means

What potential problems, if any, are connected to countries that have persistent current account deficits? To understand the key issues, think of your own (personal) balance of payments. If you spent more than you earned in combined wages, net investment income, and gifts received, would this be evidence of an impending financial problem? To finance this deficit, you would have three basic choices: (1) borrow, (2) liquidate some of your investments, or (3) sell or pawn[22] some of your household possessions to make up the difference.

On the other side, what are the implications if you earned more than you spent plus what you gave away as gifts? The surplus could be used to (1) invest in financial or real assets (e.g., stocks, bonds, and income-generating businesses), (2) repay old debts, or (3) repurchase the assets that you sold or

22 To pawn something means to borrow by giving the lender personal property, such as a watch or painting, as collateral for the loan.

pawned when you were living beyond your means. Countries are similar to individuals in this regard because when their spending exceeds the combined value of earnings and net transfers, they have the same three options: (1) borrow from international sources, (2) liquidate foreign investment assets, or (3) sell off reserve assets.

There is a natural tendency to assume that surpluses are desirable and deficits are undesirable. After all, given a choice between wealth and a pile of debts, almost everyone would choose the former. Nevertheless, one of the first rules of balance of payments analysis is never assume that a positive current account is good or a negative current account is bad for a nation. Here's why: A current account deficit means a nation's international debt level is rising or its international reserves are falling, but rising debts and declining reserves are not necessarily bad things. The real issue is how the newly acquired funds are spent. In short, a current account deficit only hurts a nation if the funds are used unwisely.

Suppose a family borrowed $50,000 to purchase a deluxe around-the-world vacation. A lifetime of fond memories could come from such vacations, but the expenditures would be for consumption and not investment. Without assets that could generate positive cash flows, the entire burden of this debt would fall directly on the family's future income.

Contrast the previous situation with one where the family borrows $50,000 to finance a new business. Assuming the venture is profitable, the family would have invested in assets that generated both a means of repaying the loan and earning a positive rate of return. In this case, the debt would not be burdensome because it was self-liquidating and improved the family's living standards.

The same is true for a nation. A current account deficit implies that a country is spending more than it earns. Is that good or bad? The answer is, "It depends on what assets are purchased with the expenditures." If the internationally borrowed funds are used to support current consumption, then the loans are not self-liquidating, and the burden of repayment will fall on future generations. By contrast, if the borrowed funds are used to finance new factories or improve a nation's infrastructure (e.g., roads, bridges, sanitation, and communications), then these investments could be self-liquidating or sufficiently increase the nation's productivity, and, therefore, not burden future generations.

Frequently Asked Questions about the Balance of Payments

This section answers an array of interesting questions about the balance of payments.

Who Is a Resident?

For individuals and households, residency status can depend on several factors. Among them are a person's intention to remain in a country for one year or longer, the location of his/her dwellings, employment locus, migration and income tax status, asset holdings, citizenship, and the portion of income received in a nation. As might be expected, this wide variety of individuals and personal circumstances requires countries to adjust and nuance their rules for diverse groups, such as international students, medical patients, ship crews, diplomats, military personnel, the staff of scientific stations, and civil servants employed in foreign nations. Residing in a country for one year or more or intending to do so qualifies most individuals as residents. Students who travel abroad for full-time study might be interested to know that they are considered by the IMF to be residents of their home countries, even if their foreign studies are expected to continue for more than one year. This status changes if they intend to remain after graduation. Until such time, the tuition they pay is counted in the balance of payments as a service under the heading "travel."

Why are Monetary Gold and Precious Metals Part of Reserves and Related Items?

Why are monetary gold and other precious metals included in reserves and related items, when they cannot be used directly to raise the value of a nation's currency relative to any particular foreign currency? The reason is that they can be used indirectly. To understand why, suppose the U.S. Federal Reserve wants to increase the dollar's value relative to the euro but does not have sufficient euro reserves to purchase the required amount of dollars. The Fed could sell some of its monetary gold holdings, purchase euros, and then use the euros to buy dollars, thereby raising the dollar's value. For this reason, monetary gold and other precious metals are part of a nation's reserves and related items.

Are Sovereign Wealth Funds a Part of Reserves and Related Items?

Sovereign wealth funds (SWFs) hold, manage, and administer large pools of financial assets to achieve particular macroeconomic objectives. Their funding is

often the byproduct of massive cash inflows from government privatization programs, or they are the result of balance of payments surpluses, which are created by a dominant export, such as oil, or the consequence of central bank intervention in the foreign exchange markets to reduce the domestic currency's value. If an SWF is on the books of a central bank or the books of an agency of the central government and if the central bank has substantial control over the SWF's assets, then changes in the SWF's net assets are included in reserves and related items. By contrast, if the funds are invested in long-term assets and managed independently from the central bank, they do not qualify as reserve assets because they are considered unavailable to the central bank or government for purposes of foreign exchange market intervention.

What Are SDRs?

The IMF created special drawing rights (SDRs) in 1969 as a means of providing needed liquidity for the world's rapidly expanding international trade and investment flows. The SDR is not a physical currency. Instead, it is a monetary account, like a checking account, that central banks and governments hold in the IMF. The SDR represents an unconditional right to obtain foreign exchange or other reserve assets from IMF members. Initially, it had a value of $1, which was equivalent to 0.888671 grams of fine gold. In 1974, the SDR's value was changed to a weighted basket of 16 currencies, and, again, in 1981, the basket's value was changed to reflect the prices of five currencies. When the euro was created in 1999, the SDR's value was changed to a weighted average of four currencies: the U.S. dollar, euro-area euro, Japanese yen, and British pound. Effective October 2016, the IMF changed the SDR's basket to include the Chinese yuan (renminbi), and since then, the SDR's value has been determined by this basket of five currencies.

The Balance of Payments and Double-Entry Bookkeeping

The balance of payments is built on the accounting principle that every transaction should have two sides. For example, importing a good (Side 1), requires payment to a foreign company (Side 2). Selling a bond to a foreign investor (Side 1) means receiving payment (Side 2). For this reason, we know that, if all international transactions were properly recorded, (CA + KA) must equal (FA + RRI). A few examples, showing the effects of specific transactions on the U.S. balance of payments, may help to clarify the double-entry system and its relationship to the Balance of Payments Identity.

Example 1: U.S. Exports with Payment in Mexican Pesos
Monsanto Company, in St. Louis, Missouri, exports soybeans worth MXN100 million to a Mexican meat producer. Payment is made by the Mexican company from its account at BBVA Bancomer (Bank) in Mexico City.

CA	KA	NEO	≡	FA	RRI
+ MXN 100 million *(= $ 5 million)*				+ MXN 100 million *(= $ 5 million)*	

- *Current Account*: The U.S. current account rises by MXN 100 million (i.e., the equivalent of $5 million) because exports are recorded in the balance of payments with a positive sign.
- *Financial Account*: The U.S. financial account rises by MXN 100 million because Monsanto, a U.S. company, has a new foreign asset in its MXN 100 million bank account at BBVA Bancomer. Increases of domestic assets in foreign countries are recorded as positive values in the financial account.

Example 2: U.S. Exports with Payment in U.S. Dollars
Monsanto Company in St. Louis, Missouri, exports soybeans worth $5 million to a Mexican meat producer. Payment is made from the Mexican company's U.S. dollar account at Citizens Bank in Boston, Massachusetts.

CA	KA	NEO	≡	FA	RRI
+ $5 million				+ $5 million	

- *Current Account*: The U.S. current account rises by $5 million because exports are recorded in the balance of payments with a positive sign.
- *Financial Account*: The U.S. financial account rises by $5 million because U.S. liabilities to foreign residents fall by $5 million (i.e., the $5 million bank account at Citizens Bank, which was formerly owned by the Mexican meat producer, falls by $5 million). Reductions in liabilities to foreigners are recorded as positive values in the financial account.

Example 3: Foreign Investment in U.S. Treasury Bills with Payment in U.S. Dollars
A South African investor pays $10 million to purchase U.S. government Treasury bills. Payment is drawn on Citibank in New York City.

CA	KA	NEO	≡	FA	RRI
				– $10 million +$10 million	

- *Financial Account*: The U.S. financial account falls by $10 million because U.S. liabilities to foreign residents rise. The U.S. Treasury owes the foreign investor $10 million. Increases in domestic liabilities to foreigners are recorded as negative values in the financial account.
- *Financial Account*: The U.S. financial account rises by $10 million because U.S. liabilities to foreign residents decrease when the South African investor's bank account at Citibank falls. Reductions in liabilities are recorded as positive values in the financial account.
- Therefore, the net effect of this transaction on the balance of payments is zero.

Example 4: U.S. Aid to a Foreign Country

The U.S. government donates medicine worth $15 million to immunize children in El Salvador.

CA	KA	NEO	≡	FA	RRI
+$15 million					
– $15 million					

- *Current account*: The U.S. current account rises by $15 million because the medicine is considered an export of goods, and exports are recorded as positive values.
- *Current account*: Transfers, aid, donations, and gifts are part of the "Secondary Income" section of the balance of payments. Because a donation has only one natural side, the balance of payments uses "Secondary Income" as a sort of artificial "other side." Secondary income is part of the current account. Therefore, the U.S. current account falls by $15 million. A helpful way to understand the sign attached to this entry is to treat the donation as the importation of goodwill because imports carry a negative sign in a nation's balance of payments.

Example 5: Illegal Cocaine Purchase from Colombia

A U.S. drug dealer pays $2 million to a Colombian supplier for cocaine. Payment is made on Wells Fargo Bank in San Francisco, California.

CA	KA	NEO	≡	FA	RRI
– $2 million				–$2 million	

- *Financial account*: The U.S. financial account falls by $2 million because the Colombian supplier's bank account (i.e., other investments) at Wells Fargo rises by that amount. The foreign drug dealers' bank account is a U.S. liability to a foreign resident. Increases in domestic liabilities to foreigners are recorded as negative values in the financial account.
- *Current account*: the U.S. current account *should fall* by $2 million because imports (cocaine) should be recorded in the balance of payments with a negative sign. The problem is that cocaine purchases would not be reported to U.S. customs authorities, which means only one side of this transaction would be caught (i.e., the side showing the change in bank account from a U.S. owner to a foreign owner). For this reason, net errors and

omissions exists. The missing (unreported) side of this transaction would be captured by U.S. "Net Errors and Omissions" so that (CA + KA + NEO) ≡ (FA + RRI).

CA	KA	NEO	≡	FA	RRI
– $2 million		+ $2 million		~~– $2 million~~	

Understanding IMF Balance of Payments Reports

The International Monetary Fund (IMF) collects, standardizes, and then reports balance of payments statistics for its 189 members. Its format is the same for each of country, so understanding the methodology for one implies understanding them all. Table 17.1 shows the actual IMF 2018 balance of payments report for the United States.[23] For pedagogical purposes, which will be explained shortly, Column 1 has been inserted to associate each balance of payments entry with either an (1) account, (2) balance, (3) line, or (4) subline. You will find this table very instructive in gaining a sense of balance of payments with real data.

Friendly heads-up: Before diving into how the accounts and balances in Table 17.1 are calculated, you can save yourself a considerable amount of frustration by reading the section below, entitled "How the Calculations Work." It shows how all the plus and minus tabulations are combined. Afterward, we will burrow into the meaning of and distinctions among "accounts," "balances," "lines," and "sublines."

Table 17.1: United States Balance of Payments: 2018 (*Billions of U.S. Dollars)*.

Column 1	Column 2	2018
Account I	**Current account**	(491)
Line 1	Goods, credit (exports)	1,674
Line 2	Goods, debit (imports)	2,562
Balance 1	**Balance on goods**	(887)

23 See International Monetary Fund, http://data.imf.org/?sk=7A51304B-6426-40C0-83DD-CA473CA1FD52 (accessed August 11, 2019).

Table 17.1 (continued)

Column 1	Column 2	2018
Line 3	Services, credit (exports)	827
Line 4	Services, debit (imports)	567
Balance 2	**Balance on goods and services**	(628)
Line 5	Primary income, credit	1,084
Line 6	Primary income, debit	830
Balance 3	**Balance on goods, services, and primary income**	(374)
Line 7	Secondary income, credit	150
Line 8	Secondary income, debit	267
Account II	**Capital account**	3
Line 9	Capital account, credit	3
Line 10	Capital account, debit	0
Balance 4	**Balance on current and capital account**	(488)
Account III	**Financial account (excludes reserves and related items)**	(450)
Line 11	Direct investment, assets	(78)
Sub-line	*Equity and investment fund shares*	(152)
Sub-line	*Debt instruments*	73
Line 12	Direct investment, liabilities	258
Sub-line	*Equity and investment fund shares*	357
Sub-line	*Debt instruments*	(99)
Line 13	Portfolio investment, assets	334
Sub-line	*Equity and investment fund shares*	194
Sub-line	*Debt instruments*	140
Line 14	Portfolio investment, liabilities	316
Sub-line	*Equity and investment fund shares*	142
Sub-line	*Debt instruments*	173
Line 15	Financial derivatives (other than reserves) and employee stock options	(21)

Table 17.1 (continued)

Column 1	Column 2	2018
Sub-line	*Financial derivatives and employee stock options, assets*	
Sub-line	*Financial derivatives and employee stock options, liabilities*	
Line 16	Other investment, assets	50
Sub-line	*Other equity*	
Sub-line	*Debt instruments*	50
Line 17	Other investment, liabilities	162
Sub-line	*Other equity*	
Sub-line	*Debt instruments*	162
Balance 5	**Balance on current, capital, and financial account**	(37)
Line 18	Net errors and omissions	42
Line 19	Reserves and related items	5
Sub-line	*Reserve assets*	5
Sub-line	*Net credit and loans from the IMF (excluding reserve position)*	–
Sub-line	*Total exceptional financing*	–

How the Calculations Work

Given the information above, let's calculate each of the balance of payments accounts and balances.

Accounts

- Current account equals:
  - Lines (1 + 3 + 5 + 7) minus Lines (2 + 4 + 6 + 8)
  - (1,674 + 827 + 1,084 + 150) – (2,562 + 567 + 830 + 267) = **–491**
- Capital account equals:
  - Line 9 minus Line 10
  - (3.0 – 0.0) = **3.0**
- Financial account equals:
  - Lines (11 + 13 + 15 + 16) minus Lines (12 + 14 + 17)
  - (–78 + 334 – 21 + 50) – (258 + 316 + 162) = **–450**

Balances

- Balance on goods equals:
  - Line 1 minus Line 2
  - (1,674 – 2,562) = **–887**
- Balance on goods and services
  - Lines (1 + 3) minus Lines (2 + 4)
  - (1,674 + 827) – (2,562 + 567) = **–628**
- Balance on goods, services, and primary income
  - Lines (1 + 3 + 5) minus Lines (2 + 4 + 6)
  - (1,674 + 827 + 1,084) – (2,562 + 567 + 830) = **–374**
- Balance on current account and capital account
  - Lines (1 + 3 + 5 + 7 + 9) minus Lines (2 + 4 + 6 + 8 + 10)
  - (1,674 + 827 + 1,084 + 150 + 3) – (2,562 + 567 + 830 + 267 + 0) = **–488**
- Balance on Current, Capital, and Financial Account (calculations summarized in Figure 17.13).

Balance on Current, Capital, and Financial Account ≡ (CA + KA – FA)	
Current Account (CA)	Lines (1 + 3 + 5 + 7) minus Lines (2 + 4 + 6 + 8) (1,674 + 827 + 1,084 + 150) – (2,562 + 567 + 830 + 267) = –**491**
Capital Account (KA)	Line 9 minus Line 10 (3.0 – 0.0) = **3.0**
Financial Account (FA)	Lines (11 + 13 + 15 + 16) minus Lines (12 + 14 + 17) (–78 + 334 – 21 + 50) – (258 + 316 + 162) = –**450**
(CA + KA – FA)	–491 + 3 – (–450) = –**37**

Figure 17.13: The balance on current, capital and financial account calculations.

Net Errors and Omissions

- Line 18 shows "Net errors and omissions," which is a balancing number (i.e., a plug number) that reflects unaccounted for data. This one-line entry enforces the *Balance of Payments Identity*, by making up for any difference between the sum of (CA + KA) and (FA + RRI). Therefore, if (CA + KA) exceeds (FA + RRI), then NEO is a negative amount that makes (CA + KA + NEO) equal to (FA + RRI). If (CA + KA) is less than (FA + RRI), then NEO is a positive amount that makes (CA + KA + NEO) = (FA + RRI).
- In 2018, the United States current account equaled –$491 billion, capital account equaled $3.0 billion, financial account equaled –$450, and reserves and related items equaled + $5.0 billion. Therefore, NEO equaled

(CA + KA) − (FA + RRI) = (−$491 billion + $3 billion) − (− $450 billion + $5 billion) = −$42 billion.[24]

Reserves and Related Items

- Line 19, "Reserves and related items," reflects (1) central bank intervention in the foreign exchange markets and (2) valuation changes in a nation's international reserve assets. Therefore, even if a country has flexible exchange rates, reserves and related items might show a small positive or negative value to reflect valuation changes.
- In 2018, the U.S. reserves and related items equaled +$5 billion, which reflects a small increase in the value of U.S. reserve assets. This figure is relatively insignificant, reflecting U.S. policy to allow its exchange rate to float.

Now that we have covered how the IMF calculates the balance of payments figures, which are reported in the news, let's explore what these accounts, balances, lines, and sublines mean, as well as their contents.

Accounts

- There are three *accounts* in the balance of payments: the current account, capital account, and financial account.
- *Accounts* have white lettering on a darkly shaded background and are numbered I, II, and III.
- Each account is calculated by summing *balances* or *lines*, which are described below, in the "Balances" section and the "Lines" section.
- An *account* can be positive or negative. A positive account is a surplus, and a negative account is a deficit.

Balances

- There are five *balances* in the balance of payments: the (1) balance on goods, (2) balance on goods and services, (3) balance on goods, services, and primary income, (4) balance on current account and capital account, and (5) balance on current account, capital account, and financial account.
- *Balances* have black lettering on a lightly shaded background.

24 The difference between −$43 billion calculated here and −$42 billion reported in the U.S. balance of payments for 2018 is due to rounding.

- Each balance is the sum of the relevant *lines*, which are described below in the "Lines" section.
- A balance can be positive or negative. A positive balance is a surplus, and a negative balance is a deficit.

Balances in the Current Account and Capital Account

- All "lines" in the current account and capital account are positive, but when calculating the five *balances*, such as the balance on goods and services, transactions that are sources of funds are counted as positive values, and those that are uses of funds are counted as negative values.
- Therefore, each of the following transactions is counted as a positive value because it is a source of funds: goods, credit (exports), services, credit (exports), primary income, credit, secondary income, credit, and capital account, credit.
- Each of the following transactions is counted as a negative value because it is a use of funds: goods, debit (exports), services, debit (imports), primary income, debit, secondary income, debit, and capital account, debit.

Balances in the Financial Account

- There are no *balances* in the financial account.

Balance on Current, Capital, and Financial Account

- The balance on current, capital, and financial account is the sum of the current account plus capital account plus financial account.
- Remember that (CA + KA) equals (FA + RRI). Therefore, the balance on current, capital, and financial account equals (CA + KA − FA).

Lines

Lines in the Current Account and Capital Account:

- Each line in the current and capital accounts is identified as either "(exports)," "(imports)," "credit," or "debit."
- All lines in the current account and capital account have positive signs.

Lines in the Financial Account:

- Each line in the financial account is identified as either "assets" or "liabilities."[25]
- Because the balance of payments measures international transaction *flows*, these line entries reflect *changes in* assets and *changes in* liabilities, rather than the size of any asset or liability. If an asset or liability balance rises in value, the financial account's line entry is positive, and if it falls in value, the entry is negative. For example:
  - "Direct Investment, assets" equals –$78 billion. The negative sign means U.S. residents reduced by $78 billion their holdings of direct investments in foreign countries.

Sublines

In the Current Account and Capital Account:

- There are no sublines in the current account and capital account.

In the Financial Account and Reserves and Related Items:

- Sublines in the financial account and reserves and related items more fully describe each line.
- If a subline asset or liability rises, the value is positive, and if it falls, the value is negative.
- If an asset or liability balance rises in value, the financial account's subline entry is positive, and if it falls in value, the entry is negative. For example:
  - "*Equity and investment fund shares*," which is a subline entry under "Direct investment, *assets*" equals –$152 billion. The negative sign means U.S. residents reduced by $152 billion their holdings of equity and investment fund shares in foreign countries.
  - Similarly, "*Debt instruments*," under "Direct investments, liabilities" equal –$99 billion. The negative sign means foreigners reduced their debt instrument holdings in the United States by $99 billion. Direct investments in the United States by foreign residents are considered liabilities of the United States to foreign nations.

25 Notice that Line 15, "Financial derivatives (other than reserves) and employee stock options" is the only "line" without an "asset" or "liability" label, but its sublines are labeled "asset" or "liability." Financial derivatives are generally so small that they do not have a substantial effect on a nation's balance of payments figures. Nevertheless, the reason for not labeling it is curious.

Conclusion

The balance of payments is a summary of all transactions between the residents of one nation and the residents of the rest of the world during a given period. Because it includes all transactions and not just those for which currency is exchanged, the balance of payments is much broader than the supply and demand forces that enter into the foreign exchange market.

The principal parts of the balance of payments are the current account (CA), capital account (KA), financial account (FA), and reserves and related items (RRI). Net errors and omissions (NEO) adjusts for measurement errors in the balance of payments.

Because net international expenditures must be financed by net foreign borrowing and net international earnings must be invested internationally, we know that (CA + KA) must equal (FA + RRI). This relationship is called the *Balance of Payments Identity*. Translated, it tells us that deficits in (CA + KA) are financed by (FA + RRI). Therefore, if (CA + KA) is negative, (FA + RRI) must be negative and equal to (CA + KA). Similarly, if (CA + KA) is positive, (FA + RRI) must be positive and equal to (CA + KA).

The *Net Export Identity* tells us that net exports must equal (S − I) + (T − G). This tautological relationship is valuable for the clear and straightforward way it addresses many questions dealing with international trade and protectionism.

Of all the balance of payments measures reported by the IMF, the ones most often seen in the popular media are the (1) balance on goods, (2) balance on goods and services, (3) balance on goods, services, and primary income, and (4) current account. For the study of macroeconomics, reserves and related items is often the focus because it reflects central bank intervention in the foreign exchange markets. Such intervention directly affects the nation's monetary base and indirectly affects its money supply. If errors and omissions are zero, then reserves and related items are equal to the balance on current, capital, and financial account.

At this point in the text, we have investigated the real credit market, real goods and services market, and foreign exchange market (including the balance of payments). Starting in the next chapter, we will bring together these three sectors to decipher the effects of significant economic shocks to national economies.

Key Points

- The balance of payments summarizes the value of transactions between residents of one country and the rest of the world over a given period, such as a month or year.
- The balance of payments includes all international transactions and not just ones for which currencies are exchanged. Therefore, it includes a broader range of transactions than the foreign exchange markets.
- Five major parts of the balance of payments are the current account (CA), capital account (KA), financial account (FA), and reserves and related items (RRI). Net errors and omissions (NEO) accounts for balance of payments measurement errors.
  - *Current account*: Includes exports and imports of goods and services, net international primary income, and net international secondary income.
  - *Capital account*: Includes debt forgiveness, acquisitions and disposals of nonproduced nonfinancial assets (such as natural resources), contracts, leases, licenses, and marketing assets (including goodwill).
  - *Financial account*: Includes international direct investments, portfolio investments, changes in the market value of international financial derivatives, and "other investments," which include changes in bank accounts.
  - *Reserves and related items*: Includes net changes in the assets a central bank can use to intervene in the foreign exchange markets.
  - *Net errors and omissions*: Ensures that the sum of (CA + KA) equals (FA + RRI). Therefore, (CA + KA + NEO) must equal (FA + RRI).
- Central bank intervention in foreign exchange markets changes a nation's monetary base and money supply.
  - A central bank's foreign exchange intervention may also affect a foreign nation's monetary base.
  - To increase the value of its currency, a central bank needs sufficient international reserves.
  - The domestic currency is not part of a nation's international reserves.
- Two important identities
  - *Balance of Payments Identity*: $(CA + KA) \equiv (FA + RRI)$
  - *Net Export Identity*: $NX \equiv (S - I) + (T - G)$
- The IMF reports five balance of payments "balances," which are the (1) balance on goods, (2) balance on goods and services, (3) balance on goods, services, and primary income, (4) balance on current account and capital account, and (5) balance on current, capital, and financial account.
- Beware of assuming a positive current account is good and negative current account is bad for an economy.
  - In the absence of economic growth, policies to make a current account more positive can be economically painful.
  - If a country is "living beyond its means" but doing so by borrowing to pay for productive assets, then these deficits might be sustainable.
  - Protectionist policies will not increase net exports (NX) unless the sum of $(S - I) + (T - G)$ rises.

Review Questions

1. Assuming all transactions are properly reported, do the current account plus the capital account always equal the financial account plus reserves and related items?
   a. Explain.
   b. If they must be equal, what economic forces, if any, cause this result?
   c. If they are not necessarily equal, is the imbalance because market forces are not functioning properly?
   d. If they are unequal, do reserves and related items adjust to make them equal? Explain.
2. What is the difference between "bank reserves" and "foreign exchange reserves"?
3. Use the table below to answer the following questions about the United States' balance of payments.
   a. President Donald Trump claimed that the United States had an almost $800 billion trade deficit.[26] What section of the balance of payments was President Trump referencing? What was he leaving out?
   b. According to the financial account, was the United States a net borrower or lender internationally? Which type of financial instrument (e.g., debt or equity) did the United States primarily use to borrow or lend?
   c. Does it appear as if the U.S. Federal Reserve took an active role in the foreign exchange market? Does it appear to have been controlling the international value of the dollar?
   d. Challenge Question: The United States has been called the world's venture capitalist. Given that venture capitalists tend to leverage their assets in order to make risky equity investments, use the financial account to explain why the United States might be considered the world's venture capitalist.

United States Balance of Payments, 2016 (millions of dollars)

Current Account (CA)	**–451,692**	**Financial Account (FA)**	**–379,772**
Goods	**–752,505**	**Direct Investment, assets**	**311,582**
Credit (exports)	1,455,706	Equity	329,732
Debit (imports)	2,208,211	Debt	–18,150
Services	**247,711**	**Direct Investment, liabilities**	**479,415**
Credit (exports)	752,365	Equity	351,769
Debit (imports)	504,654	Debt	127,646
Primary Income	**173,219**	**Portfolio Investment, assets**	**40,636**
Credit	813,972	Equity	14,421

26 Qui, 2018. "President Trump's Exaggerated and Misleading Claims on Trade." The New York Times.

(continued)

United States Balance of Payments, 2016 (millions of dollars)			
Debit	640,753	Debt	26,215
Secondary Income	**–120,117**	**Portfolio Investment, liabilities**	**237,366**
Credit	135,192	Equity	–141,078
Debit	255,309	Debt	378,444
		Financial Derivatives	**15,817**
Capital Account (KA)	**–59**	**Other Investment, assets**	**–6,416**
Credit	0	Debt	–6,416
Debit	59	**Other Investment, liabilities**	**24,610**
		Debt	24,610
Net Errors and Omissions (NEO)	**74,081**	**Reserves and Related Items (RRI)**	**2,102**
		Reserve assets	2,102
CA + KA + NEO =	**–377,670**	**FA + RRI =**	**–377,670**

4. Use the table below to answer the following questions about Switzerland's balance of payments.
   a. In 2015, Switzerland experienced massive capital inflows as European investors, fearing a Greek exit from the European Monetary Union, fled to Swiss assets. Where in the financial account did these capital inflows appear? Based on your answer, what type of Swiss assets were Eurozone investors buying?
   b. What effect would the capital inflows in part 4 (a) have on the value of the Swiss franc? How would this change impact Switzerland's current account?
   c. Based on reserves and related items, what was the Swiss National Bank doing during 2015? What impact did its actions have, if any, on the Swiss monetary base?

Switzerland Balance of Payments, 2015 (millions of dollars)			
Current Account (CA)	**73,800**	**Financial Account (FA)**	**–58,609**
Goods	**53,600**	**Direct Investment, assets**	**128,026**
Credit (exports)	303,245	Equity	83,653
Debit (imports)	249,645	Debt	44,373
Services	**18,253**	**Direct Investment, liabilities**	**115,892**
Credit (exports)	113,075	Equity	87,465
Debit (imports)	94,822	Debt	28,427
Primary Income	**14,977**	**Portfolio Investment, assets**	**39,769**
Credit	150,238	Equity	27,693
Debit	135,261	Debt	12,076
Secondary Income	**–13,030**	**Portfolio Investment, liabilities**	**–14,845**
Credit	38,026	Equity	–10,933
Debit	51,056	Debt	–3,912

(continued)

Switzerland Balance of Payments, 2015 (millions of dollars)			
		Financial Derivatives	**–4,527**
Capital Account (KA)	**–29,500**	**Other Investment, assets**	**–43,247**
Credit	4,179	Debt	–43,247
Debit	33,679	**Other Investment, liabilities**	**77,582**
		Debt	77,582
Net Errors and Omissions (NEO)	**–4,139**	**Reserves and Related Items (RRI)**	**98,770**
CA + KA + NEO =	**40,161**	**FA + RRI =**	**40,161**

5. Use the table below to answer the following questions about Venezuela's balance of payments between 2014 and 2015.
   a. From June 2014 to January 2016, the global price of oil fell from $111 to $33 per barrel. During this time, oil made up 96% of Venezuela's exports. How did this change impact the Venezuelan current account? Which component was most noticeably changed?
   b. How did the financial account respond to the changes in the current account? Specifically, which asset's flows changed the most? How did these flows change?
   c. Banco Central de Venezuela (Venezuela's central bank) pegged the bolivar fuerte to the U.S. dollar. According to the balance of payments account, how was the peg maintained during the adjustment to the lower price of oil? What effect did the central bank's actions have, if any, on Venezuela's monetary base?
   d. During this period, Venezuela's central bank was also printing money for the government to use to provide services. Was this policy compatible with your answer to part 5(c)? Explain what should have happened.

Venezuela Balance of Payments, 2014–2015 (millions of dollars)		
	2014	**2015**
Current Account (CA)	**4,919**	**–16,051**
Goods	**27,449**	**3,956**
Credit (exports)	74,672	37,232
Debit (imports)	47,223	33,276
Services	**–14,898**	**–12,191**
Credit (exports)	2,130	1,635
Debit (imports)	17,028	13,826
Income	**–7,632**	**–7,816**
Capital Account (KA)	**0**	**–3,980**
Net Errors and Omissions (NEO)	**–3,219**	**–2,265**
Financial Account (FA)	**2,309**	**–17,826**
Direct Investment, assets	**4,536**	**2,586**

(continued)

Venezuela Balance of Payments, 2014–2015 (millions of dollars)

	2014	2015
Equity	807	738
Debt	3,729	1,848
Direct Investment, liabilities	**1,135**	**2,956**
Equity	577	−282
Debt	558	3,238
Portfolio Investment, assets	**−2,615**	**−502**
Equity	−2	−6
Debt	−2,613	−496
Portfolio Investment, liabilities	**392**	**−3,454**
Equity	49	5
Debt	343	−3,459
Financial Derivatives	**0**	**315**
Other Investment, assets	**7,670**	**−15,192**
Other Investment, liabilities	**5,755**	**5,531**
Reserves and Related Items (RRI)	**−609**	**−4,470**
CA + KA + NEO =	**1,700**	**−22,296**
FA + RRI =	**1,700**	**−22,296**

6. Suppose Japan's reserves and related items equaled –¥ 400 billion (i.e., negative 400 billion yen).
   a. Was the Bank of Japan (BOJ) intervening in the foreign exchange markets? If it was intervening, was the central bank buying or selling yen? Explain.
   b. Was Japan's monetary base rising or falling by an amount greater than, less than, or equal to ¥ 400 billion, or did the monetary base remain unchanged? Explain
   c. Was the Bank of Japan raising the value of the yen, lowering it, or was the change impossible to determine? Explain.
7. The Croatian National Bank (CNB) uses a managed floating exchange rate system, which means that the domestic currency's value is not fixed against another foreign currency or a basket of foreign currencies. Instead, the CNB intervenes when it feels market developments warrant intervention. At the same time, the CNB has an interest in stabilizing the value of its currency, the kuna, against the euro. Suppose the treasurer of your company stops by your office and asks you to make a brief report in 30 minutes about the likelihood of Croatia devaluing its currency. Your company's treasurer is worried about a depreciation of the kuna and the negative effect it might have on the company's profitability. You send an assistant to get the balance of payments figures online from the IMF's International Financial Statistics, and he returns in 10 minutes with the following unorganized and noninterpreted figures.

Balance of Payments, Croatia *(Figures in billions of dollars)*	
Secondary income	−90
Imports of goods and services	−510
Primary income	−30
Exports of goods and services	+324
Financial account	−355
Net errors and omissions	0
Capital account	−4

a. Arrange the balance of payments figures in their proper order. Then, calculate the balance on goods and services and the current account.
b. Calculate reserves and related items from the information given, and explain what it means in terms of the nation gaining or losing reserves and in terms of the country's monetary base.
c. Explain whether Croatia is "living within its means." Which account shows this?
d. Explain how likely it is that the kuna will depreciate in the near future. Is it more likely that the kuna will appreciate? Explain.
e. What actions, if any, could your company take to profit from the economic changes implied by these balance of payments figures?

8. Is it correct to say that a current account deficit is bad for a nation? If so, explain why. If not, give an example of how it might be good for a nation to have a current account deficit.
9. Must a country with a current account deficit also have a government budget deficit? Under what conditions, if any, could a nation with a budget surplus have deficit in its current account? Fully explain.
10. Suppose Mexico has sizable capital inflows, and its currency fluctuates freely.
    a. What effect should these inflows have on Mexico's current account, financial account, and reserves and related items?
    b. What effect should these flows have on the international value of the Mexican peso?
    c. What effect should these flows have, if any, on Mexico's monetary base?
11. Suppose that you had business holdings in a small country that had serious debt problems and borrowed from the IMF. The IMF recommended that the small country peg its exchange rate at the equilibrium level. You observe that the country's foreign exchange reserves are falling very rapidly. Is the country's exchange rate undervalued or overvalued? Explain why. As a business manager, what actions might you take, if any, to increase your profits or to protect your business interests?
12. If a Japanese bank lent ¥100 billion to finance a U.S. takeover, where payment was to be made in dollars for the acquired company, what effect would this transaction and the conversion of yen into dollars have on Japan's monetary base, the value of the yen, and Japan's reserves and related items? Explain.
13. Suppose you are in a conversation with friends who are discussing the economic positions of two U.S. presidential candidates. How would you respond to the following statement? "Ask any economist, and you will find that if a nation's budget deficit rises,

the nation always ends up importing more than it exports." The United States is no different. If fiscal policies cause the U.S. government budget deficits to rise, you can be sure that U.S. foreign debts will also rise. It's almost a one-to-one relationship."

14. Assume Bolivia's fiscal deficit was 3% of GDP. If the nation also had a current account surplus equal to 2% of GDP, what can be said, if anything, about the relationship between Bolivia's gross private domestic investment and saving relative to GDP?

Discussion Questions

15. Many observers have blamed large U.S. current account deficits on China's artificially low exchange rate. At the same time, China has blamed these deficits on the U.S. government's large government budget deficits. Explain both sides of this argument.
16. Suppose France decided to provide debt forgiveness equal to €25 billion to Cameroon, one of the African CFA-zone countries. What effect would this debt relief have on France's current account, capital account, and financial account?
17. Fully explain the following statement. "A spokesman for the People's Bank of China announced that the central bank was trying to reduce the nation's foreign exchange reserves, which were nearly $3 trillion. These reserves were acquired mainly as a result of China's fixed-exchange-rate policy. The central bank spokesman indicated that this policy had pumped excess cash into the economy and now threatened to increase China's domestic inflation."

Chapter 18
Putting It All Together

The markets of our Three-Sector Model are represented by the familiar image of three interconnected spinning gears in Figure 18.1. The focus, until now, has been on factors that change the speed or direction of only one gear. We have not considered systematically how the movement of one affects the other two. With this in mind, it is time to take a broader view and fully explore how the three gears are interconnected. From Figure 18.1, it is evident that the three gears move synchronously, and if one of them moves in a specific direction and at a particular speed, the other two will also do the same.

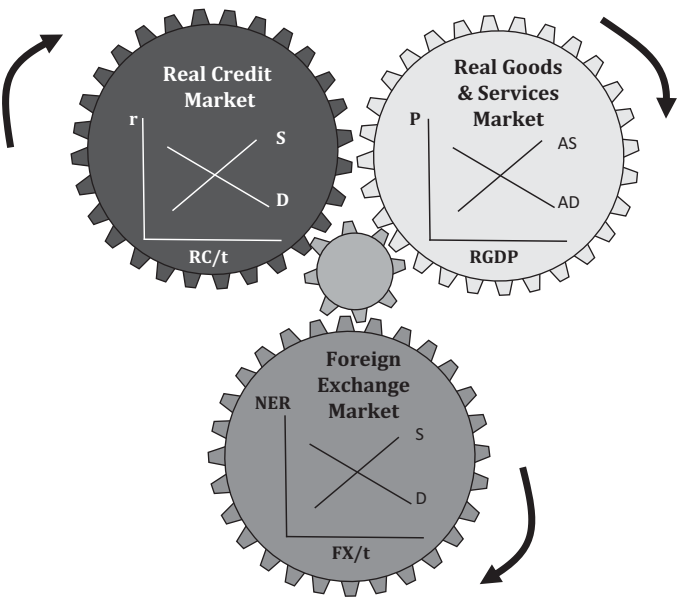


Figure 18.1: Three-Sector Model.

The Basics

The Three-Sector Model and Common Sense

Before we begin to integrate the macroeconomic markets, let's reflect on what we have done. If the previous chapters of this text were successful, the economic

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relationships in each of the three major macroeconomic sectors should reflect the way *you* think people behave and markets work. At this point, the main question to answer is, "Do these economic relationships reflect *your common sense*, or are they pure memorization?" If they seem logical and sound, then a significant step has been taken. If not, now is the time to identify and dispel misunderstandings.

The reason it is so important for these economic relationships to be consistent with *your* common sense is the Three-Sector Model should be treated as just the first significant step toward the goal of building a solid understanding of international macroeconomics. Refining and improving this skill is a pleasant, lifetime job. If the logic on which the Three-Sector Model is built seems rational, it will provide a foundation and framework on which to build, organize, and interpret new experiences, information, and insights.[1]

Let's do a quick reality check to see if some of the essential pillars on which the Three-Sector Model has been built reflect your common sense. Each of the following statements is consistent with the logic that we have developed. If the reasoning is inconsistent with the way you feel the world works, then it is worth pausing to understand why there is a difference.

According to the Three-Sector Model, *if all other things remain constant*, then the following are true:

- A higher national price level (i.e., P) increases the ability and willingness of domestic businesses to supply goods and services, but it decreases consumers' willingness and ability to buy them. In short, aggregate supply (AS) slopes upward and aggregate demand (AD) slopes downward. (*These adjustments are in the real goods and services market*.)
- A higher demand for a nation's goods and services (i.e., AD) typically increases the amount produced (i.e., RGDP) and average price level (i.e., P). Usually, if output increases, it creates more jobs, which reduces the nation's unemployment rate and increases its employment-to-population ratio. (*These adjustments are in the real goods and services market*.)

1 If you feel that the Three-Sector Model developed in this book is logical and reflects common sense, but it is not a reflection of how you believe the economy actually works (i.e., the model is logical but invalid), then it is worth pursuing alternative economic paradigms, such as monetarist models, Marxist models, or heterodox models, which might be more in line with your views. The key is to begin building a solid macroeconomic structure that is durable, defendable, expandable, practical, and useful as a decision-making tool. For further information, see Bennett T. McCallum, "Monetarism," http://www.econlib.org/library/Enc/Monetarism.html, and David L. L. Prychitko, "Marxism," *Library of Economics and Liberty: The Concise Encyclopedia of Economics,* https://www.econlib.org/library/Enc/Marxism.html; and Homepage, *Association of Heterodox, Economics,* http://www.hetecon.net/ (accessed June 2, 2019).

- A higher supply of a nation's goods and services (i.e., AS) tends to raise the amount sold per period and lower the nation's GDP Price Index (P). Higher output creates more jobs, which reduces the nation's unemployment rate and increases its employment-to-population ratio. (*These adjustments are in the real goods and services market*.)
- A higher real (i.e., inflation-adjusted) interest rate increases the willingness and ability of lenders/savers to supply real credit per period and decreases the willingness and ability of individuals and companies to borrow. In short, the supply of real credit slopes upward, and its demand slopes downward. (*These adjustments are in the real credit market*.)
- An increase in real credit demand (i.e., borrowing) causes the real interest rate and the equilibrium quantity of real credit per period to rise. (*These adjustments are in the real credit market*.)
- An increased supply of real credit reduces the real interest rate and raises the equilibrium quantity of real credit per period. (*These adjustments are in the real credit market*.)
- An increase in the value of a nation's currency encourages imports and discourages exports. Therefore, the supply of currency in the foreign exchange market slopes upward, and its demand slopes downward. (*These adjustments are in the foreign exchange market*.)
- An increase in the demand for foreign exchange raises both its international value and equilibrium quantity per period. (*These adjustments are in the foreign exchange market*.)
- An increase in the supply of foreign exchange lowers its international value and raises the equilibrium quantity per period. (*These adjustments are in the foreign exchange market*.)

Integrating Macroeconomic Markets

As previously mentioned, it is helpful to view national and international macroeconomic markets as spinning, interconnected gears that continue to turn at the same rate until they are disturbed by an external (i.e., exogenous) force. After an initial shock hits one (or more) of the gears (markets), its impacts are relayed to the other markets.

We will use a three-step process to analyze the economic consequences of these external shocks. Step 1 describes the initial economic setting or landscape of the nation being analyzed. Once the economic landscape has been defined, Step 2 identifies the initial shock or the expected initial shock that causes economic changes. This disturbance might have an economic, political, or social

cause, such as a newly implemented fiscal or monetary policy, revised expectations, higher risks, war, or the threat of economic sanctions. The last step (Step 3) analyzes the economic chain of events that results from the initial external shock. Figure 18.2 summarizes these three steps.

Step 1	Describe the initial economic setting of the nation.
Step 2	Identify the economic shock (or expected shock) to the nation.*
Step 3	Analyze the chain of economic interactions.
**For now, we will analyze only one exogenous shock at a time.*	

Figure 18.2: Three-Step Analysis.

Step 1: Describe the Initial Economic Setting

Having a view of a nation's current economic landscape is essential because the consequences of any shock can be highly sensitive to economic conditions. For example, rising real interest rates could have much different influences on developed nations, such as England, Germany, Japan, Switzerland, and the United States, than they have on developing countries, such as Argentina, Brazil, Egypt, Malaysia, and Mexico. These asymmetries could be caused by economic factors, such as relative differences in capital market sophistication, country risk, investment alternatives, unemployment rates, levels of unused capital, natural resource availability, exchange rate regime, or degree of international capital mobility.

An important step toward identifying a nation's economic landscape is to clarify or define the slope or elasticity[2] of the supply and demand curves in each of the three principal macroeconomic markets. The higher the elasticity, the larger the percentage change in quantity per period for any percentage change in stimulus (e.g., price or rate).

2 *Elasticity* is the percentage change in a response divided by the percentage change in a stimulus. Three examples of macroeconomic-relevant elasticities are: (%ΔRGDP/%ΔP), (%ΔQuantity of real credit per period/%ΔReal interest rate), and (%ΔQuantity of foreign exchange per period/%ΔNominal exchange rate). These relationships are elastic, inelastic, or unit elastic depending on whether their absolute values are greater than, less than, or equal to one, respectively. Slope is not the same as the elasticity, but for our analyses, a *steeply sloped* supply or demand curve will indicate that the pertinent section of the curve is relatively inelastic. A relatively *flat-sloped* section of the supply or demand curve will indicate an elastic relationship.

Real Goods and Services Market: Describe the Initial Economic Setting

Figure 18.3 shows the general shape of the aggregate supply (AS) curve. Among the most important factors influencing its shape are the nation's rate of resource utilization, efficiency, and degree of resource mobility. Over a short-term horizon, the aggregate supply curve becomes steeper as a country approaches full employment, which means it becomes increasingly more difficult to increase output by raising demand. Fewer resources (i.e., labor, capital, land, and entrepreneurship) are available, bottlenecks often occur, and the productivity of newly hired resources tends to be relatively low. Therefore, any increase in demand, when an economy is at or near full employment, tends to raise prices more than it increases output.

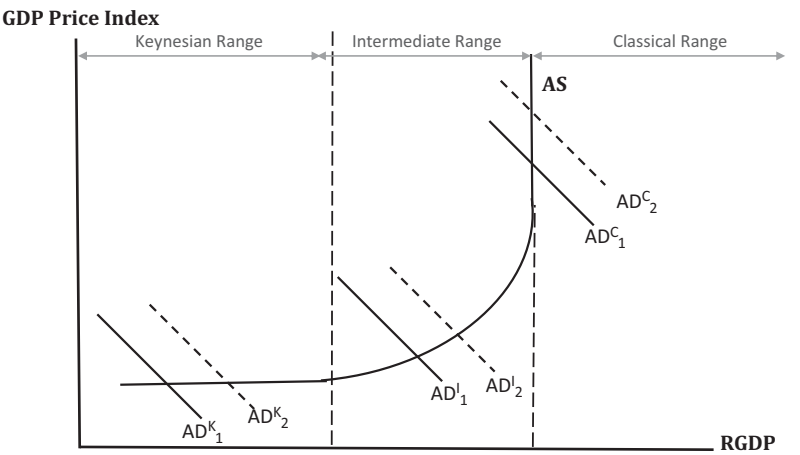

Figure 18.3: Three Major Aggregate Supply Areas in the Real Goods and Services Market.

Among the key economic indicators that provide clues about where a nation is on its aggregate supply curve are the unemployment rate, employment-to-population ratio, and capacity utilization rate, as well as estimates of labor and capital mobility. In general, a nation's aggregate supply curve is more elastic the higher its rate of unemployment, the lower its rates of employment and capacity utilization, and the larger its degree of resource mobility. All of these characteristics imply a greater capacity to increase production with any increase in aggregate demand (AD).

Figure 18.3 illustrates how identical shifts in aggregate demand produce different results depending on where a nation is on its aggregate supply curve. In the Keynesian range (i.e., the horizontal region where a country has very low

levels of resource utilization), an increase in aggregate demand from AD_1^K to AD_2^K, causes no change in the GDP Price Index—only real GDP increases. By contrast, in the classical range (i.e., where the aggregate supply curve is vertical because resources are fully employed), an increase in aggregate demand from AD_1^C to AD_2^C causes no change in real GDP—only the GDP Price Index rises. Finally, increasing aggregate demand from AD_1^I to AD_2^I in the intermediate range causes both the GDP Price Index and real GDP to rise.

Real Credit Market: Describe the Initial Economic Setting

The impacts of economic, political, and social shocks to a nation's economy are influenced significantly by how sensitive borrowers and lenders/savers are to changes in the real interest rate. A highly elastic demand for real credit means that movements in the real interest rate cause significant changes in borrowers' willingness and ability to tap the domestic real credit markets. In such cases, numerous investment projects have their net profitability tied closely to the cost of real credit and many consumer expenditures rely heavily on the cost of real credit.

On the supply side, the more elastic a nation's supply of real credit, the more sensitive lenders and savers of real credit (e.g., households, banks, institutional investors, hedge funds, foreign investors, and government suppliers) are to changes in the real interest rate. The amount of international real credit supplied per period can vary substantially from country to country, and therefore, it can be a critical factor in country analyses.

One reason the elasticities of supply and demand in the real credit market are of interest is that they have a sizeable influence on the stability of a nation's real interest rate and equilibrium volume of real credit per period. Figure 18.4 shows a country on the inelastic portion of its demand for real credit.[3] Any shift in the supply of real credit causes the nation's real interest rate to change by a larger percentage than the percentage change in the equilibrium quantity of real credit per period. Therefore, countries with low demand elasticities have real interest rates that are volatile relative to the amount of real credit supplied and demanded per period.

Figure 18.5 arrives at similar conclusions on the supply side. If the supply of real credit is inelastic, then any change in the demand causes the nation's real interest rate to vary proportionately more than the change in equilibrium quantity of real credit per period. For nations with low supply elasticities, the

3 All straight-line, downward-sloping demand curves have inelastic, elastic, and unit elastic portions. In Exhibit 18.4, demand is steeply sloped to provide an intuitive feeling for inelasticity.

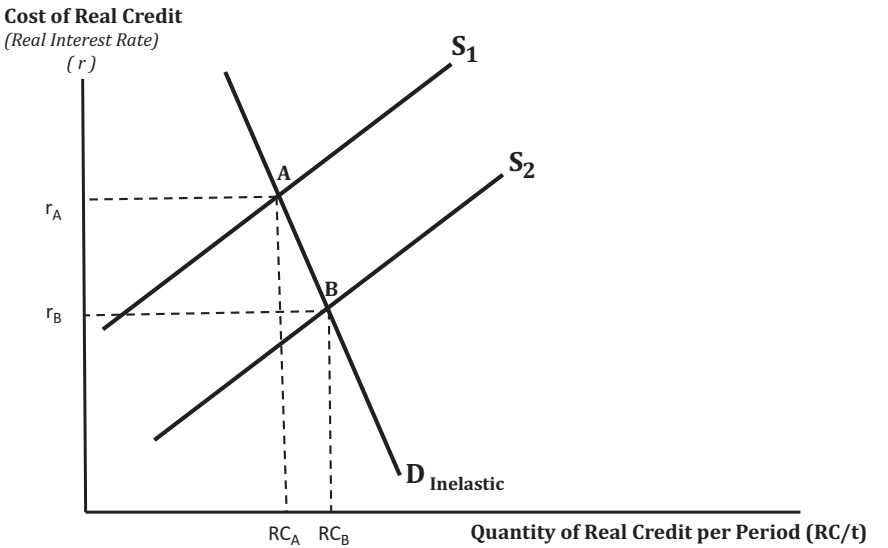

Figure 18.4: Effects of a Changing Supply When Real Credit Demand Is Inelastic.

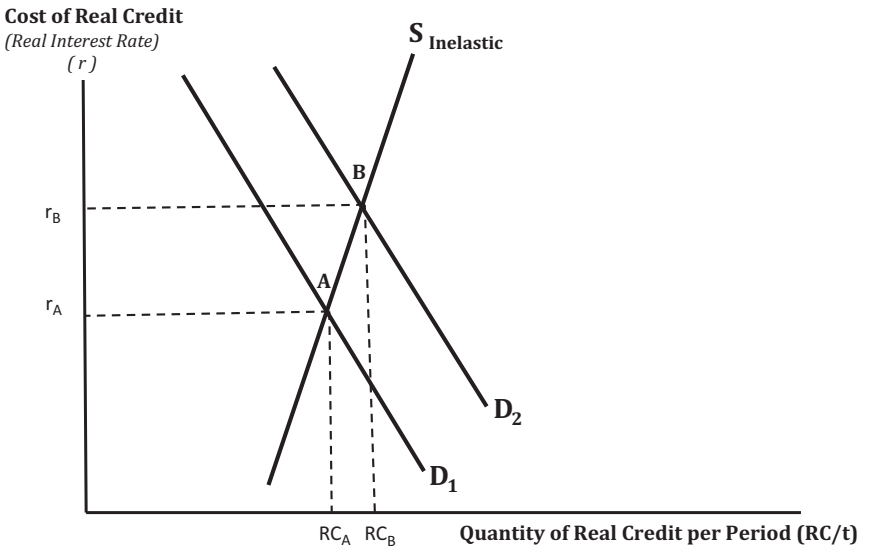

Figure 18.5: Effects of a Changing Demand When Real Credit Supply Is Inelastic.

real interest rate is relatively volatile compared to the amount of real credit supplied and demanded per period.

Foreign Exchange Market: Describing the Initial Economic Setting

The exchange rate system adopted by a nation is a key factor in virtually all macroeconomic analyses. Exchange rates can have a significant influence on economic behavior, and when they are held steady by central banks, intervention can have powerful spillover effects on the real credit market. Exchange rate regimes vary from freely flexible (i.e., floating) at one extreme to fixed at the other extreme. As was the case when we discussed the real credit market, the less elastic a nation's supply or demand for foreign exchange, the more volatile will be its nominal exchange rate relative to the equilibrium quantity of foreign exchange per period.

Flexible Exchange Rates

If a nation chooses a flexible exchange rate system, then the currency value is free to move with the forces of supply and demand, and currency values can be significant risk factors in international trade and investment decisions. At the same time, a flexible exchange rate system empowers a nation's central bank with substantial control over the domestic monetary base and money supply. Consequently, changes in the monetary base and money supply (along with subsequent causes-and-effects, such as inflation) become less significant risk factors at the same time that the exchange rate becomes a more important one. This relationship will be explained in Chapter 19, "Shocks to Nations with Flexible Exchange Rates."

Fixed Exchange Rates

With a fixed exchange rate system, the central bank must offset any shortages or surpluses in the foreign exchange market. An exchange rate can remain fixed at its targeted level as long as the central bank is willing and able to maintain it. For credible central banks, the exchange rate loses its importance as a significant risk factor in international trade and investment decisions. At the same time, a fixed exchange rate can make a nation's money supply, real interest rate, and inflation rate riskier because the central bank can lose a considerable amount of control of its monetary base and money supply. This relationship will be developed in Chapter 20, "Shocks to Nations with Fixed Exchange Rates."

International Capital Mobility

International capital mobility is the extent to which the domestic and foreign suppliers and demanders of a country's currency respond to relative international changes in real interest rates. This text distinguishes between high-mobility and low-mobility international capital markets. Therefore, there are four broad categories of exchange rate regimes and international capital mobility, which are flexible rate/high mobility, flexible rate/low mobility, fixed rate/high mobility, and fixed rate/low mobility. In the following two chapters, the implications of these combinations will be explained for countries with flexible and fixed exchange rate systems.

Step 2: Identify the Shock (or Expected Shock) to the Nation

The second step of our analysis is to identify the shock that jolts the economy and disrupts existing economic conditions. These shocks are caused by exogenous variables, where "exogenous" means it is a variable that is not determined by the forces of supply and demand within the Three-Sector Model. In economics, it is vital to make the distinction between endogenous and exogenous economic variables because changes in exogenous variables are always the sources of the initial changes in an economic system. Endogenous variables react to changes triggered by exogenous forces.

The key to understanding the difference between endogenous and exogenous variables is to remember that our Three-Sector Model was built to determine six *endogenous economic variables*, which are:

- The real interest rate (r)
- The quantity of real credit per period (RC/t) in the real credit market
- The GDP Price Index (P)
- The real GDP (RGDP) in the real goods and services market
- The nominal exchange rate (NER)
- The quantity of currency per period (FX/t) in the foreign exchange market

These variables remain in equilibrium (i.e., where the quantity supplied equals the quantity demanded per period) until an exogenous shock shifts supply or demand.

By contrast, exogenous variables are determined outside the three macroeconomic markets of the country being analyzed. They are the sources of supply-side or demand-side changes in one or more of our three macroeconomic markets. For this reason, all of our analyses begin with an exogenous shock to the existing macroeconomic system.

The following example helps explain the difference between exogenous and endogenous variables, as well as the reason care should be taken when using them.

Suppose you are working as the finance manager for the English affiliate of a large multinational company headquartered in the United States. Anticipating a management committee review of the company's European strategy, suppose the chief financial officer (CFO) asks you to develop an analysis that explains the effects a higher real interest rate might have on the English economy.

Like all countries, England real interest rate is determined by the forces of supply and demand in its real credit market. This rate cannot change by itself. A higher real interest rate could be caused either by a reduction in the supply of real credit (perhaps due to contractionary monetary policies) or by an increase in the demand for real credit (perhaps due to increased government budget deficits). For this reason, you will need further clarification because the source of change can make a big difference to your conclusions.

By contrast, suppose your assignment is to present an analysis of the likely economic effects of a legislated change in England's tax rate. The tax rate is not an endogenous variable that is determined by the forces of supply and demand in any of the three main macroeconomic markets. Instead, it is an exogenous variable that is determined solely by the government. In this case, no further clarification will be needed to conduct your analysis.

Step 3: Analyze the Chain Reaction of Economic Interactions

Once the economic setting has been described (Step 1) and the exogenous source of change has been identified (Step 2), you can start your analysis, but where do you begin, what path should you follow, and are there any helpful tips that might guide the way?

Where to Begin Your Analysis

Deciding where to begin is made easier by *Guideline #3: "Show me the money!"* which reminds us to *follow the funds* when it comes to matters of economics and finance.

- For consumers, businesses, and governments, Guideline #3 means you cannot spend funds you do not have. To finance expenditures, you might need to borrow or liquidate assets, which means your analysis would start in the real credit market.
- For international transactions, Guideline #3 means you may not be able to invest in a foreign nation or purchase foreign goods and services unless you first exchange the currency you have (e.g., U.S. dollars) for the currency you

want (e.g., euros), which means your analysis would start in the foreign exchange market.

An exogenous shock can have a "direct" impact on one or two macro markets. This impact is called "direct" because it shifts supply or demand but does not depend on movements of any endogenous variable in the Three-Sector Model. Once the direct impact shifts supply or demand, the resulting changes in endogenous variables have "indirect" impacts on other markets. These impacts are called "indirect" because they are based on movements of endogenous variables. In short, other markets are affected "indirectly" only if these endogenous variables move. A few examples will help clarify these important points.

Exogenous Shocks That Directly Affect One Market

Suppose a central bank changed its open market operations, reserve ratio, or discount rate to increase the nation's real money supply. The direct impact would only be on the real credit market, as the central bank's actions increased the supply of real credit. This impact is called "direct" because it does not depend on movements of any endogenous variable in the Three-Sector Model. Once supply increases, the lower real interest rate and higher quantity of real credit per period would *indirectly* affect the real goods and services market and foreign exchange market (see Figure 18.6). These impacts are called "indirect" because they are based on movements of the real interest and quantity of real credit, which are endogenous variables.

Exogenous Shocks That Directly Affect Two Markets

An exogenous shock can simultaneously affect two markets. When this occurs, start your analysis in either of the two markets affected, but make sure the second market you analyze is the other one directly affected by the exogenous shock. When in doubt, remember *Guideline #3: "Follow the money!"* and start in the real credit market. Three examples explain how and when two markets are simultaneously affected.

- *Example #1*: Central bank intervention in the foreign exchange market has direct impacts on two markets, namely, the foreign exchange market, because it directly affects the demand or supply for foreign exchange, and the real credit market, because intervention changes the monetary base and the supply of real credit (see Figure 18.7).

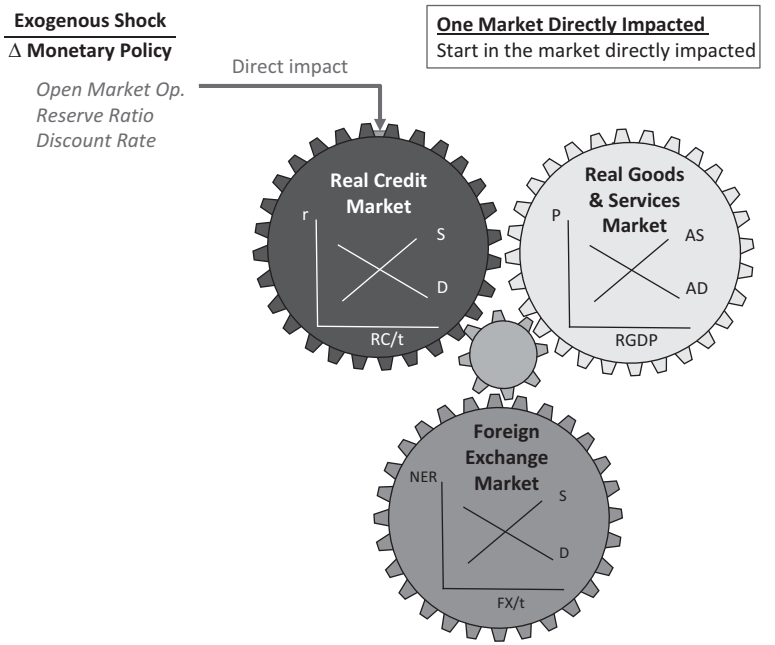

Figure 18.6: Exogenous Shocks That Directly Impact One Macro Market: Open Market Operations, Reserve Ratio, and Discount Rate.

- *Example #2*: An increase in the tax rate on corporate profits or household income also has direct impacts on two markets. By reducing the government's need to borrow or increasing its surplus, the tax rate hike affects the real credit market. By reducing business investment spending or household consumption, the tax increase affects aggregate demand in the real goods and services market (see Figure 18.8).
- *Example #3*: Capital flight from a nation has direct impacts on two markets, namely, the foreign exchange market, because it directly affects the demand for foreign currency (i.e., supply of domestic currency), and the real credit market, because it reduces supply in the domestic real credit market (see Figure 18.9).

Where would you begin your analysis if the government pursued expansionary fiscal policy by increasing government spending? You might be quick to start in the real goods and services market because government spending is a part of aggregate demand, but consider this: before the government can purchase anything, it

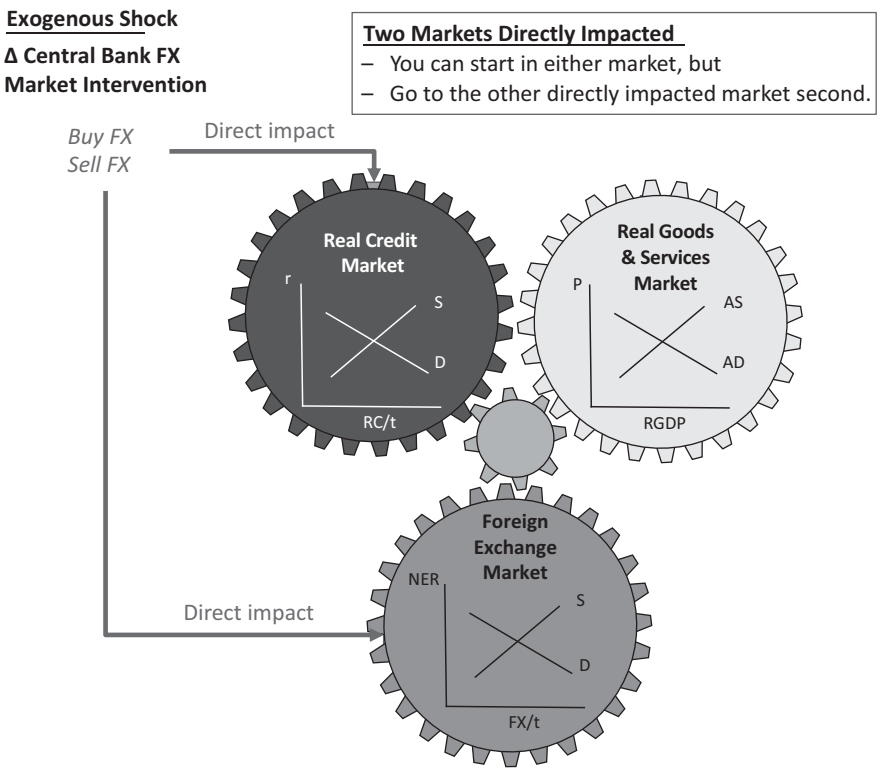

Figure 18.7: Example 1: Exogenous Shock That Directly Impacts Two Macro Markets: Central Bank Intervention.

needs funding. If it funded the expenditures by borrowing in the private financial markets, then the initial effect would be an increase in real credit demand. Spending would occur only after the funds were borrowed. Alternatively, if the government funded its spending by borrowing directly from the central bank,[4] the initial effect would increase the nation's monetary base, real money supply, and supply of real credit. Again, the analysis would begin in the real credit market. Finally, if the government imposed higher income taxes to fund its spending, the increased taxes would cut the budget deficit (or increase the budget surplus) as well as reduce disposable income (i.e., after-tax income) and saving. Once again, the analysis would begin in the real credit market. The critical takeaway from this

4 The ability of governments to borrow directly from their central banks is restricted in most developed countries.

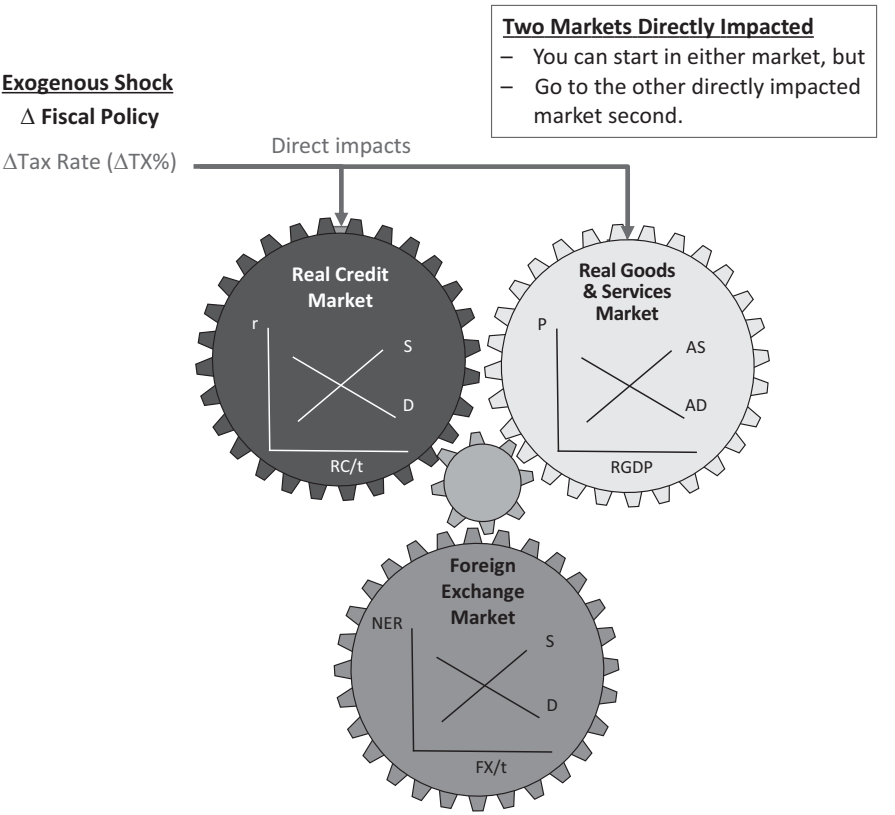

Figure 18.8: Example 2: Exogenous Shock That Directly Impacts Two Macro Markets: Fiscal Policy.

discussion is that an exogenous shock impacts one or two markets first and then spreads to the other(s). The point of impact is ordinarily easy to identify and the subsequent spillover effects logically follow.

Figure 18.10 provides suggestions for where to begin and where not to begin your macroeconomic analysis. Always remember that you should never start with a movement of an endogenous variable. Endogenous variables are the ones on the horizontal and vertical axes of the real goods and services market, real credit market, and foreign exchange market. They are the variables we are trying to explain. Endogenous variables move only after a shift of the entire supply or demand curve. For that, an exogenous (external) force is needed.

There are also shocks, such as tariffs, that can affect all three macroeconomic markets simultaneously.

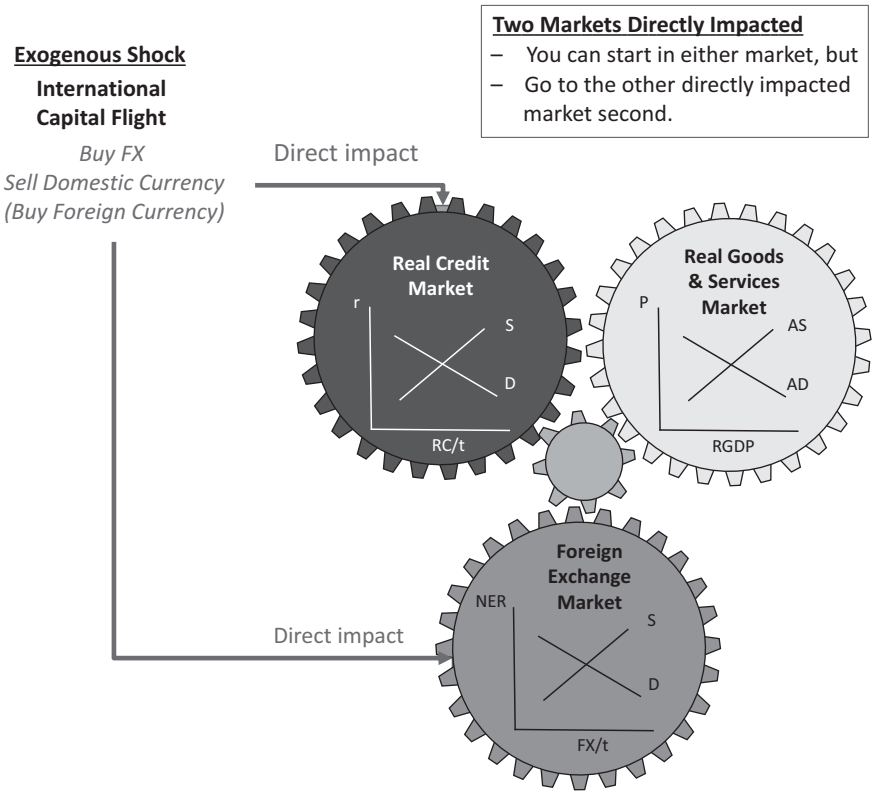

Figure 18.9: Example 3: Exogenous Shock That Directly Impacts Two Macro Markets: International Capital Flight.

What Path Do We Follow?

Once you analyze one market, move in logical order to the next in line and, then, to the final market, until you have finished all three. Chapters 19 and 20 explain how. Normally, there is no need to go back to a market you already considered because *direct impacts* are stronger than the *indirect impacts*. In short, considering second-round impacts should not affect your initial qualitative conclusions.

A Helpful Tip to Guide the Way

Analyzing all the changes caused by an exogenous shock is facilitated by keeping in mind the difference between primary and secondary effects.

Never begin your analysis with a:

- Movement of any endogenous variable in the analyzed country. For the country or currency area you are analyzing, your analysis should never begin with a change the GDP Price Index, real GDP, real interest rate, quantity of real credit per period, nominal exchange rate, or quantity of currency per period.

Begin your analysis in the *Real Goods and Services Market* if there is a shift in:

- **Aggregate demand due to a change in:**
  - Consumption expenditures
  - Investment expenditures
  - Government spending on final goods and services
  - Net exports
- **Aggregate supply due to change in variables, such as:**
  - Input prices
  - Productivity
  - Resource availability
  - Supply-related government regulations that change business costs
  - Expectations

Begin your analysis in the *Real Credit Market* if there is a shift in the:

- **Supply of real credit due to changes in variables, such as the:**
  - Real money supply
  - Real saving rate
  - Speculative supply of credit
  - Real government budget surplus
  - Supply of foreign funds to the domestic real credit market
- **Demand for real credit due to changes in:**
  - Real consumer credit demand
  - Real business credit demand
  - Real government credit demand (i.e., budget deficits)
  - Real foreign credit demand

Begin your analysis in the *Foreign Exchange Market* if there is a shift in the:

- **Supply of domestic currency in the foreign exchange market due to changes in variables, such as relative international*:***
  - Capital flows (e.g., due to changed expectations and risks)
  - Protectionism (e.g., tariffs, quotas, and exchange controls)
  - Real interest rates
  - Real GDP
  - Capital controls
- **Demand for domestic currency in the foreign exchange market due to changes in variables, such as relative international*:***
  - Capital flows (e.g., due to changed expectations and risks)
  - Protectionism (e.g., tariffs, quotas, and exchange controls)
  - Real interest rates
  - Real GDP
  - Captial controls

Figure 18.10: Where to Begin Your Three-Sector Analysis and Where *Not* to Begin.

Primary and Secondary Effects

A *primary effect* is a shift of an entire supply or demand curve in any of the three macroeconomic markets; a *secondary effect* is a movement along a supply or demand curve (see Figure 18.11). Movements along a supply curve occur when the demand curve shifts, and movements along a demand curve occur when the supply curve shifts. For normal, upward-sloping supply and downward-sloping demand curves, the primary effect on quantity per period is always greater than the secondary effect. These points will be reinforced in Chapters 19 and 20.

Effect	Description
Primary	A shift of the entire demand or supply curve
Secondary	A movement along the supply or demand curve
Notice	Primary effects are stronger than secondary effects.

Figure 18.11: Primary and Secondary Effects.

Conclusion

This chapter sets the stage for the country analyses discussed in the next two chapters. In our Three-Sector Model, the GDP Price Index and real GDP are determined in the real goods and services market; the real interest rate and the quantity of real credit per period are determined in the real credit market; and the nominal exchange rate and quantity of currency per period are determined in the foreign exchange market. At this point, it is essential that the economic relationships in each of these markets are logical to you and consistent with *your* common sense about how people react to economic incentives, such as changing prices, interest rates, real income, and exchange rates.

This chapter also laid out the methodology we will follow in our macroeconomic analyses. In Step 1, we will describe the initial economic environment of the economy being analyzed. This step consists mainly of determining the economic factors that influence the slope (elasticity) of supply and demand in each of the three principal macroeconomic markets. In Step 2, we will identify the exogenous shock to the nation's economy. Finally, in Step 3, we will analyze the cause-and-effect chain of economic reactions that result from an initial shock. For each analysis, we must make sure to begin in the market that is most directly affected by the exogenous economic shock and clearly distinguish primary effects from secondary

effects. As for where to start our analyses, when in doubt, remember *Guideline #3: "Show me the money!"*

Key Points

- The Three-Sector Model should reflect your common sense of how people behave and markets work.
- Macroeconomic changes are due to external shocks that directly affect one market (or more) and then spread to the others.
- Real Goods and Services Market
  - The shape of the aggregate supply curve is affected by the level of resource utilization, efficiency, and resource mobility. The unemployment rate, employment-to-population ratio, and capacity utilization rate provide clues as to where a nation is on its aggregate supply curve.
  - In the Keynesian range, the aggregate supply curve is horizontal. Changes in real GDP are greatest, and changes in the GDP Price Index are smallest for any shift in aggregate demand.
  - Changes in real GDP are smallest, and changes in the GDP Price Index are largest for any shift of aggregate demand in the classical range.
  - Most nations are in the Intermediate range.
- Real Credit Market
  - The shape of the supply and demand for real credit is based on borrowers' and lenders' sensitivities to changes in the real interest rate.
- Foreign Exchange Market
  - The economic setting in the foreign exchange market depends on the exchange rate system (sometimes called "regime") a nation chooses (i.e., fixed, flexible, or something in between).
  - A credible flexible exchange rate reduces business risks associated with changes in a nation's money supply but increase business risks related to currency value movements.
  - A credible fixed exchange rate reduces business risks associated with changes in a nation's international currency value, but it increases risks related to changes in a nation's money supply.
- Where to Begin
  - A shock from an exogenous variable is determined outside the analyzed nation's Three-Sector Model. It is always the source of an initial economic change. Changes in an exogenous variable cause movements in endogenous variables.
  - Endogenous macroeconomic variables are determined by the forces of supply and demand within the Three-Sector Model.
  - *Guideline #3, "Show me the money!"* is useful for determining where to begin your analysis.
  - When an exogenous variable changes, it has a "direct" impact on one or two macroeconomic markets. Exogenous shocks cause changes in endogenous variables, which have "indirect" impacts on the other macroeconomic markets.

– A primary effect is due to a shift of an entire supply or demand curve in any of the three macroeconomic markets. A secondary effect is due to a movement along a supply or demand curve. Primary effects are stronger than secondary effects.

Review Questions

1. Explain the three-step process used to analyze the effects that external shocks have on a nation's economy.
2. What economic indicators provide evidence that a nation is on the inelastic portion of its aggregate supply curve?
3. If a nation were near the classical range of its aggregate supply curve, what should be assumed about the percentage change in GDP Price Index relative to the percentage change in real GDP, for any increase in aggregate demand?
4. In the context of the Three-Sector Model, what is wrong with the following statement? "Let's begin our analysis of the United States with a depreciation of the U.S. dollar in terms of the euro."
5. What guideline should be followed to determine in which of the three markets to begin your macroeconomic analysis?
6. Name two exogenous shocks that would begin your Three-Sector-Model analysis in the foreign exchange market. Name two exogenous shocks that would begin it in the real goods and services market. Finally, name two exogenous shocks that would begin your analysis in the real credit market.
7. Why should a change in an endogenous variable never be the starting point of your macroeconomic analysis?
8. Is the following statement true or false? "In nations with high demand elasticities for real credit, any shift of supply causes the real interest rate to fluctuate wildly relative to the equilibrium quantity of real credit per period."
9. Is the following statement true or false? "The higher the elasticity of demand for real credit, the more this demand acts like a stimulus to economic activity when the real interest rate falls."
10. Is the following statement true or false? "In nations with elastic demands for real credit, monetary policy should be relatively more powerful than in nations where demand is inelastic."
11. Is the following statement true or false? "Fiscal policies tend to be less effective the higher a nation's elasticity of demand for real credit."

Chapter 19
Shocks to Nations with Flexible Exchange Rates

This chapter uses the Three-Sector Model to analyze the economic effects of shocks to nations with flexible exchange rates. Our methodology will follow the three-step process that involves describing the initial economic setting of the country being considered, identifying the economic, political, or social shock, and, finally, examining the macroeconomic implications of the shock (see Figure 19.1). This third step will integrate what we have learned in Chapter 10, "Real Credit Market," Chapter 12, "Real Goods and Services Market," and Chapter 16, "Foreign Exchange Market," along with the understanding gained from all of the supporting chapters, especially Chapter 17, "Balance of Payments."

Step 1	Describe the initial economic setting of the three key macroeconomic markets (i.e., the real credit market, real goods and services market, and foreign exchange market) for the country being considered.
Step 2	Identify the shock or expected shock to the nation.[1]
Step 3	Analyze the chain reaction of economic causes and effects in the three major macroeconomic markets.

Figure 19.1: Methodology: Three Analytical Steps.

We begin by analyzing the economic effects of expansionary fiscal policy and then go on to explain the impacts and effects of expansionary monetary policy. Our analysis will show that differences in the degree of international capital mobility can have a significant (sometimes unexpected) influence on the effectiveness of fiscal policies. The systematic techniques developed in this chapter will also be helpful in the next chapter (Chapter 20, "Shocks to Nations with Fixed Exchange Rates"), where we will extend our exploration to nations with fixed exchange rates.

The Basics

Effects of Expansionary Fiscal Policy

Picture yourself working as the new finance manager in Mexico City, Mexico, for Fenway, Inc., a large, multinational health care company based in Boston,

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Massachusetts. You just got off the phone with the chief financial officer (CFO) in Boston, who is concerned about an article in a well-respected business publication that mentions the populist Mexican government's desire to reduce its high unemployment rate by dramatically increasing government spending. She promises to e-mail the article to you shortly.

The reason for the CFO's concern is that potential investments in Mexico play significant roles in Fenway's current five-year business plan, and, therefore, a careful review of expected future cash flows from these investments is being made. Your job, as spelled out by the CFO, is to analyze the likely economic effects of Mexico's expansionary fiscal policy and to lead a conference-call discussion the next morning at 11:00. Because the corporate treasurer and three members of a divisional task force have been working on this portion of the business plan, the CFO has also invited them to participate in the conference call with you.

During the phone conversation, you learned that the CFO is especially interested in the likely effects that Mexico's expansionary fiscal policy will have on key business plan variables that will affect Fenway's projected cash flows. In particular, she is concerned about changes in Mexico's:

- GDP Price Index (P)
- Nominal GDP (GDP) and real GDP (RGDP)
- Unemployment rate and employment-to-population ratio
- Nominal wage (W) and real wage (W/P)
- Real interest rate (r) and nominal interest rate (i)
- Monetary base (B)
- M2 money supply (M2)
- Gross private domestic investment (I)
- Real exchange rate (RER) and nominal exchange rate (i.e., NER = \$/MXN ≡ dollars per peso)
- Significant balance of payments components

After hanging up, you realize the CFO is looking not only for your answers and insights but also for a logical and fruitful framework that will allow everyone to participate in the conversation. A consensus viewpoint is needed so that critical work on the business plan can proceed. You also know that your analysis will be carefully and critically scrutinized by everyone in the group—especially in light of the strong and varied vested interest groups taking part in the meeting.

1 Remember from Chapter 18, "Putting It All Together" that we will analyze only one shock at a time.

One thing is clear: Your reasoning must be logical, consistent, and informed because any unsupported claims or errors in reasoning will cast doubts on the objectivity and depth of your presentation.

Within a few minutes of your phone call with the CFO, you receive the e-mailed article shown below. Given the information in the article, how will you go about preparing your remarks for tomorrow's meeting and organizing your thoughts for the possible questions and comments of others?

Mexican President Seeks to Reduce Unemployment
By J. E. Marthinsen

MEXICO CITY, Mexico—For the past two years, high unemployment, low plant utilization, and sluggish growth have plagued Mexico. Unfortunately, it has also been suffering from large and rising current account deficits, which have increased the nation's indebtedness to foreign countries. On the bright side, the Mexican peso's value has held steady during the past few months, but the nation's commitment to flexible exchange rates could come under pressure with the president's recent proposal to reduce the unemployment rate to single-digit levels by dramatically increasing government spending. Despite a budget deficit that is already approaching 4% of GDP, the president indicated that any increase in the deficit resulting from his expansionary policies would be financed by borrowing in the domestic capital markets.

Step 1: Describe Mexico's Initial Economic Setting

Let's begin by making reasonable assumptions about the shape (slope or elasticity) of the supply and demand curves in Mexico's real goods and services market, real credit market, and foreign exchange market.

Real Goods and Services Market: Economic Setting

Due to the high level of unemployment, low plant utilization, and sluggish GDP growth, there should be ample resources available to expand output. As a result, let's assume that Mexico is on a relatively flat portion of its aggregate supply (AS) curve (see the circled region shown in Figure 19.2). It is important to remember that our assumption of a relatively flat aggregate supply means that we are expecting any increase in aggregate demand (AD) to cause Mexico's real GDP (RGDP) to change by a larger percentage than its GDP Price Index (P).

Real Credit Market: Economic Setting

At a minimum, Mexico's supply of real credit is upward sloping because the real interest rate affects the behavior of domestic and foreign credit sources,

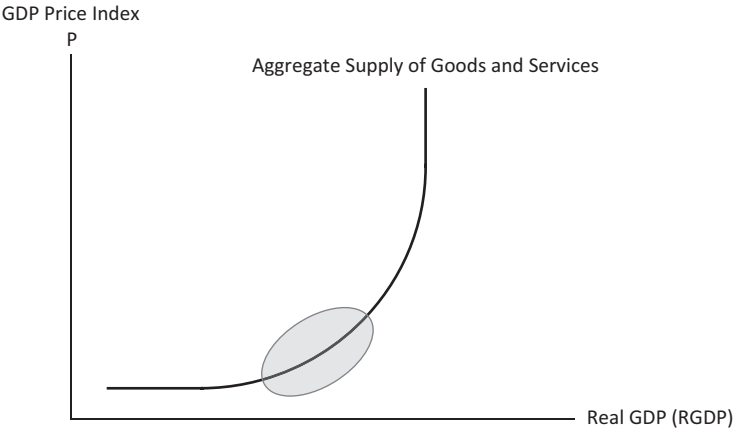

Figure 19.2: Mexico's Real Goods and Services Market: Economic Setting.

such as households, businesses, banks, and governments. At the same time, being a developing nation with a relatively low per capita GDP, it is unlikely that changes in the real interest rate will significantly affect the nation's saving rate. Other variables, such as income levels and expectations, are likely to be much more important.

Foreign investments in Mexico and Mexican investments abroad are affected by changes in the nation's real interest rate relative to foreign countries. Because Mexico has a relatively unsophisticated domestic financial market and there are risk premiums attached to foreign investments there, let's assume that the supply of real credit is upward sloping but inelastic. This means that the percentage change in the amount of funds supplied to the real credit market is less than the percentage change in Mexico's real interest rate (see Figure 19.3).

As for demand, we will assume, for now, that Mexico's demand for real credit is also rather inelastic. Given the current state of the economy, the private sector is not anxious to borrow if the real interest rate falls, and, likewise, a higher real interest rate does not significantly discourage borrowing.

Foreign Exchange Market: Economic Setting

Figure 19.4 shows the dollar-peso foreign exchange market. We have no information on whether the international market responds forcefully or weakly to changes in the nominal dollar-peso exchange rate. Therefore, we cannot make

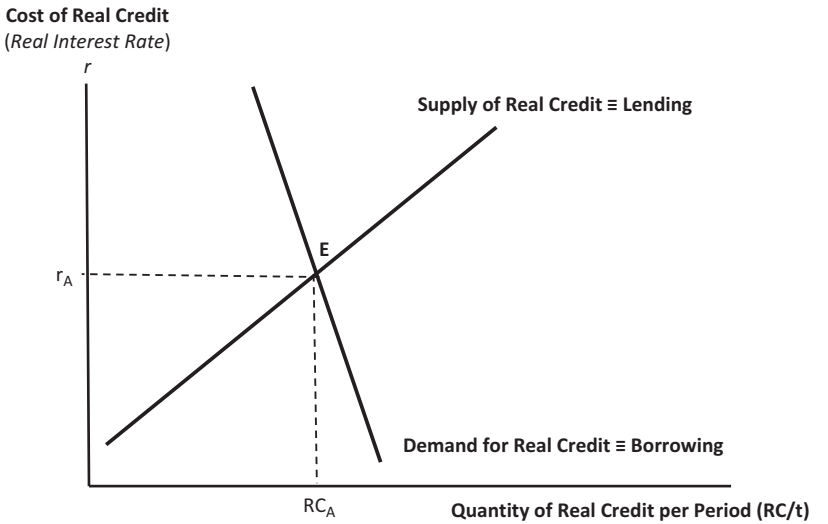

Figure 19.3: Mexico's Real Credit Market: Economic Setting.

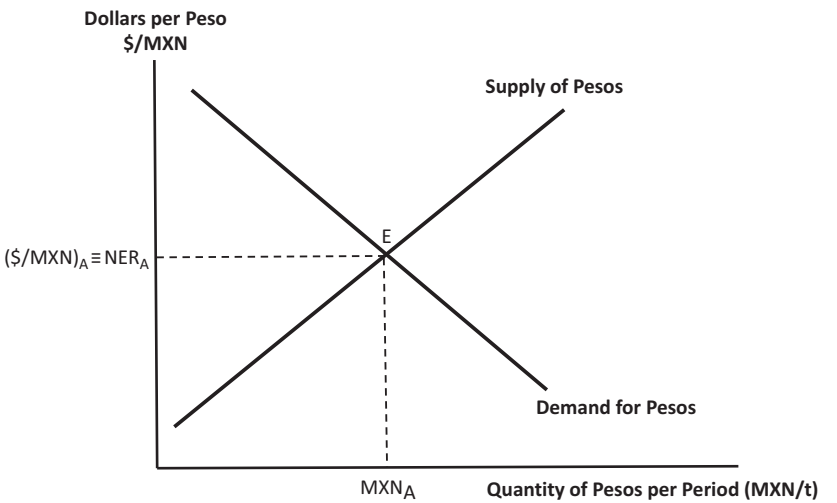

Figure 19.4: Dollar-Peso Foreign Exchange Market: Economic Setting.

any initial assumptions about whether Mexico's foreign exchange supply and demand curves are elastic or inelastic. Nevertheless, we do know that Mexico has a freely fluctuating exchange rate system, which means the nation's central bank (Bank of Mexico) has made a policy decision not to intervene in the

foreign exchange market. This example's focus is on the dollar-peso market. Therefore, a truly flexible dollar-peso exchange rate implies that both the Bank of Mexico and U.S. central bank (Federal Reserve) have made a commitment not to intervene in this particular market.[2]

With the economic setting in the three markets tentatively established, let's identify the exogenous shock that sets off the chain of economic reactions.

Step 2: Identify the Expected Economic Shock to Mexico

The exogenous shock in this analysis is increased government spending, which will be financed by borrowing in Mexico's real credit market. This shock is exogenous because it is not determined by the forces of supply and demand in any of the three macroeconomic markets. Notice that this exogenous shock directly impacts two markets: the real credit market and the real goods and services market.

Step 3: Analyze the Chain Reaction of Economic Interactions

Deciding where to begin our analysis is important, but this decision is made easier by using *Guideline #3, "Show me the money!"* which was introduced in the last chapter. Guideline #3 emphasizes the fact that the government must raise funds before they can be spent. Therefore, let's begin in the real credit market.

Economic Changes in the Real Credit Market

Government borrowing is an exogenous factor that directly increases demand in the real credit market. In Figure 19.5, the increase in government borrowing causes the demand for real credit to rise from D_1 to D_2, thereby raising Mexico's real interest rate from r_A to r_B and increasing the equilibrium quantity of real credit per period from RC_A to RC_B. Notice that the rightward shift in demand is a *primary* change because it shifts the entire curve.

Crowding Out

Figure 19.5 shows an increase in the equilibrium quantity of real credit per period from RC_A to RC_B, but the rise in government borrowing and spending is equal to RC_Z — RC_A (i.e., the distance from A to Z). The net amount borrowed is less than the government's demand because of *crowding out*. Government

2 During each period, there must be either no intervention or self-canceling intervention.

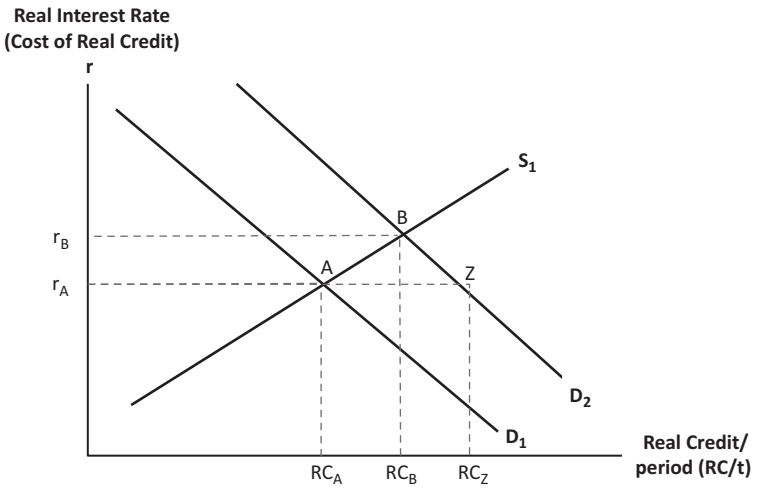

Figure 19.5: Effect of Increased Government Borrowing on the Real Credit Market.

borrowing causes real credit demand to rise from D_1 to D_2 and, therefore, the real interest rate to increase from r_A to r_B. As a result, private borrowing (i.e., business and household borrowing) falls. The amount of real credit that would have been demanded at r_A falls from RC_Z to RC_B, as the real interest rate rises to r_B. This reduction in private borrowing (and spending), due to government-induced increases in the real interest rate, is called *crowding out*.[3] Notice that this is a *secondary effect* because a higher real interest rate causes the movement along the supply *and* demand curves.

Economic Changes in the Real Goods and Services Market

Figure 19.6 builds on conclusions from the real credit market. An increase in government spending causes Mexico's aggregate demand (i.e., the sum of consumption expenditures [C], gross private domestic investment expenditures [I], government spending on final goods and services [G], and net exports [NX]) to rise. In the real goods and services market, an increase in aggregate demand from AD_1 to AD_2 causes prices to rise from P_A to P_B and real GDP to rise from $RGDP_A$ to $RGDP_B$.

3 For an extended discussion of crowding out see Chapter 12, "Fiscal Policy."

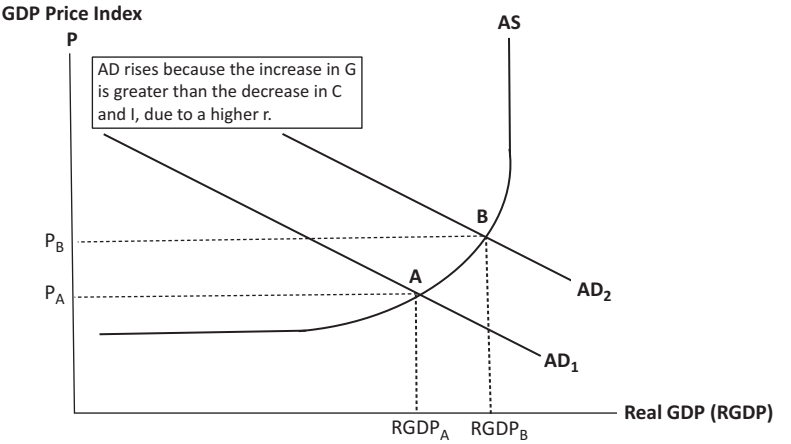

Figure 19.6: Effects of a Net Increase in Aggregate Demand on RGDP and the GDP Price Index.

This shift in aggregate demand deserves a bit more attention because it is due to the interaction between a direct and indirect impact. The *direct* impact is the increase in government spending (i.e., the fiscal stimulus that is financed by borrowing). This causes aggregate demand to increase by the full amount of government spending times the fiscal multiplier. The *indirect* impact is from the real credit market, where the increased real interest rate causes both household and business borrowing to fall. The resulting decrease in consumption and investment offset *part of* the increase in government spending (i.e., they are crowded out). Nevertheless, the direct impact of increased government spending in the real goods and services market is stronger than the indirect impact of reduced consumption and investment from the real credit market. Looking only at the real credit market, the relative strength of the direct impact (i.e.. the primary effect) is confirmed as we see that net borrowing rises, from RC_A to RC_B, after government enters the market and crowding out occurs (see Figure 19.5). Figure 19.7 summarizes our analysis.

Expansionary fiscal policy	G ↑	AD ↑	Direct impact
Real interest rate ↑	C ↓ and I ↓	AD ↓	Indirect impact from the real credit market
Net Effect	**(C + I + G + NX) ↑**	**AD ↑**	**Direct impact > Indirect impacts**

Figure 19.7: Direct and Indirect Impacts in the Real Goods and Services Market.

Economic Changes in the Foreign Exchange Market

Let's turn our attention to the last macroeconomic market in the Three-Sector Model and determine what happens to Mexico's nominal exchange rate. The foreign exchange market is affected only when individuals, businesses, or governments exchange one currency for another currency. Therefore, the Mexican government's demand in the real credit market and its subsequent expenditures in the real goods and services market have no *direct* impact on the dollar-peso exchange rate.

Despite the lack of any direct impact, government borrowing and spending have indirect impacts on the nominal exchange rate because they change the nation's real interest rate, GDP Price Index, and real GDP. Movements in the real interest rate trigger adjustments in international investment flows, which affect the nominal exchange rate, and changes in the GDP Price Index and real GDP affect international trade flows, which also affect the nominal exchange rate.

To answer the question, "What happens to the peso's value?" the balance of payments provides a useful framework for organizing our thoughts on the supply and demand forces at work in the foreign exchange market. Recall from Chapter 17, "Balance of Payments," that the balance of payments can be separated into four major parts, which are the: (1) current account (CA), (2) capital account (KA), (3) financial account (FA), and (4) reserves and related items (RRI).[4] Furthermore, the *Balance of Payments Identity* tells us that the current account plus capital account (CA + KA) must equal the financial account plus reserves and related items (FA + RRI).

The sum of the current account plus capital account (CA + KA) is usually dominated by movements in the current account (CA), which include a nation's imports and exports of goods and services, plus net changes in international primary and secondary income. The capital account (KA) is typically insignificant because it includes infrequent exchanges for debt forgiveness and purchases of natural resources, legal and accounting creations, and marketing assets. The financial account (FA) measures net international borrowing and lending, such as foreign portfolio and direct investments by private individuals and businesses. Reserves and related items (RRI) measure net central bank intervention in the foreign exchange markets.

4 Net errors and omissions are omitted from our discussion here because they reflect balance of payments measurement mistakes, which should equal zero.

Changes in a nation's nominal exchange rate are determined only by those transactions that affect the supply of or demand for foreign currencies. To remind ourselves that we are using the balance of payments *format* to organize our thoughts on the forces changing the nominal exchange rate, we will use the following abbreviations:

- *CAX* is an abbreviation for import and export transactions in the current account (CA), which require the conversion of one currency into another
- *FAX* is an abbreviation for international capital flows in the financial account (FA), which require the conversion of one currency into another
- *RRIX* is an abbreviation for central bank transactions in the foreign exchange markets, which are recorded in reserves and related items (RRI)

We will leave the capital account and net errors and omissions out of our foreign exchange market discussions, limiting our focus to the forces affecting CAX, FAX, and RRIX. The reason for ignoring capital account transactions is that they are a diminutive part of most nations' balance of payments and an even smaller portion of the global foreign exchange markets. Furthermore, they are unlikely to be affected by changes in the real interest rate, GDP Price Index, or real GDP. Similarly, net errors and omissions are ignored because, theoretically, they should equal zero.

Table 19.1 summarizes the major macroeconomic variables that cause movements in CAX, FAX, and RRIX. Imports and exports of goods and services are the most important transactions influencing CAX. Of the endogenous variables in the Three-Sector Model, relative movements of international prices and

Table 19.1: Macroeconomic Variables That Influence CAX, FAX, and RRIX.

Abbreviation	Balance of Payments	Variables That Affect Foreign Exchange Transactions
CAX	Current account (CA) transactions that affect the nominal exchange rate	– Relative international prices ($P_{Mexico}/P_{Foreign}$) – Relative international real GDP ($RGDP_{Mexico}/RGDP_{Foreign}$)
FAX	Financial account (FA) transactions that affect the nominal exchange rate	– Relative international real interest rates ($r_{Mexico}/r_{Foreign}$)
RRIX	Reserves and related items (RRI) transactions that affect the nominal exchange rate	– Central bank intervention in the foreign exchange markets

real income are the ones that most affect CAX. FAX forces are influenced mainly by changes in relative real international interest rates, and RRIX forces are determined by central bank intervention in the foreign exchange markets. With this in mind, let's take a closer look at the effects expansionary fiscal policy has on the dollar-peso exchange rate.

CAX-Related Supply and Demand Forces in the Foreign Exchange Market

So far, we have found that expansionary fiscal policy increases Mexico's real interest rate (r), GDP Price Index (P), and real GDP (RGDP). We also know that movements in Mexico's real GDP and GDP Price Index have their most significant effects on the nation's imports and exports. Let's look closer at these effects.

Indirect impact of real GDP changes on CAX: As Mexico's real GDP increases, so does the purchasing power of its household sector. While many of the goods and services that Mexicans consume are produced domestically, others are imported. Figure 19.8 shows that, as Mexicans import U.S. goods and services, they supply pesos to the foreign exchange market to buy dollars, which depreciates the peso's value.

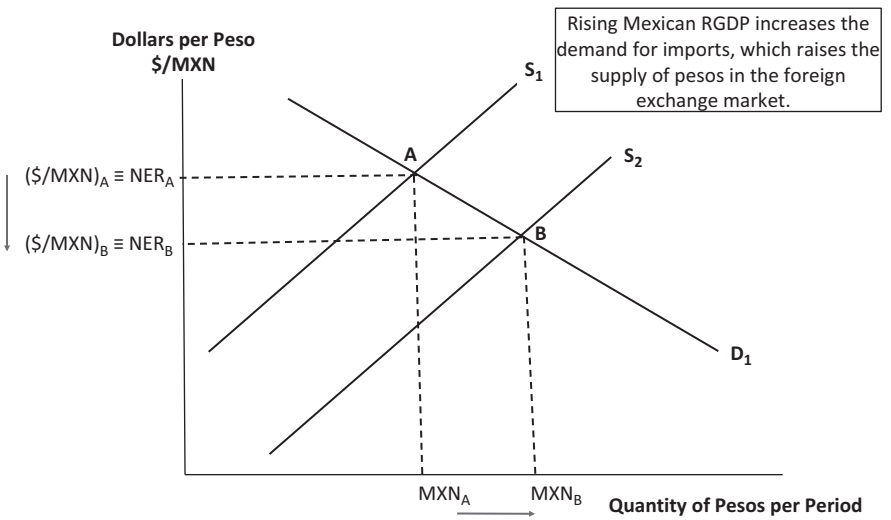

Figure 19.8: Effects of Rising Real GDP on the Peso's Value.

Indirect impacts of relative price level changes on CAX: Higher Mexican prices relative to the United States increase Mexican imports from the United States and decrease Mexican exports to the United States. As Mexico's imports rise, the demand for dollars increases, which raises the supply of pesos in the foreign exchange market. Figure 19.9 shows that, as the supply of pesos to the foreign exchange market increases from S_1 to S_2, the peso depreciates from \$/MXNA to \$/MXNB. Similarly, falling Mexican exports reduce the U.S. demand for Mexican goods and services and, therefore, decrease the demand for pesos. As the demand for pesos falls, from D_1 to D_2, the peso depreciates from \$/MXNB to \$/MXNC.

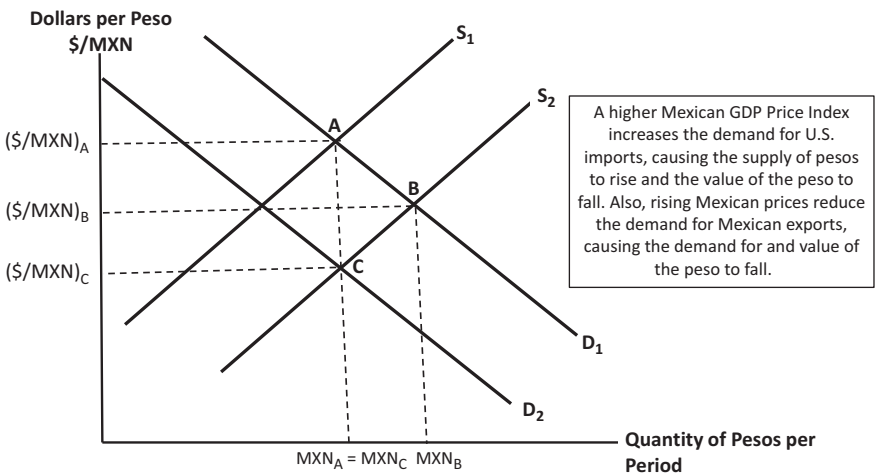

Figure 19.9: Effects of Rising Mexican Prices on the Peso's Value.

The quantity of pesos traded in the foreign exchange market per period is not a critical decision variable for Fenway's business plan analysis. Nevertheless, let's determine if the volume of activity in the dollar-peso market rises or falls. When more pesos are supplied to the foreign exchange market, the equilibrium quantity of pesos per period increases, but when demand falls, the equilibrium quantity per period falls. Therefore, without further information, there is no way to determine the net change in pesos supplied and demanded per period. Figure 19.9 shows no net change in the equilibrium quantity of pesos per period, but this result would vary depending on the relative magnitudes by which supply and demand shift.

FAX-Related Supply and Demand Forces in the Foreign Exchange Market

Mexico's FAX-related transactions include short-term and long-term international investment outflows and inflows. Of the endogenous economic variables that changed in the real credit market and real goods and services market, movements in Mexico's real interest rate relative to the United States have the most significant effect on these investment flows.

The increased demand for real credit by Mexico's government raises the nation's real interest rate. This makes peso-denominated interest-earning assets, such as bills, notes, and bonds, more attractive relative to dollar-denominated securities. In Figure 19.10, as dollar holders purchase pesos to invest in peso-denominated assets, the demand for pesos in the foreign exchange market increases from D_1 to D_2. This increased demand causes the peso to appreciate relative to the dollar from $\$/MXN_A$ to $\$/MXN_B$.

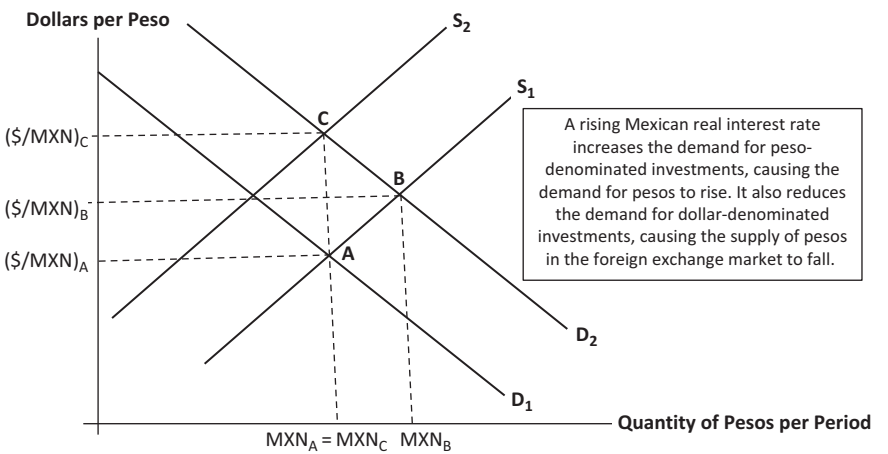

Figure 19.10: Effects of a Rising Real Mexican Real Interest Rate on the Peso's Value.

Similarly, the change in Mexico's relative real interest yield provides an incentive for Mexican investors to adjust the composition of their investment portfolios toward peso-denominated assets. Figure 19.10 shows that a decrease in the supply of pesos to the foreign exchange market, from S_1 to S_2, (i.e., which is the same as a decrease in the demand for dollars in the foreign exchange market) causes the peso to appreciate relative to the dollar, from $\$/MXN_B$ to $\$/MXN_C$.

As was the case when we analyzed CAX's supply and demand forces, the quantity of pesos traded per period in the foreign exchange market is not a critical decision variable for Fenway's business plan. Nevertheless, notice the rising

demand for pesos causes the equilibrium quantity per period to increase, but the declining supply causes it to fall. Figure 19.10 shows the two effects canceling each other, so there is no net change in quantity per period, but this does not have to be the case. An increase in demand that is relatively stronger than the reduction in supply would raise the equilibrium quantity per period, and a relatively substantial reduction in supply would decrease it. Without further information, there is no way to determine the net change in quantity per period.

RRIX-Related Supply and Demand Forces in the Foreign Exchange Market

RRIX-related transactions occur only when central banks intervene in the peso-related foreign exchange markets (in this case, the dollar-peso market). Because Mexico has a flexible exchange rate system, neither the Bank of Mexico nor any foreign central bank (e.g., the U.S. Federal Reserve) intervenes in this foreign exchange market. As a result, there are no RRIX-related supply or demand forces at work in this case.

Figure 19.11 summarizes the supply and demand shifts in the foreign exchange market, due to the indirect impacts from the real credit market and real goods and services market.

Sources of Supply and Demand Changes	Effects	Change in the Peso's Value
CAX Effects		
GDP Price Index$_{Mexico}$ ↑	Exports ↓ → D_{pesos} ↓	Peso depreciates
	Imports ↑ → S_{pesos} ↑	
Real GDP$_{Mexico}$ ↑	Imports ↑ → S_{pesos} ↑	
FAX Effects		
Real interest rate$_{Mexico}$ ↑	Financial capital inflows ↑ → D_{pesos} ↑	Peso appreciates
	Financial capital outflows ↓ → S_{pesos} ↓	
RRIX Effects		
No central bank intervention (*flexible exchange rate*)	No change	No change
Net change		Depends on degree of international capital mobility

Figure 19.11: Summary of Changes in the Peso's Value.

International Capital Mobility: It appears as if the peso's changed value is uncertain, due to conflicting CAX and FAX forces. CAX supply and demand forces cause the peso to depreciate, but FAX forces cause it to appreciate. To determine which of the two dominates, we need to introduce the distinction between *high-mobility* and *low-mobility* international capital markets.

High-mobility international capital markets exist when FAX forces in the foreign exchange market outweigh CAX forces. In other words, high-mobility international capital markets exist when changes in a nation's real interest rate relative to other countries stimulate greater international investment flows than the trade flows stimulated by changes in a nation's relative GDP Price Index and relative real GDP.

By contrast, *low-mobility* international capital markets are just the opposite. Low mobility exists when FAX-related investment flows, which are stimulated by movements in the real interest rate relative to the rest of the world, are less than CAX-related forces, which are stimulated by changes in a nation's relative GDP Price Index and relative real GDP. In general, the greater the international capital market impediments and imperfections facing a country, such as central bank or government controls and taxes, the more immobile the global capital markets it faces. Table 19.2 summarizes the two different levels of international capital mobility.

Table 19.2: High-Mobility and Low-Mobility International Capital Markets.

Mobility	Description
High international capital mobility	FAX effects > CAX effects in the foreign exchange market
Low international capital mobility	CAX effects > FAX effects in the foreign exchange market

Notice that high and low international capital mobility are relative concepts, which are connected to changes in relative international incomes, prices, and interest rate elasticities. In the short run, most countries face high-mobility international capital markets because global investments (especially financial investments) can be executed in a matter of seconds, but changes in trade flows usually react with considerable lags. It takes time for businesses and consumers to notice that relative prices have changed and then act on them by switching suppliers, developing new purchasing and marketing strategies, adjusting sales channels, entering into new contracts, and canceling existing contracts.

For your presentation, should you assume high or low international capital mobility in your analysis? It would take very severe restrictions, such as exchange controls or taxes on international financial transactions, to reduce investment flows to the low-mobility level. Therefore, assuming high-mobility is reasonable. At the same time, to cover yourself, it would be a good idea to also present the effects of low-mobility international capital markets. Perhaps one or more of the conference-call participants will have strong beliefs one way or the other.

In any case, this is not going to be the last time you are asked to make an analysis like this. As Fenway's finance manager in Mexico City, you should expect to be called on regularly for market feedback and advice. Therefore, your insights for this meeting are just the beginning of a self-education process and not an end in itself.

How would the results of high international capital mobility differ from low international capital mobility? If Mexico faced high-mobility international capital markets, the forces of international investment flows would overpower the trade flows, causing the peso to appreciate. By contrast, if the nation faced low-mobility international capital markets, then the peso would depreciate because the CAX-related trade flows would overpower the FAX-related investment flows.

Summary of Answers to the CFO's Questions

Fenway's CFO will be expecting feedback and so far, our Three-Sector Model has produced some interesting results. Let's review the conclusions we have derived.

GDP Price Index and Real GDP Rise

From our analysis of the real goods and services market, we found that Mexico's GDP Price Index and real GDP are expected to rise, due to the increase in government spending and net increase in aggregate demand.

Nominal GDP Rises

Nominal GDP is equal to the prices multiplied by the quantities of all final goods and services produced each period. If Mexico's GDP Price Index and real GDP are expected to rise with the increase in aggregate demand, nominal GDP must rise.

Unemployment Rate Falls and Employment-to-Population Ratio Rises

If Mexico's real GDP is expected to increase, more workers will be needed to produce these new goods and services. Therefore, the increase in real GDP

should cause the nation's unemployment rate to fall and its employment-to-population ratio to rise as the demand for labor increases.

Real and Nominal Wages Rise

Rising rates of output in Mexico cause an increase in the demand for labor. As a result, there should be upward pressure on real wages. Because the percentage change in nominal wages should approximately equal the percentage change in real wages plus the expected inflation rate, an increase in both real wages and expected price level (i.e., GDP Price Index) implies that Mexico's nominal wage rates should rise.

Real and Nominal Interest Rates Rise

Our analysis of the real credit market shows that an increase in government demand for real credit should cause the real interest rate to rise. It also shows that the increased aggregate demand raises prices, which means the anticipated expansionary fiscal policy is likely to increase expected inflation. Because the nominal interest rate is (approximately) equal to the real interest rate plus expected inflation, increases in both the real interest rate and inflationary expectations (due to the prospect of expansionary fiscal policy) should increase Mexico's nominal interest rate.

Monetary Base Does Not Change

Mexico's monetary base remains the same because the central bank has not engaged in open market operations or altered its discount loans. Notice, as well, that reserves and related items does not change. Therefore, there is no central bank intervention in the foreign exchange market that changes the monetary base. This result is also confirmed by using *Guideline #1*, which says "*a nation's monetary base does not change unless the central bank crosses our imaginary horizontal line and changes the size of its balance sheet*." Neither of these has taken place.

Money Supply (M2) Rises

M2 equals the monetary base times the M2 money multiplier. We know already from our previous answer that Mexico's monetary base does not change. Therefore, M2 can vary only if Mexico's M2 money multiplier varies.

Fluctuations in the M2 money multiplier are caused by movements in Mexico's reserve requirement ratio(s) due to new central bank policies, and movements in preferred asset ratios due to changes in interest rates and interest

spreads. The Mexican central bank has not changed the reserve ratio(s), and we have no reason to believe Mexico's preferred asset ratios will be affected *directly* by expansionary fiscal policy, but there are indirect impacts. As the nation's real interest rate rises and interest spreads widen, Mexico's preferred asset ratios adjust.[5] The public holds less cash and more near money deposits,[6] causing the M2 money multiplier to increase. Similarly, bank managers hold fewer excess reserves, again causing the M2 money multiplier to rise.[7] All three of these real-interest-based and spread-based movements increase the ability of banks to lend and, therefore, cause the M2 money multiplier to rise, which increases M2 and the quantity of real credit supplied.[8]

Gross Private Domestic Investment Change Is Uncertain

The increase in Mexico's real interest rate raises companies' credit costs, thereby causing marginal business investments to be postponed or abandoned. Similarly, rising Mexican prices have dampening effects on investment. At the same time, Mexico's growing GDP is likely to stimulate new investments. Therefore, the net change in real gross private domestic investment (I) is uncertain until we know more about the relative magnitudes of interest-induced and price-induced movements relative to real income-induced movements in investment.

Fenway's CFO may not be happy to hear you come back with an ambiguous answer, but ambiguity with an explanation is worth much more than an unqualified answer that cannot be supported. Everyone (CFOs included) understands and appreciates that some questions have equivocal answers. If the change in Mexico's gross private domestic investment is ambiguous, then the next step should be to see how important it is to the overall business plan. If it is relatively unimportant, then perhaps further investigation is not needed, but if it is a crucial factor, then a statistical inquiry might be used to determine the change. In cases where a detailed study is too costly, the results ambiguous, or the task impossible to complete, then likely changes in gross private domestic

5 To refresh your memory on the link between changes in real interest rates and changes in the preferred asset ratios, see Chapter 8, "Money Creation."

6 The preferred asset ratio CC/D falls and N/D rises, causing the M2 money multiplier to increase. See Chapter 8, "Money Creation."

7 The preferred asset ratio ER/D falls, causing the M2 money multiplier to increase. See Chapter 8, "Money Creation."

8 Notice that the change in the M2 money multiplier, mm_2, and the amount of credit supplied are caused by a higher real interest rate, which means the real-credit-market adjustment is due to a *secondary effect*, which moves the nation along its real credit supply curve.

investment might be more carefully analyzed with other methods and techniques, such as surveys, interviews, and "what if" scenarios. The major point here is that equivocal answers have the effect of setting some variables apart from the others. Under closer scrutiny, they may be consciously dropped from the business plan, but if they are essential, then highlighted ambiguity increases their visibility.

Nominal Exchange Rate Change Depends on International Capital Market Mobility
We saw in our analysis of the foreign exchange market that changes in the value of the peso depend on the degree of international capital mobility. If Mexico faces high-mobility international capital markets, then the nominal value of the peso rises. If it faces low-mobility international capital markets, the peso's value falls.

Real Exchange Rate Change Depends on International Capital Market Mobility
The Mexican real exchange rate equals:

$$\frac{\text{Nominal Exchange Rate}_{(\$/\text{MXN})} \times \text{Average Price Level}_{\text{Mexico}}}{\text{Average Price Level}_{\text{United States}}}$$

To unravel the movement in Mexico's real exchange rate, let's review the effects of GDP Price Index and nominal exchange rate changes.

Price-level change: From our analysis of the real goods and services market, we learned that an increase in government spending raises Mexico's aggregate demand, thereby increasing its GDP Price Index. This price-level movement causes the real exchange rate to rise.

Nominal exchange-rate change: If Mexico faces high-mobility international capital markets, then the nominal exchange rate ($/MXN) appreciates. Mexico's nominal exchange rate depreciates if it faces low-mobility international capital markets.

Real exchange-rate change: *high mobility*: Assuming U.S. prices remain relatively constant, Mexico's real exchange rate must rise with high mobility international capital markets because prices and the nominal exchange rate increase. An increase in the real exchange rate causes Mexico to lose international competitiveness, which causes CAX to fall.

Real exchange-rate change: *low mobility*: By contrast, if Mexico faces low-mobility international capital markets, the movement in real exchange rate is ambiguous because the nominal exchange rate falls at the same time Mexican prices rise.

Changes in Mexico's Balance of Payments

The Balance of Payments Identity tells us that (CA + KA) always equals (FA + RRI). There is no need for macroeconomic variables, such as relative real interest rates, real GDPs, exchange rates, or relative prices, to adjust for this identity to hold. At the same time, macroeconomic equilibrium requires this identity, over time, to co-exist with international forces because imbalances cause economic variables to fluctuate until they do.

Let's look at the expected changes in the Mexican economy as a result of expansionary fiscal policy and see if we can draw any conclusions about adjustments in the nation's balance of payments. Our analysis will begin with the easiest market and progress to the most challenging one (shown in Figure 19.12).

	Balance of Payments Accounts and Changes in the Economic Variables Affecting These Accounts	Causes	Effects	Net Change in the Balance of Payments Account
1	**CA Transactions**	→	**Net exports ↓**	CA ↓
	Real exchange rate ↑	→	Net exports ↓	
	– GDP Price Index ↑	→	– Exports ↓ and imports ↑ → NX ↓	
	– Nominal peso value ↑	→	– Exports ↓ and imports ↑ → NX ↓	
	RGDP ↑	→	– Imports ↑ → NX ↓	
2	**FA Transactions**	→	**Net Financial Capital Inflows ↑**	FA ↓
	Real interest ↑	→	Financial capital inflows ↑ and outflows ↓	
3	**RRI Transactions**	→	No change	0
	No central bank intervention	→	None	

Figure 19.12: Changes in Mexico's Balance of Payments: High-Mobility International Capital Markets.

Changes in Reserves and Related Items

Because Mexico has a flexible exchange rate system (relative to the dollar), there are no changes in the nation's reserves and related items. This result is summarized in Row 3 of Figure 19.12.

Changes in the Financial Account

Mexico's financial account is affected by changes in its real interest rate relative to other nations. A rising Mexican real interest rate causes financial capital inflows to rise, financial capital outflows to fall, and, therefore, net international capital inflows to increase, which are recorded with negative values in the balance of payments. Therefore, Mexico's financial account becomes more negative as its real interest rate rises. The resulting flows raise the value of the Mexican peso. These results are summarized in Row 2 of Figure 19.12.

Changes in the Current Account

If reserves and related items equal zero and the financial account is negative, then the current account must be negative because (CA + KA) must equal (FA + RRI).[9] Let's see if this conclusion is consistent with the economic forces we have laid out. We will start with Mexico facing high mobility international capital markets and then deal with low mobility capital markets.

Changes in the Current Account When Mexico Faces High-Mobility International Capital Markets: The current account is affected by changes in real GDP, the GDP Price Index, and the nominal exchange rate. As real GDP increases, Mexico's imports rise, causing the current account to fall. As Mexican prices rise, the nation's imports rise and exports fall, causing the current account to fall even further. Finally, with high-mobility international capital markets, the peso appreciates, and this appreciation combined with higher domestic prices raises the real exchange rate, causing the current account to fall even deeper into deficit. Notice in Figure 19.12 (Row 1) that, when Mexico faces high-mobility international capital markets, all the economic incentives drive the nation's current account toward a deficit position. These results are consistent with our conclusion that, if reserves and related items equal zero and the financial account becomes more negative, then the current account must become more negative.[10]

9 In all of our analyses, we de-emphasize the capital account. Therefore, the Balance of Payments Identity becomes CA $=$FA + RRI.

10 If the financial account is negative, the nation is a net debtor for the period considered. If the financial account becomes "more negative," the nation's indebtedness relative to a previous period becomes larger.

Changes in the Current Account When Mexico Faces Low-Mobility International Capital Markets: How different are the results with low mobility international capital markets? Figure 19.13 is similar to Figure 19.12, except it shows the balance of payments effects if Mexico faces low-mobility international capital markets. As in Figure 19.12, the increase in real GDP and the GDP Price Index cause Mexico's current account to fall, but with low-mobility international capital markets, the change in real exchange rate is uncertain because rising prices and the depreciating peso work in opposite directions.

Balance of Payments Accounts and Changes in the Economic Variables Affecting Them		Causes	Effects	Net Changes
1	**CA Transactions**	→	**Net exports↓**	CA ↓ (*RGDP and P effects overpower NER effects*)
	Real exchange rate (?)	→	Net exports (?)	
	– GDP Price Index ↑	→	– Exports ↓ and imports ↑ → NX ↓	
	– Nominal peso value↓	→	– Exports ↑ and imports ↓ → NX ↑	
	RGDP ↑	→	Imports ↑ → NX ↓	
2	**FA Transactions**	→	**Net Financial Capital Inflows↑**	FA ↓
	Real interest rate ↑	→	Financial capital inflows ↑ and outflows ↓	
3	**RRI Transactions**	→	No change	No change in RRI
	No central bank intervention	→	None	

Figure 19.13: Changes in Mexico's Balance of Payments: Low-Mobility International Capital Markets.

Nevertheless, we can make inferences about changes in the current account because Mexico's increased real interest rates cause net financial investment inflows, which are recorded as negative values in the financial account. The lack of central bank intervention means there is no change in reserves and related items. If Mexico's financial account is negative and reserves and related items equal zero, then the financial account plus reserves and related items must be less than zero (i.e., (FA + RRI) < 0). The Balance of Payments

Identity tells us (CA + KA) must equal (FA + RRI).[11] Therefore, for the balance of payments to be in economic equilibrium, relative-price and relative real-income effects must offset the nominal exchange rate effects, causing the current account to fall.[12]

To summarize, if FAX is negative and RRI is equal to zero, then CA must be negative. We are assured of this equality between (CA + KA) and (FA + RRI) because it is an accounting truism (i.e., the Balance of Payments Identity), but for this accounting tautology to be in sync with economic equilibrium, macroeconomic variables, such as the GDP Price Index, real GDP, and real interest rates adjust to move the current account into deficit.

Summary: Economic Effects of Expansionary Fiscal Policy

The methodology we have used, in this section, to examine the effects of expansionary *fiscal* policy on a nation with a flexible exchange rate system will be reinforced in the next section of this chapter when we investigate the economic impacts and effects of expansionary *monetary* policy. This methodology will also be useful in the Chapter 20 when our focus shifts to nations with fixed exchange rates.

Figures 19.14 and 19.15 summarize all the cause-and-effect relationships that occur when a government pursues expansionary fiscal policy under a flexible exchange rate regime. Figure 19.14 summarizes these effects when the nation faces high-mobility international capital markets, and Figure 19.15 summarizes them when it faces low-mobility international capital markets.

Effects of Expansionary Monetary Policy

Let's employ the methodology and tools of the Three-Sector Model to evaluate the economic effects of expansionary monetary policy. Again, picture yourself working as the new finance manager in Mexico City, Mexico, for Fenway, Inc. Suppose you just got off the phone with the CFO, who is concerned about an article that indicates Mexico's central bank will pursue expansionary monetary policy to reduce the nation's unemployment rate. The article (which follows)

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11 Remember that we deemphasize the capital account in these analyses. Therefore, the Balance of Payments Identity is CA ≡ (FA + RRI)

12 *The Rest of the Story* provides a second way to understand why the current account must fall. See the section entitled "A Second Look at Expansionary Fiscal Policy with Low Mobility International Capital Markets."

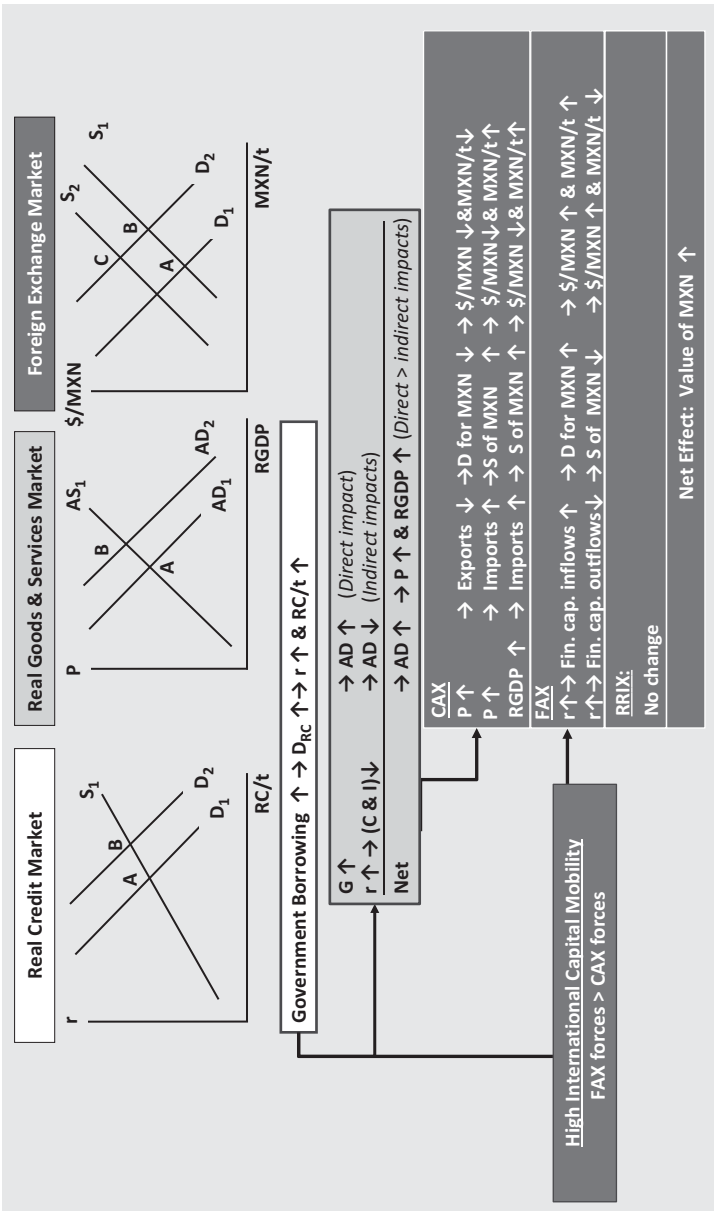

Figure 19.14: Expansionary Fiscal Policy, Flexible Exchange Rates, and *High Mobility* International Capital Markets.

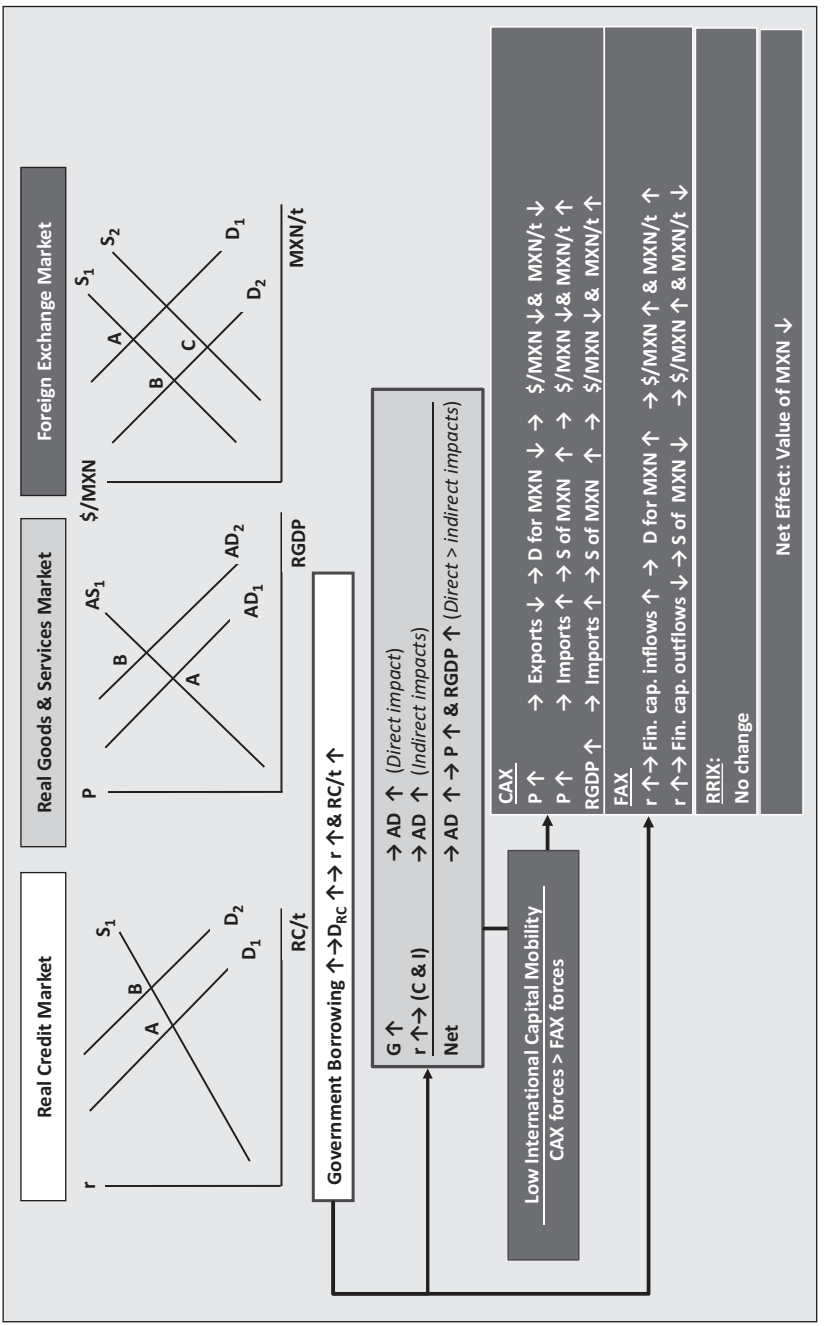

Figure 19.15: Expansionary Fiscal Policy, Flexible Exchange Rates, and *Low-Mobility* International Capital Markets.

was just e-mailed to you, and you have until 11:00 tomorrow morning to analyze and present the likely economic effects.

Bank of Mexico Seeks to Reduce Unemployment
By J. E. Marthinsen

MEXICO CITY, Mexico—For the past two years, high unemployment, low plant utilization, and sluggish growth have plagued Mexico. Unfortunately, it has also been suffering from large and rising current account deficits, which have increased the nation's indebtedness to foreign countries. On the bright side, the Mexican peso's value has held steady during the past few months, but the nation's commitment to flexible exchange rates could come under pressure with the *central bank's recent decision to pursue expansionary monetary policy by lowering the reserve ratio on bank deposits until the level of unemployment falls to single-digit levels.*[13]

Step 1: Describe the Initial Economic Setting

Mexico's economic setting is still the same as in our analysis of expansionary fiscal policy. Therefore, we will assume, the country is on the relatively flat portion of its aggregate supply curve (see Figure 19.2); its supply of and demand for real credit are somewhat inelastic (see Figure 19.3), and the nominal exchange rate fluctuates freely against the dollar (Figure 19.4). Thus, there is no central bank intervention in the dollar-peso foreign exchange market.

Step 2: Identify the Expected Economic Shock

The exogenous shock that sets off the chain of economic reactions is the increase in Mexico's real M2 money multiplier and real M2 money supply due to the lower reserve ratio.

Step 3: Analyze the Chain Reaction of Economic Interactions

Deciding in which market to begin our evaluation is, again, made easier if we use *Guideline #3,* "*Show me the money!*" Changes in the M2 money multiplier directly affect the real M2 money supply and the supply of real credit. Therefore, let's begin in the real credit market.

13 The article title and italicized phrase are the only differences between this e-mail and the one presented earlier in this chapter, when we analyzed the economic effects of expansionary *fiscal* policy.

Economic Effects in the Real Credit Market

If the Bank of Mexico increases the nation's real money supply, then the direct impact (and primary effect) is that the supply of real credit rises. Figure 19.16 shows that an increase in the supply of real credit from S_1 to S_2 creates a surplus of funds at r_A (the original real interest rate) equal to RC_Z — RC_A (i.e., the distance from A to Z). As a result, the secondary effect is that the real interest rate falls from r_A to r_B, causing the amount of real credit borrowed per period (e.g., investment and consumption) to rise from RC_A to RC_B. Notice also that as the real interest rate falls from r_A to r_B, the amount of real credit supplied per period decreases from RC_Z to RC_B. We have now completed our analysis of the real credit market and are ready to examine the indirect impacts on the real goods and services market.

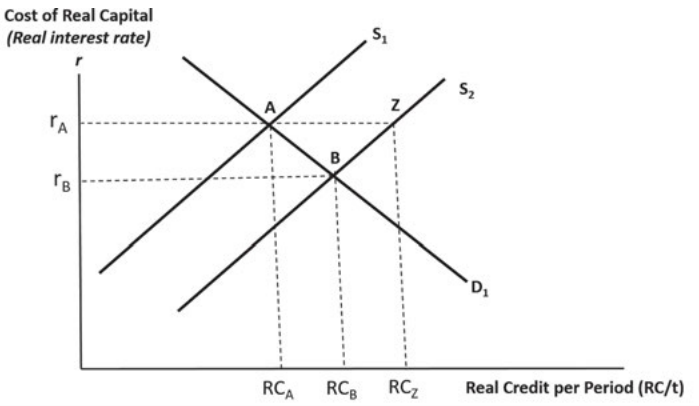

Figure 19.16: Effects of an Increase in the Real Money Supply on the Real Credit Market.

Economic Effects in the Real Goods and Services Market

Expansionary monetary policy has no *direct* impact on the real goods and services market, but there are indirect impacts, due to the reduction in real interest rates and net increase in borrowing in the real credit market. As the real interest rate falls, household and business borrowing rise. The resulting increase in consumption and investment raise aggregate demand in the real goods and services market. Figure 19.17 shows that an increase in aggregate demand from AD_1

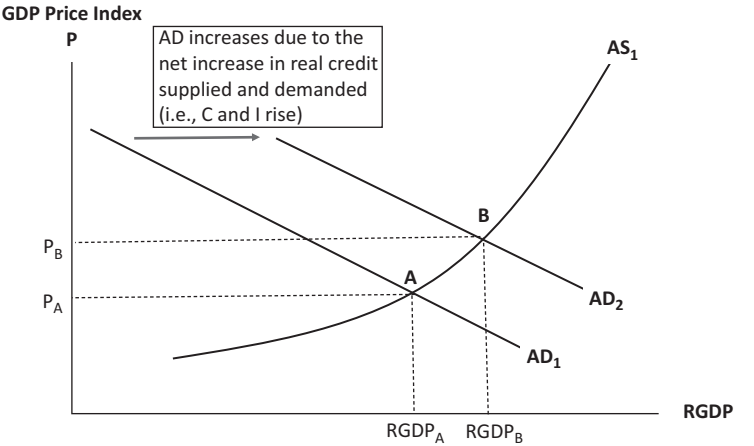

Figure 19.17: Effects of an Increase in Aggregate Demand.

to AD_2 causes Mexico's GDP Price Index to rise from P_A to P_B and real GDP to rise from $RGDP_A$ to $RGDP_B$.

Figure 19.18 provides a summary of results and a progress report on our Three-Sector Model analysis. Now, we are ready to examine the indirect impacts on the foreign exchange market.

Economic Effects in the Foreign Exchange Market

To determine the change in Mexico's nominal exchange rate, we must analyze the indirect impact of the real credit market on the foreign exchange market and the indirect impact of the real goods and services market on the foreign exchange market. As we did when we examined the effects of expansionary fiscal policy, we will use the balance of payments *format* to organize the supply and demand forces at work. In particular, we will address the CAX-related, FAX-related, and RRIX-related forces affecting the dollar-peso foreign exchange market.

CAX-Related Supply and Demand Forces in the Foreign Exchange Market

Expansionary monetary policy increases Mexico's real GDP and GDP Price Index. Let's evaluate their CAX-related impacts of these changes on the foreign exchange market.

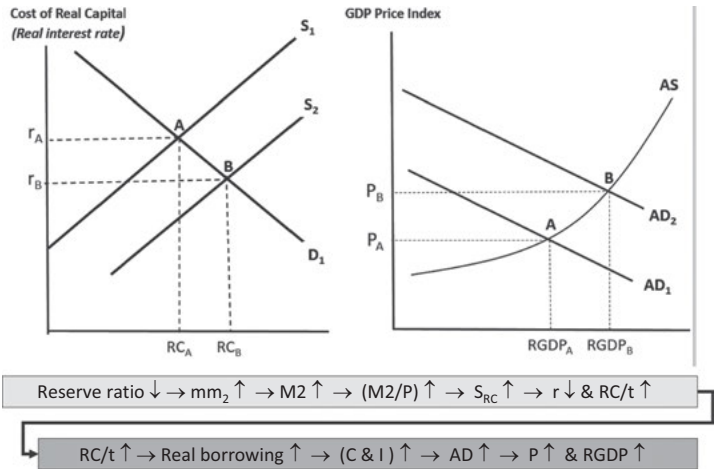

Figure 19.18: Progress Report on the Three-Sector Model.

Indirect Impacts of Relative Real GDP Changes on CAX: An increase in real GDP raises Mexico's ability and willingness to purchase imports, which increases the supply of pesos in the foreign exchange market.[14] Figure 19.19 shows that an increase in the supply of pesos in the foreign exchange market from S_1 to S_2 causes the nominal value of the peso to fall from $\$/MXN_A$ to $\$/MXN_B$.

Indirect Impacts of Relative GDP Price Index Changes on CAX: The increase in Mexico's GDP Price Index (relative to the United States) increases the nation's imports and reduces its exports. Greater Mexican imports increase the demand for dollars, which means the supply of pesos in the foreign exchange market increases. In Figure 19.20, as the supply of pesos rises from S_1 to S_2, the value of the peso falls from $\$/MXN_A$ to $\$/MXN_B$. Similarly, a decrease in Mexico's exports reduces the demand for pesos, thereby causing a further depreciation of the peso. Figure 19.20 shows that a decrease in the demand for pesos from D_1 to D_2 causes the nominal value of the peso to fall from $\$/MXN_B$ to $\$/MXN_C$.

14 Remember that an increase in the supply of pesos in the dollar-peso foreign exchange market is the same as an increase in the demand for dollars.

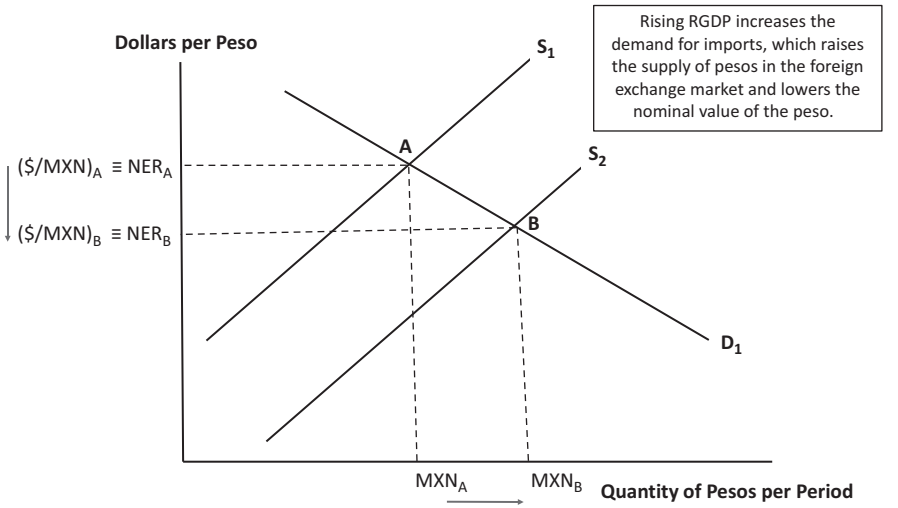

Figure 19.19: Effects of Rising Mexican Real GDP on the Peso's Value.

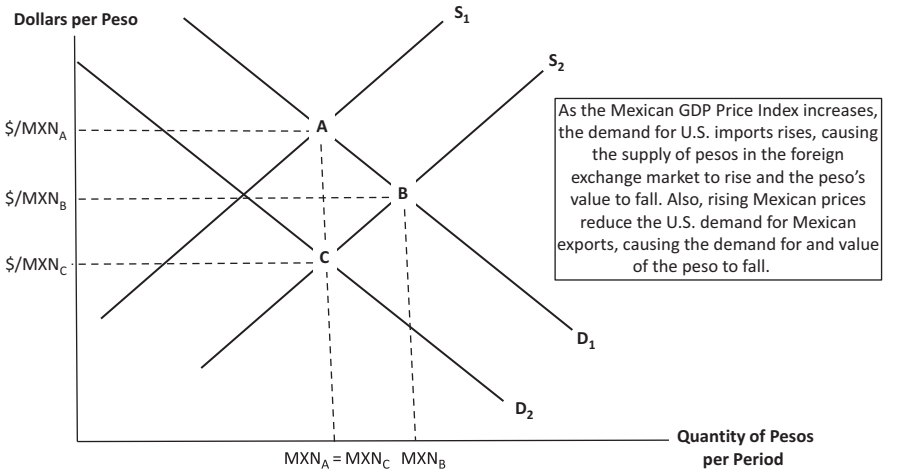

Figure 19.20: Effects of Rising Mexican Price Index on the Peso's Value.

Indirect Impacts of Relative Real GDP and GDP Price Index Changes on Quantity per Period: Our analysis indicates that the nominal value of the peso falls, but without further information, the change in the equilibrium quantity of pesos per period in the foreign exchange market is indeterminate. The rising supply of pesos raises the equilibrium quantity per period, and the falling demand

lowers it. Figure 19.20 shows no net change in the equilibrium quantity of pesos per period, but this result would vary depending on the relative magnitudes of the supply and demand shifts. Fortunately, movements in foreign exchange market turnover are not essential to Fenway's business plan.

FAX-Related Supply and Demand Forces in the Foreign Exchange Market

As Mexico's real interest rate falls (due to the increased supply of real credit), peso-denominated securities become less attractive relative to dollar-denominated securities. This causes the demand for pesos in the foreign exchange market to fall as foreign investors adjust their portfolios away from the less attractive peso-denominated investments and toward dollar-denominated securities. Similarly, the supply of pesos in the foreign exchange market rises as Mexican investors respond to the relatively more attractive dollar-denominated investments.

Figure 19.21 shows that an increase in the supply of pesos causes the peso to fall in value from $\$/MXN_A$ to $\$/MXN_B$. The decrease in the demand, from D_1 to D_2, causes the peso's value to fall even further from $\$/MXN_B$ to $\$/MXN_C$. The change in equilibrium quantity per period is indeterminate.

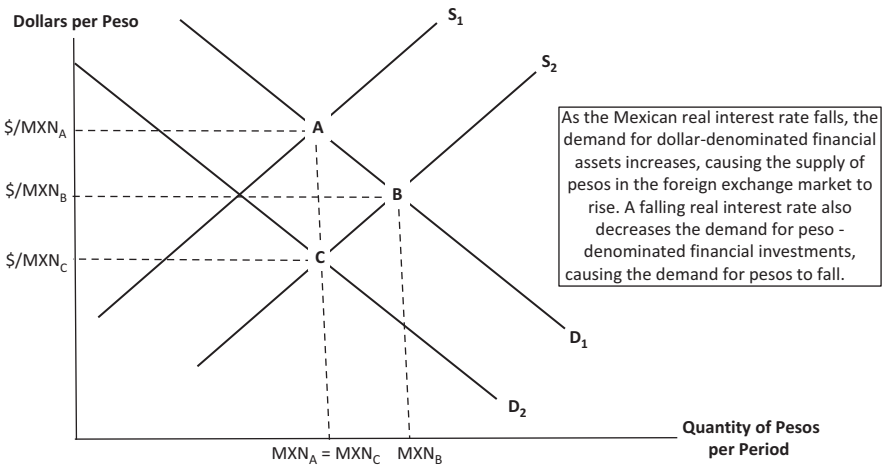

Figure 19.21: Effects of a Falling Real Interest Rate on the Peso's Value.

RRIX-Related Supply and Demand Forces in the Foreign Exchange Market

Mexico's flexible exchange rate system implies that neither the Bank of Mexico nor any foreign central bank intervenes in the dollar-peso foreign exchange market. Therefore, there are no RRIX-related forces in the foreign exchange market.

Summary of Exchange Rate Changes

Figure 19.22 summarizes the supply and demand changes in the foreign exchange market due to the indirect impacts from the real credit market and the real goods and services market. With expansionary monetary policy, the degree of international capital mobility does not influence the qualitative change in the peso's value. We know this because global trade flows, which are connected to CAX forces, and investment flows, which are connected to FAX forces, both lower the peso's value. Therefore, the peso depreciates whether Mexico faces high-mobility or low-mobility international capital markets. Of course, the higher the degree of capital mobility, the lower the peso will fall in value. Notice how this result is different from expansionary fiscal policy, where the degree of international capital mobility determined whether the nominal exchange rate appreciated or depreciated.

Sources of Supply and Demand Changes	Effects	Change in the Peso's Value
CAX-Related Forces		
GDP Price Index ↑	Exports ↓ → D_{pesos} ↓	Peso depreciates
	Imports ↑ → S_{pesos} ↑	
RGDP ↑	Imports ↑ → S_{pesos} ↑	
FAX-Related Forces		
Real interest rate ↓	Net financial capital inflows ↓ → D_{pesos} ↓	Peso depreciates
	Net financial capital outflows ↑ → S_{pesos} ↑	
RRIX-Related Forces		
No central bank intervention (flexible exchange rates)	No change	No change
Net change		**Peso depreciates**

Figure 19.22: Summary of Changes in the Peso's Value.

Figure 19.23 provides a summary of our results and the final progress report of the adjustments in our Three-Sector Model.

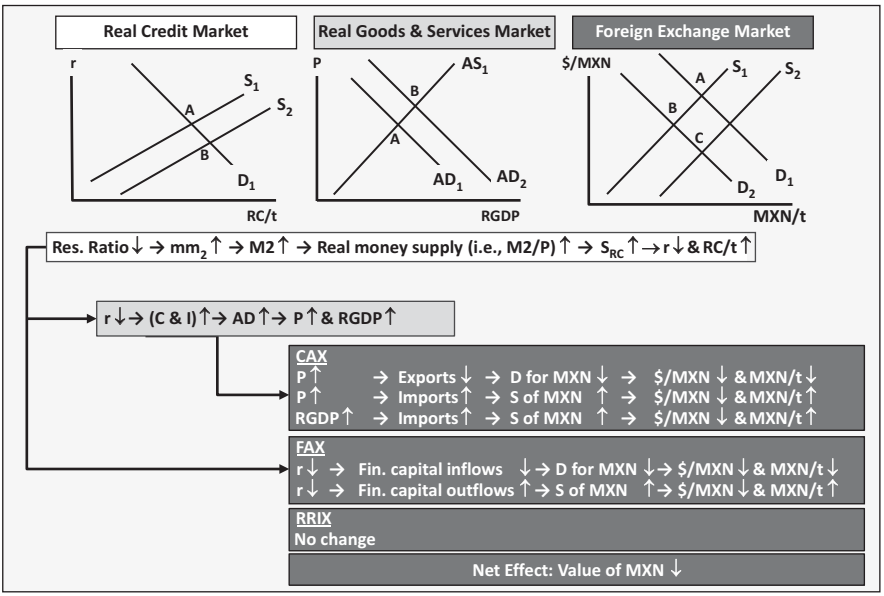

Figure 19.23: Summary of All the Change in the Three-Sector Model Analysis.

Summary of Answers to CFO's Questions

Now that we have completed our first-round analysis of expansionary monetary policy, let's summarize the results.

GDP Price Index and Real GDP Rise

An increase in Mexico's real money supply raises the supply of real credit, lowers the real interest rate, and increases the equilibrium quantity of real credit supplied and demanded per period. The increase in borrowing causes aggregate demand to rise, thereby increasing Mexico's GDP Price Index and real GDP.

Nominal GDP Rises

Nominal GDP is equal to the prices multiplied by the quantities of all final goods and services produced in Mexico each period. If Mexico's GDP Price Index and real GDP rise with the increase in aggregate demand, then nominal GDP must rise.

Unemployment Rate Falls and Employment-to-Population Ratio Rises
An increase in Mexico's real GDP raises the demand for labor, which should reduce Mexico's unemployment rate and increase its employment-to-population ratio.

Real and Nominal Wages Rise
The percentage change in the nominal wage rate is approximately equal to the percentage change in the real wage rate plus inflationary expectations. An increase in the demand for labor puts upward pressure on real wages. Therefore, nominal wages should rise because both the real wage rate and expected inflation rate increase.

Real Interest Rate Falls and the Nominal Interest Rate Change Is Uncertain
The nominal interest rate is approximately equal to the real interest rate plus the expected inflation rate. Therefore, the movement in Mexico's nominal interest rate is ambiguous. An increase in the supply of real credit reduces Mexico's real interest rate, but the anticipated increase in aggregate demand raises inflationary expectations. Hence, the net change in nominal interest depends on the relative movements of these two variables, but remember that variations in the real interest rate should be more critical to your business plan than changes in the nominal interest rate.

Monetary Base Does Not Change, M2 Multiplier Rises, and M2 Rises
Because the central bank lowered the reserve ratio on bank deposits, the nation's M2 money multiplier rose, causing the M2 money supply and real money supply (M2/P) to rise. At the same time, the central bank did not conduct open market operations, change its discount loans, or intervene in the foreign exchange market. Therefore, Mexico's monetary base remained constant.

There are secondary effects, due to changes in Mexico's preferred asset ratios—which weaken (but do not reverse) the primary effect associated with the increased M2 money multiplier. For instance, as Mexico's real interest rate falls and interest spreads narrow, individuals and businesses hold more cash and place fewer funds in savings and time deposits, causing the M2 money multiplier to fall.[15] Furthermore, lower interest rates reduce the cost to bank managers who voluntarily hold excess reserves. The more excess reserves they hold,

15 The preferred asset ratio (CC/D) rises and (N/D) falls, causing mm_2 to fall.

the less they lend, which diminishes the banking system's lending potential and causes the M2 money multiplier to fall.[16]

Gross Private Domestic Investment Change Is Uncertain

A decrease in Mexico's real interest rate and increase in real GDP stimulate gross private domestic investment, but Mexico's rising prices reduce real investments. Therefore, the net change in gross private domestic investment is uncertain.

Nominal Exchange Rate (Dollar Value of the Peso) Falls

The increase in Mexico's GDP Price Index, growth in real GDP, and decrease in real interest rate (all three) cause the nominal value of the peso to fall.

Real Exchange Rate Falls

Mexico's real exchange rate equals:

$$\frac{\text{Nominal Exchange Rate}_{(\$/\text{MXN})} \times \text{Average Price Level}_{\text{Mexico}}}{\text{Average Price Level}_{\text{United States}}}$$

It looks as if the change in real exchange rate is ambiguous because the nominal exchange rate falls and Mexico's GDP Price Index rises, which means they move in opposite directions. We will find, in the next section, how to clarify this ambiguity and understand why Mexico's real exchange rate must fall.

CA Rises, FA Falls, and RRI Does Not Change

From the Balance of Payments Identity, we know (CA + KA) $\equiv$ (FA + RRI). Therefore, if we can determine the direction in which (FA + RRI) changes, we can infer the direction in which (CA + KA) must move.

A falling real interest rate increases financial capital outflows from Mexico and decreases inflows, thereby increasing the financial account because net assets held abroad rise and net liabilities to foreigners fall. Because Mexico has a flexible exchange system, reserves and related items does not change. Therefore, (FA + RRI) is positive, which means the only way (CA + KA) can equal (FA + RRI) is if the current account (CA) increases.[17]

Mexico's current account is affected by changes in real GDP and the real exchange rate. The increase in real GDP raises the nation's imports and thereby

16 The preferred asset ratio (ER/D) rises, causing mm_2 to fall.

17 Remember that the capital account is ignored because it is typically insignificant.

causes the current account to become more negative. Higher Mexican prices increase imports and reduce exports, thereby further lowering the nation's current account. Both of these effects move the current account in the opposite direction from what we know must happen.

By contrast, a depreciation of the nominal peso exchange rate causes the current account to become more positive. Therefore, nominal exchange rate forces must overpower the income and price forces in the current account for balance of payments to be in economic equilibrium. Another way to state this conclusion is to say that the real exchange rate must fall enough to make the current account more positive. These results are summarized in Figure 19.24.

	Balance of Payments Accounts and Changes in the Economic Variables Affecting These Accounts	Cause	Effects	Net Change in Balance of Payments Account
1	**CA Transactions**	→	**Net Exports ↑**	CA↑ (*Nominal exchange rate effects offset the price and RGDP effects*)
	Real exchange rate ↓	→	Net exports ↑	
	– Prices ↑	→	– Exports ↓ and imports ↑	
	– Nominal peso value ↓	→	– Exports ↑and imports ↓	
	Real GDP ↑	→	Imports ↑ → Net exports ↓	
2	**FA Transactions**	→	**Net Financial Capital Outflows ↑**	FA↑
	Real interest rate ↓	→	Financial capital inflows ↓ and outflows ↑	
3	**RRI Transactions**	→	No change	No change in RRI
	No central bank intervention	→	None	

Figure 19.24: Changes in Mexico's Balance of Payments with Expansionary Monetary Policy.

The Rest of the Story

Feedback Effects in the Three-Sector Model

At this point in our analysis, we have linked Mexico's three most important macroeconomic markets and shown how they function like interdependent gears (see Figure 19.25), but our study has only considered the first iteration of

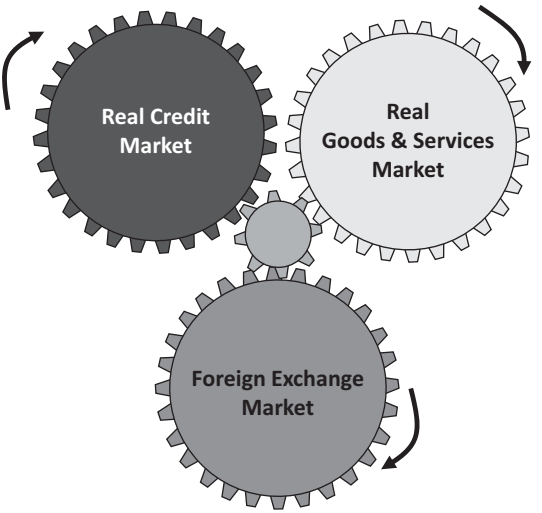

Figure 19.25: Interdependence of the Markets in the Three-Sector Model.

cause-and-effect relationships (i.e., the first turn of each gear). Feedback effects occur after the initial round, which cause recurring rounds of changes as adjustments in each market spill over and indirectly impact the other two markets.

Feedback Effects with Expansionary Fiscal Policy

Recall that we started our analysis of expansionary fiscal policy in the real credit market with the government increasing its demand for real credit. Then we examined the direct and indirect impacts that changes in government spending have on the real goods and services market and ended by examining the indirect impacts that changes in the real credit market and the real goods and services market have on the foreign exchange market. After the first-round of economic changes, new ones are ignited, which trigger a recurring series of new indirect impacts.

Changes in the price level and real GDP in the real goods and services market feed back into the real credit market. In addition, changes in the nominal exchange rate, which is determined in the foreign exchange market, feed back into the real credit market and affect the real goods and services market.

Feedback Effects with Expansionary Monetary Policy

Similarly, expansionary monetary policies have feedback effects. For example, changes in the real goods and services market and foreign exchange market

have feedback effects on the real credit market, and changes in the foreign exchange market have feedback effects on the real goods and services market.

General Comments on Feedback Effects

Fortunately, the echoing rounds of feedback effects do not prevent us from drawing conclusions because they should be weaker than the first-round effects. In other words, the qualitative change of each endogenous variable in our three-sector analysis is ultimately in the direction of the first-round movement.

Remember that the Three-Sector Model is a robust framework for determining qualitative changes in six key macroeconomic variables (the GDP Price Index, real GDP, real interest rate, quantity of real credit per period, nominal exchange rate, and quantity of foreign exchange per period). It is also a useful framework for drawing inferences about many other macroeconomic variables, such as the real wage and unemployment rate. However, the Three-Sector Model does not provide insights about the magnitude of these changes, such as whether an exogenous variable will move from 3% to 3.5% or from 3% to 5%. Answers to questions such as these need healthy doses of econometrics and model estimation.

The reason we can stop our analysis after the first round of cause-and-effect interactions is that most economies are stable. Therefore, macroeconomic models are based on the assumption that economic changes grow smaller with each iterative round of interaction. Is this assumption reasonable? To answer this question, consider the consequences of a world in which economies were unstable. Under such circumstances, any small change in economic activity would produce indirect impacts that grew progressively larger as they worked their way through the economy. Most nations do not face such volatile and unstable economic environments.

Figure 19.26 shows the path an economic variable might take in an unstable economy, such as in Mexico, when the peso was forced to depreciate in 1994, in Brazil in 1999, when its currency, the real, came under considerable speculative pressure, in Zimbabwe in 2008, when its annual inflation rate reached nearly 90 sextillion percent, or in Venezuela from 2018 to 2020, when the wheels came off the economy and inflation rates exceeded one million percent. Such changes could occur in a speculative bubble or market mania, but they are the exceptions and not the rules.

Figure 19.27 shows four possible paths an economic variable in a stable economy might take over several rounds of cause-and-effect interactions. In Cases A and A_1, the economic variable rises to a higher level, and in both cases,

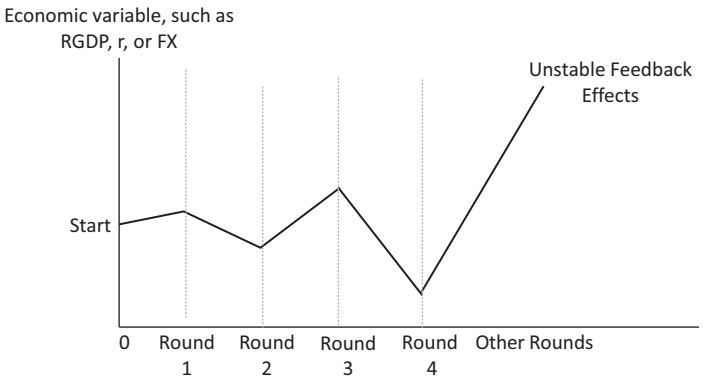

Figure 19.26: Unstable Economic Feedback Effects.

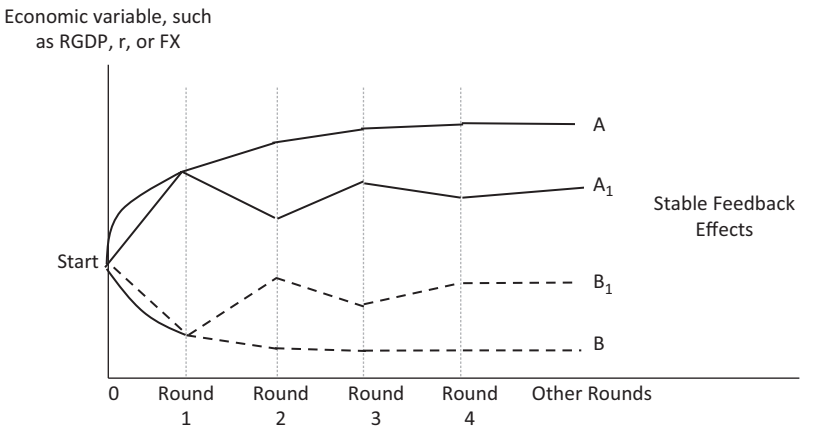

Figure 19.27: Stable Feedback Effects: Four Scenarios.

the changes diminish with each subsequent round. Along Line A, the feedback effects continually reinforce the initial adjustment, but along Line A_1, the feedback effects ripple (i.e., move up and down), partially offsetting the round before it. Nevertheless, in both cases, the ultimate qualitative change is in the direction of the initial movement.

The paths shown by Lines B and B_1 are also possible. Line B follows a path that continually reinforces the initial downward change, and Line B_1 has rippling feedback effects. Again, in both cases, the ultimate qualitative changes are in the direction caused by the initial shock.

A Second Look at Expansionary Fiscal Policy with Low Mobility International Capital Markets

There is another way to understand why Mexico's current account must fall when expansionary fiscal policy is pursued under a flexible exchange rate regime with low-mobility international capital markets. It shows how the combined forces of rising prices and rising real GDP, which decrease net exports, must be greater than the increase in net exports due to the nominal depreciation of the peso. This conclusion is more apparent after we separate the primary and secondary effects.

Low international capital mobility exists when CAX forces in the foreign exchange market overpower FAX forces. Consequently, with low-mobility international capital markets, expansionary fiscal policy lowers the nominal value of the peso because the real income and price effects, which reduce the value of the peso (i.e., CAX forces), are greater than the real interest rate effects, which raise the exchange rate (i.e., FAX forces).

In Figure 19.28, suppose shift in demand for pesos from the CAX forces equals negative MXN 20 billion (see the movement from D_1 to D_{CAX}), and the change in the demand for pesos from the FAX forces equals positive MXN 15 billion (see the movement from D_{CAX} to $D_{(CAX + FAX)}$). At the exchange rate $\$/MXN_A$, the net movement in demand from D_1 to $D_{(CAX + FAX)}$ causes the quantity

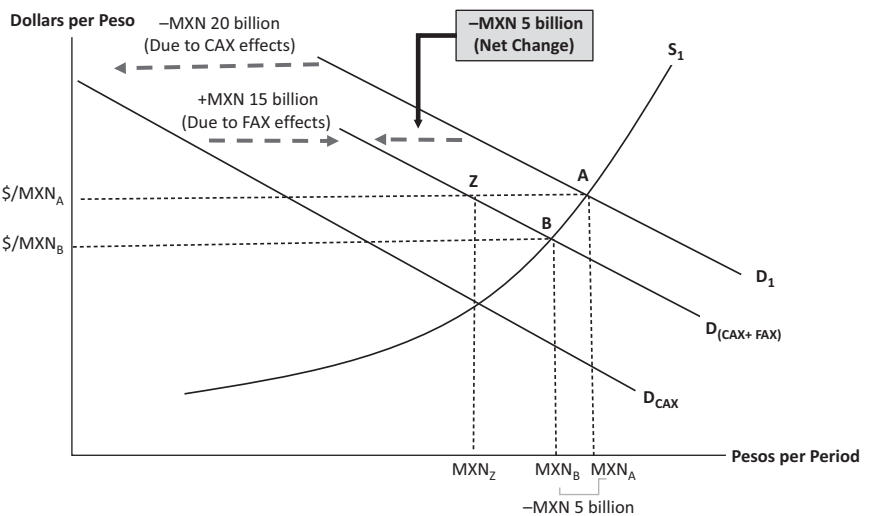

Figure 19.28: Real Income and Price Effects Overpower the Nominal Exchange Rate Effects in the Current Account.

of pesos demanded per period to equal MXN_Z and the quantity supplied per period to equal MXN_A. As a result, the surplus of pesos in the foreign exchange market causes the currency to depreciate from $\$/MXN_A$ to $\$/MXN_B$—that is, from Point A to Point B.

When it does, the quantity of pesos demanded per period rises from MXN_Z to MXN_B, as foreigners increase their purchases of relatively cheap Mexican exports, such as agricultural products, petroleum, and metals. Similarly, the quantity of pesos supplied per period falls from MXN_A to MXN_B, as the depreciating peso makes U.S. products, such as electronics and pharmaceuticals, more expensive to Mexicans. The new equilibrium quantity per period, MXN_B, is located between the original quantity per period, MXN_A, and MXN_Z. This means that MXN_B is above MXN_Z by fewer than MXN 5 billion.

Notice how the peso's nominal depreciation causes net exports (and the current account) to rise by an amount less than MXN 5 billion, but the real income and price effects cause them to fall by a net of MXN 5 billion. Therefore, the nominal exchange rate effects on the current account must be weaker than the real income and price effects. In short, the current account must fall.

Conclusion

This chapter has provided a framework for analyzing the short-term economic consequences of exogenous shocks to nations with flexible exchange rates. The two shocks evaluated in this chapter were expansionary fiscal policy and expansionary monetary policy, but the same methodology and set of tools could be used to study any shocks to a nation's economy.[18]

We found from our inquiry that expansionary fiscal policy stimulates growth in real GDP and creates jobs, but it also has unpleasant side effects, such as higher prices, rising government budget deficits, and an increasing real interest rate. Furthermore, the change in nominal exchange rate is ambiguous due to the conflicting CAX and FAX forces. Because most nations face high-mobility international capital markets, FAX forces typically dominate CAX forces, but our approach left this an open question.

We also found that expansionary monetary policy stimulates growth in real GDP and creates jobs, but the nation must bear the burden of higher prices and less competitive nominal and real exchange rates. The methodology we used in

18 A quick look at the Review and Discussion questions at the end of this chapter should provide ample evidence of the versatility of the macroeconomic tools explained in this chapter.

this chapter to analyze the effects of expansionary fiscal and expansionary monetary policies under a flexible exchange rate regime will be used in the next chapter when our focus shifts to shocks to nations with fixed exchange rates.

Key Points

- Expansionary Fiscal Policy
- Where to begin? Show me the money!
- *Real credit market*:
  - Increased government borrowing raises the real interest rate and quantity of real credit per period.
  - The increase in government borrowing is a direct impact *and* primary effect.
  - Crowding out occurs when government borrowing raises the real interest rate, but the net change real borrowing is positive. Reductions in consumption (C) and investment (I), due to a rising real interest rate, are secondary effects.
- *Real goods and services market*:
  - Increased government spending is a direct impact and primary effect that increases aggregate demand.
  - The reduction in consumption and investment, due to rising real interest rates in the real credit market, is an indirect effect that is weaker than the direct effect of greater government spending.
- *Foreign exchange market*:
  - Supply and demand forces in the foreign exchange market can be separated into three major parts: CAX, FAX, and RRIX forces.
  - CAX-related supply and demand forces decrease the value of the peso because higher prices and increases in real GDP decrease exports and increase imports.
  - FAX-related supply and demand forces increase the value of the peso due to the higher real interest rate, which causes net financial capital inflows.
  - There is no central bank intervention in the foreign exchange market and, therefore, no RRIX-related changes in supply or demand.
  - International capital mobility determines exchange rate movements.
    - High-mobility international capital markets exist when FAX forces on the nominal exchange rate are greater than the CAX forces.
    - Low-mobility international capital markets exist when FAX forces on the nominal exchange rate are less than CAX forces.
- Expansionary monetary policy
  - Where to begin? Show me the money!
  - *Real credit market*:
    - An increase in the real money supply and supply of real credit lowers the real interest rate and increases the equilibrium quantity of real credit supplied and demanded per period.
    - The increase in real money supply is a direct impact and primary effect.

- *Real goods and services market*:
  - A lower real interest rate increases consumption and investment, which raises aggregate demand.
  - The increase in aggregate demand is an indirect impact coming from the real credit market.
  - An increase in aggregate demand raises real GDP and the GDP Price Index.
- *Foreign exchange market*
  - CAX effects: Rising Mexican prices and higher real GDP cause the value of the peso to fall.
  - FAX effects: Lower real interest rates cause the value of the peso to fall.
  - RRIX effects: There are no RRIX-related forces in the foreign exchange market.
- Feedback effects occur in the Three-Sector Model, but they are weaker than the first-round effects.

Review Questions

1. During the 2020 U.S. presidential race, a number of candidates promised to pass a large infrastructure spending bill that would repair and modernize aging roads, bridges, and airports. The proposed expenditures amounted to trillions of U.S. dollars. Assume the following about the U.S. economy:
   - The United States has a flexible exchange rate against the euro.
   - The United States is in the intermediate range of its aggregate supply.
   - The United States has high international capital mobility.

   a. Use the Three-Sector Model to analyze the short-run consequences of an increase in government spending on the U.S. economy. In particular, explain how it will affect real GDP, the GDP Price Index, real interest rate, quantity of real credit per period, value of the dollar relative to the euro, and quantity of dollars traded in the foreign exchange market per period. Ignore how the improved infrastructure will affect the U.S. economy in the long run.
   b. Use the conclusions you reached in Question 1a to answer how the increase in government spending will affect the unemployment rate, monetary base, M2 money supply, and real exchange rate.
   c. As a foreign exporter, would this expansionary fiscal policy improve or hurt your ability to sell products in the United States? What does this mean for the U.S. current account?
   d. As a foreign investor, would this expansionary fiscal policy increase or decrease your desire to invest in U.S. financial assets? What does this mean for the U.S. financial account?
   e. Has the U.S. central bank changed its foreign exchange reserves? What does this mean for U.S. reserves and related items in the balance of payments?
   f. *Challenge Question:* Explain the effects increased infrastructure spending should have on the U.S. government's structural, cyclical, and total government budget deficits. (Hint: See *Structural Versus Cyclical Deficits and Surpluses* in Chapter 13, "Fiscal Policy.")

2. Suppose international investors believe that investments in Argentina will become riskier relative to alternative investments in the United States, which causes capital flight from the Argentine peso. Use the Three-Sector Model to explain the effects that increased capital flight should have on Argentina's real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal dollar-peso exchange rate, and quantity of pesos traded per period. For the purposes of this analysis, assume the peso floats freely. Once you have completed your Three-Sector Model analysis, please address the following points:
   a. Explain the (direct and indirect) impacts and effects that capital flight should have on Argentina's M2 money supply.
   b. Explain the (direct and indirect) impacts and effects that capital flight should have on Argentina's real exchange rate against the U.S. dollar.
   c. Explain the (direct and indirect) impacts and effects that capital flight should have on Argentina's current account, financial account, and reserves and related items.
   d. Suppose you are the chief executive officer of a large U.S. company, who is considering erecting a manufacturing facility in Argentina and selling either inside the country or exporting to the United States. Explain the opportunities and possible pitfalls your company faces.
3. In the aftermath of Brexit, suppose the European Union imposes trade restrictions on its imports from the United Kingdom. Use the Three-Sector Model to explain the effects that these trade restrictions should have on the U.K.'s real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal exchange rate of pound the against the euro, and quantity of pounds traded per period. Assume that the British pound floats against the euro. Once you have completed your Three-Sector-Model analysis, please address the following points:
   a. Explain the (direct and indirect) impacts and effects that these trade restrictions should have on the U.K.'s M2 money supply.
   b. Explain the (direct and indirect) impacts and effects that these trade restrictions should have on the U.K.'s real exchange rate against the euro.
   c. Explain the (direct and indirect) impacts and effects that these trade restrictions should have on the U.K.'s current account, financial account, and reserves and related items.
   d. Suppose you are the chief executive officer of a large German company, who is considering erecting a manufacturing facility in the U.K. and selling either inside the country or exporting to the Euro Area. Explain the opportunities and possible pitfalls your company faces.
   e. Suppose the Bank of England wishes to maintain its inflation target during the Brexit transition. What sort of monetary policy should it pursue? Specifically, focus your analysis on the U.K.'s real credit market.
4. Suppose the People's Bank of China tightens controls on domestic residents' financial investment in foreign nations–particularly in the United States. Use the Three-Sector Model to explain the effects that tighter capital controls on financial outflows should have on China's real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal exchange rate of the yuan against the dollar, and quantity of yuan traded per period. Assume that the yuan fluctuates freely. Once you have completed your Three-Sector-Model analysis, please address the following points:

a. Explain the (direct and indirect) impacts and effects that tighter capital controls on financial outflows should have on China's M2 money supply.
b. Explain the (direct and indirect) impacts and effects that tighter capital controls on financial outflows should have on China's real exchange rate against the U.S. dollar.
c. Explain the (direct and indirect) impacts and effects that tighter capital controls on financial outflows should have on China's balance of payments (current account, financial account, and reserves and related items).
d. Suppose you are the Chief Executive Officer of a large U.S. company, who is considering erecting a manufacturing facility in China and selling either inside the country or exporting to the United States. Explain the opportunities and possible pitfalls your company faces.

5. The Brexit vote separating the United Kingdom from the European Union, had a heavy initial impact on U.K. commercial real estate prices, residential real estate prices, and the market value of the U.K.'s largest commercial property funds (e.g., M&G Investment, Avia, and Standard Life Investments). Use the Three-Sector Model to analyze the effects that falling real estate and housing market prices (i.e., U.K. residents' wealth) should have on the U.K. economy. In particular, explain how they should affect the U.K.'s real GDP, GDP Price Index, real interest rate, quantity of real credit per period, value of the pound relative to the euro, and quantity of pounds traded in the foreign exchange market per period. When you have completed your three-sector analysis, please answer the following questions.
   a. Explain the (direct and indirect) impacts and effects that falling real estate and housing market prices should have on the U.K.'s M2 money supply.
   b. Explain the (direct and indirect) impacts and effects that falling real estate and housing market prices should have on the U.K.'s nominal interest rate.
   c. Explain the (direct and indirect) impacts and effects that falling real estate and housing market prices should have on the U.K.'s real exchange rate against the euro.
   d. Explain the overall effects (i.e., *after* exchange rate, GDP Price Index, real GDP, and real interest rate changes) that falling real estate and housing market prices should have on the U.K.'s balance of payments (current account, financial account, and reserves and related items).
   e. What effect would the withdrawal of investments from commercial property funds have on the U.K.'s monetary base if the proceeds were placed in the U.K. stock market?
   f. What effect would the withdrawal of investments from commercial property funds have on the U.K.'s monetary base if the proceeds were placed in into euro-denominated and U.S-dollar denominated funds in the Euro Area and United States?
   g. The massive sales of British property funds bring to the fore significant issues dealing with liquidity, market, and credit risks. Explain these risks in the context of Brexit and their impact on commercial property funds.
6. In November 2016, India launched an ambitious demonetization program with a number of goals in mind. One of those goals was to have India's residents embrace cashless exchange in much greater numbers. Use the Three-Sector Model to explain the effects that an increase in electronic payments should have on India's real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal exchange rate of the rupee against the dollar, and quantity of rupees traded per period. Assume that the Indian rupee

floated freely against the dollar. Once you have completed your Three-Sector-Model analysis, please address the following points.

a. Explain the (direct and indirect) impacts and effects that demonetization and greater cashless exchanges should have on India's M2 money supply.
b. Explain the (direct and indirect) impacts and effects that demonetization and greater cashless exchanges should have on India's real exchange rate against the U.S. dollar.
c. Explain the (direct and indirect) impacts and effects that demonetization and greater cashless exchanges should have on India's current account, financial account, and reserves and related items.
d. Suppose you are the chief executive officer of a large U.S. company, who is considering erecting a manufacturing facility in India and selling either inside the country or exporting to the United States. Explain the opportunities and possible pitfalls your company faces.
e. Suppose that India's central bank has done an analysis similar to your Three-Sector-Model investigation above. If the central bank wished to minimize the macroeconomic consequences of this shock, what monetary policy would it pursue? Focus your answer on the real credit market.

7. Use the Three-Sector Model to analyze the effects that tariffs on U.S. imports from China should have on the U.S. economy. In particular, explain how it should affect U.S.'s real GDP, GDP Price Index, real interest rate, quantity of real credit per period, value of the dollar relative to the Chinese yuan, and quantity of dollars traded in the yuan-dollar foreign exchange market per period.
   a. Explain the (direct and indirect) impacts and effects that tariffs should have on the U.S. M2 money supply.
   b. Explain the (direct and indirect) impacts and effects that tariffs should have on the U.S.'s nominal interest rate.
   c. Explain the (direct and indirect) impacts and effects that tariffs should have on the U.S. real exchange rate against the Chinese yuan and its effect on the level of U.S. international competitiveness.
   d. Explain the overall effects (i.e., *after* exchange rate, GDP Price Index, real GDP, and real interest rate changes) that tariffs should have on the U.S.'s balance of payments (current account, financial account, and reserves and related items).
   e. *Challenge Question*. Explain the effects that higher tariffs should have on the U.S. government's structural, cyclical, and total government budget deficits. (Hint: See *Structural Versus Cyclical Deficits and Surpluses* in Chapter 13, "Fiscal Policy.")
8. Shortly after the June 2016 Brexit vote, the Bank of England (BoE) took steps to prevent a recession by pursuing expansionary monetary policies. Its actions focused on (1) purchasing government and also corporate bonds (i.e., from companies that made "a material contribution to the U.K. economy"), thereby extending its existing set of quantitative easing (QE) tools, (2) cutting the interest rates on repurchase agreements[19] from 0.50% to

19 Central bank repurchase agreements are one type of open market operation in which the central bank buys (or sells) an asset and at the same time agrees to sell it back to the counterparty on a future date for a specified price. The difference between the purchase and sale prices determines the interest rate on these transactions.

0.25%, and (3) reducing, from 0.25% to 0.0%, the countercyclical capital requirement[20] banks were required to hold against their risk-weighted assets. This "macroprudential" policy tool was imposed by the BoE on domestic banks in March 2016 (on top of the standard capital requirement). For Questions 8a, 8b and 8c (below), consider only the effects that BoE's expansionary open market operations should have had on England's economy. Assume the following about the U.K. economy:

- The pound fluctuated freely in foreign exchange markets.
- England's economy was in the intermediate range of its aggregate supply curve.
- Financial capital could flow freely in and out of England and, therefore, there was high international capital mobility.
- The Bank of England was highly credible.

a. Use the Three-Sector Model to analyze the effects of the BoE's expansionary monetary policy on the U.K. economy. In particular, explain how they should have affected the U.K.'s real GDP, GDP Price Index, real interest rate, quantity of real credit per period, value of the pound relative to the euro, and quantity of pounds traded in the foreign exchange market per period.

b. Use the conclusions you reached in Question 8a to answer how the BOE's expansionary monetary policy should have affected the unemployment rate, monetary base, M2 money supply, real exchange rate against the euro, current account, financial account, reserves and related items, and the central bank's foreign exchange reserves.

c. *Challenge Question*. How would your answers change if the Bank of England wasn't credible, and people didn't trust its commitment to low inflation?

d. *Challenge Question*. How should the elimination of BoE's countercyclical capital requirement affect bank incentives to lend?

9. On December 16, 2015, the U.S. Federal Reserve decided to increase the interest rate paid on banks' required and excess reserves from 0.25% to 0.50%. Assume the following about the U.S. economy:

- The U.S. dollar fluctuated freely in foreign exchange markets.
- The U.S. economy was in the intermediate range of their aggregate supply curve.
- Financial capital could flow freely in and out of the United States and, therefore, there was high international capital mobility.

a. Explain how the increased interest rate, paid by the Fed, on required and excess bank reserves affected the U.S. monetary base and the M2 money supply.

b. Use the Three-Sector Model to analyze the economic consequences of the Fed's policy to increase the interest rate paid on required and excess bank reserves. In particular, explain how this policy should have affected the U.S. real GDP, GDP Price Index, real interest rate, quantity of real credit per period, value of the U.S. dollar relative to the euro, and quantity of dollars traded in the foreign exchange market per period.

20 To satisfy capital requirements, banks must maintain a minimum amount of equity as a fraction of their assets.

c. Use the conclusions you reached in Question 9b to answer how an increase in the interest on required and excess bank reserves should have affected the unemployment rate, monetary base, M2 money supply, real exchange rate, current account, financial account, reserves and related items, and the central bank's foreign exchange reserves.
d. How would all your previous answers change if, instead of lifting the interest rate on bank reserves, the Fed had implemented open market sales?

10. Due to domestic instability, suppose Ukraine experiences significant capital flight. Use the Three-Sector Model to explain the effects of capital flight on Ukraine's real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal exchange rate against the U.S. dollar, and quantity of Ukrainian hryvnia traded per period. Assume that Ukraine has a flexible exchange rate.
    a. Explain the (direct and indirect) impacts and effects that capital flight should have on Ukraine's M2 money supply.
    b. Explain the (direct and indirect) impacts and effects that capital flight should have on Ukraine's real exchange rate against the U.S. dollar.
    c. Explain the direct impacts and effects (i.e., immediate impacts and effects *before* any exchange rate, GDP Price Index, real GDP, and real interest rate changes) of capital flight on Ukraine's balance of payments. Assume the net amount of capital flight equals 600 billion Ukrainian hryvnia (i.e., UAH600 billion). Show the effects on Ukraine's current account, financial account, and reserves and related items.
    d. Explain the overall effects (i.e., *after* exchange rate, GDP Price Index, real GDP, and real interest rate changes) that capital flight should have on Ukraine's balance of payments (current account, financial account, and reserves and related items).
11. Suppose China sells a portion of its enormous dollar-denominated foreign exchange reserves. Use the Three-Sector Model to analyze the effects these sales should have on the Chinese economy. In particular, explain the effects on China's real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal exchange rate against the U.S. dollar, and quantity of Chinese yuan traded per period. Assume China's exchange rate fluctuates freely.
    a. Explain the (direct and indirect) impacts and effects that China's foreign exchange reserve sales should have on the nation's M2 money supply.
    b. Explain the (direct and indirect) impacts and effects that China's foreign exchange reserve sales should have on China's real exchange rate against the U.S. dollar.
    c. Explain the *direct* impacts and effects (i.e., immediate effects *before* any GDP Price Index, real GDP, and real interest rate changes) that foreign exchange reserve sales should have on China's balance of payments. Assume the amount of intervention equals $450 billion (i.e., CNY3,000 billion). Show the changes in China's current account, and financial account, and reserves and related items.
    d. Explain the overall effects (i.e., *after* GDP Price Index, real GDP, and real interest rate changes) that China's foreign exchange reserve sales have on the nation's balance of payments (current account, financial account, and reserves and related items).

Discussion Questions

12. In 2019, drug overdose in the United States accounted for more deaths each year than traffic accidents or suicides. Most of these deaths were due to heroin and the synthetic opioid fentanyl. Many good-paying jobs were reportedly going unfilled because employers could not find qualified applicants who could pass the drug tests. Research suggested that the impact of drugs was high enough to affect the U.S. labor force. For example, a 2016 report by Alan Kreuger found that nearly half of the prime age men *not* in the U.S. labor force took pain medication on a daily basis, and opioid availability could account for approximately 20% of the decline in U.S. labor force participation. Suppose the United States finds a way to substantially reduce the drug abuse problem, in general, and the drug overdose problem, in particular. As a result, the U.S. labor force participation rate and employment increase. Use the Three-Sector Model to explain the effects this *solution* should have on the nation's real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal euro-dollar exchange rate, and quantity of dollars traded per period. Assume the United States has a freely fluctuating exchange rate.
    a. Explain the (direct and indirect) impacts and effects that these changes in drug policy and implementation should have on the real U.S. M2 money supply.
    b. Explain the (direct and indirect) impacts and effects that these changes in drug policy and implementation should have on U.S. nominal interest rates.
    c. Explain the (direct and indirect) impacts and effects that this drug policy and implementation should have on the United States' real exchange rate against the euro.
    d. Explain the overall effects (i.e., *after* exchange rate, GDP Price Index, real GDP, and real interest rate changes) changes drug policy and implementation should have on the U.S. balance of payments (current account, financial account, and reserves and related items).
    e. Suppose you are the Chief Executive Officer of a large German company, who is considering erecting a manufacturing facility in the United States and selling either inside the United States or exporting to Europe. Explain the opportunities and possible pitfalls.
    f. *Challenge Question*. Given your answers to the questions above, assume the U.S. government spends the same amount on drug prevention as before but uses existing funds in more effective ways. Explain the effects a federal solution to the opioid crisis should have on the U.S. government's structural, cyclical, and total government budget deficits. (Hint: See *Structural Versus Cyclical Deficits and Surpluses* in Chapter 13, "Fiscal Policy.")
    g. *Challenge Question*. Suppose the U.S. government spends $1.5 trillion to solve the opioid problem, with the same effectiveness as in Question 12f (i.e., it spends extra funds on the drug problem instead of reallocating existing funds). Use the real goods and services market and real credit markets (only) to explain the effects government spending should have on the U.S. economy. Keep in mind the existing U.S. deficit position.
13. The Climate Leadership Council, which includes senior Republican statesmen, proposed the elimination of nearly all of the Obama administration's climate policies in

exchange for a carbon tax that would start at $40 per ton. Forecasters expected it to raise about $80 billion in government tax revenues during the first year. Because the carbon content of coal, gas, and oil can be determined with relative precision and ease, the plan would impose this tax upstream directly on the suppliers, which meant, for example, levying the tax on oil suppliers when it was extracted or imported. As a result, energy costs for all businesses would rise. Proponents claimed that this tax would be a better approach to tackling climate change than government regulations. Analyze how this carbon tax plan would affect the U.S. economy. Assume the following about the U.S. Economy:

- The United States has a flexible exchange rate against the euro
- The United States is in the intermediate range of its aggregate supply
- The United States has high international capital mobility

a. What should be the direct impacts and effects (i.e., *before* considering changes in real GDP, GDP Price Index, real interest rate, and exchange rate) of this carbon tax on the government's budget deficit?
b. What should be the direct impacts (i.e., *before* considering changes in real GDP, GDP Price Index, real interest rate, and exchange rate) of this carbon tax on business after-tax income?
c. What should be the direct impacts and effects (i.e., *before* considering changes in real GDP, GDP Price Index, real interest rate, and exchange rate) of this carbon tax on overall investment spending in the United States?
d. What should be the direct impacts and effects (i.e., *before* considering changes in real GDP, GDP Price Index, real interest rate, and exchange rate) of this carbon tax on production costs?
e. Where should your analysis begin?
   - Explain the reasons, if any, to start your analysis in the real credit market.
   - Explain the reasons, if any, to start your analysis in the real goods and services market.
   - Explain the reasons, if any, to start your analysis in the foreign exchange market.
f. Use the Three-Sector Model to analyze the consequences of a carbon tax on the U.S. economy. In particular, explain how it should affect U.S. real GDP, GDP Price Index, the real interest rate, quantity of real credit per period, value of the dollar relative to the euro, and quantity of dollars traded in the foreign exchange market per period. Begin your analysis in the real credit market.
g. Use the conclusions in your previous answers to explain how the carbon tax should affect the U.S. unemployment rate, monetary base, M2 money supply, real exchange rate, and nominal interest rate.
h. *Challenge Question*. Should investment spending by all firms change in the same direction as a result of the carbon tax? Taking into account your previous answers, discuss how investment spending by companies that produce carbon-intensive goods and by companies that produce non-carbon-intensive goods should change.
i. *Challenge Question*. Should consumption expenditures for all types of goods and services change in the same direction as a result of the carbon tax? Taking into account your previous answers, discuss how consumption of carbon-intensive goods and non-carbon-intensive should change.

j. *Challenge Question*. Explain the effects a carbon tax should have on the U.S. government's structural, cyclical, and total government budget deficits. (Hint: See *Structural Versus Cyclical Deficits and Surpluses* in Chapter 13, "Fiscal Policy.")

14. Republican members of the U.S. House of Representatives have proposed a border-adjustment tax. Under it, U.S. importers would not be permitted to deduct the cost of imports from their profits, and export revenues would be free from corporate taxes, which is equivalent to a tax on imports and a subsidy for exports. Suppose the U.S. Congress and the President pass the border tax into law.
    a. *Starting your analysis in the foreign exchange market*, use the Three-Sector Model to explain the effects the border-adjustment tax should have on the U.S. real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal euro-dollar exchange rate, and quantity of dollars traded per period.
    b. Explain the (direct and indirect) impacts and effects that the border-adjustment tax should have on the U.S. M2 money supply.
    c. Explain the (direct and indirect) impacts and effects that the border-adjustment tax should have on the U.S. nominal interest rate.
    d. Explain the (direct and indirect) impacts and effects that the border-adjustment tax should have on the U.S. real exchange rate against the euro.
    e. Explain the overall effects (i.e., *after* exchange rate, GDP Price Index, real GDP, and real interest rate changes) of the border-adjustment tax on the U.S. balance of payments (current account, financial account, and reserves and related items).
    f. *Challenge Question*. Explain the effects a border adjustment tax should have on the U.S. government's structural, cyclical, and total government budget deficits. (Hint: See *Structural Versus Cyclical Deficits and Surpluses* in Chapter 13, "Fiscal Policy.")
15. Due to the loss of international reserves, suppose the Russian central bank finds it increasingly difficult to defend the ruble's value by "directly intervening" in the foreign exchange market. Explain what tools the Russian central bank might use to "indirectly influence" (i.e., raise) the ruble's international value.
    a. Of the aforementioned monetary tools the Russian central bank could use to "indirectly influence" the ruble's international value, explain their (direct and indirect) impacts and effects on Russia's M2 money supply. Do they affect the monetary base or M2 money multiplier?
    b. Use the Three-Sector Model to explain the consequences of these indirect monetary actions on Russia's real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal exchange rate of the ruble against the U.S. dollar, and quantity of Russian rubles traded per period. Assume that Russia has a flexible exchange rate and high international capital mobility.
    c. Explain the (direct and indirect) impacts and effects that these indirect actions should have on Russia's consumption and investment spending.
    d. Explain the (direct and indirect) impacts and effects that these indirect actions should have on Russia's real exchange rate against the U.S. dollar.
    e. Explain the overall effects (i.e., *after* changes in the exchange rate, GDP Price Index, real GDP, and interest rate) these actions should have on Russia's balance of payments (current account, financial account, and reserves and related items).

Chapter 20
Shocks to Nations with Fixed Exchange Rates

In Chapter 19, "Shocks to Nations with Flexible Exchange Rates," currency values were free to fluctuate with the forces of supply and demand when an exogenous shock (economic, political, or social) disrupted equilibrium in our Three-Sector Model. This chapter investigates how things change when a nation adopts a fixed exchange rate system. We will see that this decision is a serious one because choosing a fixed exchange rate means either losing monetary autonomy or depriving residents of economic freedom to transact international trade and investment activities.

The chapter begins with an explanation of fixed exchange rates, why nations adopt them, and two ways in which central banks can keep them fixed. It goes on to discuss the economic effects and business implications of expansionary fiscal policy and expansionary monetary policy for nations with fixed exchange rates. In doing so, the effectiveness of these policies in a fixed-rate system can be compared to a flexible-rate regime, which was the focus of the last chapter.

As was done in the chapter on flexible exchange rates, we begin by analyzing the economic effects of expansionary fiscal policy and then go on to explain the impact of expansionary monetary policy. Similarly, the degree of international capital mobility will be important, but this time in terms of the magnitude by which the central bank needs to react to maintain the fixed exchange rate. One of the most important macroeconomic takeaways from this chapter is the *Impossible Trinity*, which is an economic identity, rather than a general guideline. No country, rich or poor, large or small, can escape its binding constraints.

The Basics

Why Do Nations Choose Fixed Exchange Rates?

Nations that allow their exchange rates to fluctuate freely do so for two major reasons.[1] First, flexible exchange rates enable central banks to conduct independent

1 To reinforce your understanding of the fixed-versus-flexible exchange rate decision, see "To Fix or Not to Fix, That Is the Question" in *The Rest of the Story* section of Chapter 15, "Foreign Exchange Markets."

https://doi.org/10.1515/9781547401437-020

monetary policies. This chapter explains, in detail, how monetary independence is lost with fixed exchange rates. Second, flexible exchange rates act like economic shock absorbers, which diminish the effects of foreign economic jolts on the domestic economy. For example, suppose Switzerland's inflation rate was low relative to the high and rising rates of its major trading partners. Foreign residents would turn their demand toward lower-priced Swiss products, and Swiss residents would turn their demand away from international markets. If Switzerland fixed its exchange rate, increased purchases of its goods and services would put upward pressure on domestic prices and inflation. By contrast, a flexible exchange rate would help absorb (all or a portion of) the increase in foreign demand by allowing the value of the Swiss franc to rise, rather than stoke Switzerland's inflation rate. The higher-priced franc would increase the all-in cost[2] of Swiss products and reduce foreign demand.

You might be asking yourself, "If flexible exchange rates have these valuable advantages, why would any nation voluntarily give them up for a fixed-rate system?" The answer is multifaceted and controversial. Some nations choose to fix their exchange rates because they have lost confidence in the willingness or ability of their own central banks to control inflation. By choosing fixed exchange rates, governments can debilitate the independent decision-making powers of their central banks and place these powers in the hands of a foreign nation's central bank. This is another topic that will be discussed in this chapter.

Other nations choose fixed exchange rates to promote commerce and investment relations with their major trading partner(s) or to prevent significant erosion of wealth. For example, a Latin American nation might fix its currency value relative to the U.S. dollar because the vast majority of its trade and investment flows are with the United States or because the country owes vast amounts of dollar-denominated debt. By fixing the exchange rate, traders, investors, debtors, and creditors no longer have to worry that the value of their foreign-currency payments or receipts will change with adverse exchange rate movements.

This is not to say that adverse exchange rate movements always victimize traders and investors who operate in countries with flexible exchange rates. On the contrary, these exposures can be hedged, but doing so is always at a cost. For instance, the purchase or sale of forward currency contracts requires the payment of bid-ask spreads, and hedging with options requires the payment of premiums. These costs would not be present if exchange rates were credibly fixed.

2 "All-in cost" means the expense of purchasing the Swiss franc *and* purchasing Swiss products.

No exchange rate system is appropriate for all nations at all times. To understand why flexible exchange rates are not always appropriate, consider this: If a flexible exchange rate was always better than a fixed exchange rate, then every nation should have its own currency, which could fluctuate freely. Going further, if this is true for every country, then it should also be true for every state, province, or canton within a nation. After all, many *states* in the United States, Brazil, and Germany, *provinces* in Canada, and some *cantons* in Switzerland are as large as countries.

Would the United States be better off if every state had its own freely fluctuating currency? If this idea seems plausible, then why stop there? Should every city and town within each state have its own currency? Furthermore, if having a freely fluctuating currency is beneficial for every city and town, then shouldn't it also be beneficial for every individual? Clearly, at some point, the costs of having a freely fluctuating, independent currency outweigh the benefits. A currency for each person would be economic lunacy because it would make even the simplest purchase a complicated mess. For example, it would require businesses to deal with a different currency for each employee, supplier, and customer.[3]

How Do Nations Fix Their Exchange Rates?

A nation can fix the value of its currency to another in two ways. The first is to impose strict exchange controls that require all foreign-currency purchases and sales to be transacted through the central bank. The second way is for the central bank to intervene in the foreign exchange market to offset any upward or downward pressure on the exchange rate. Let's see how these two systems work.

Fixing Currency Rates by Exchange Control

Suppose the People's Bank of China (PBOC), China's central bank, decided to fix or defend the value of the yuan relative to the U.S. dollar at 20 cents per yuan (i.e., \$0.20/¥). If by chance, \$0.20/¥ were also the free-market equilibrium rate, there would be nothing for the central bank to do. The market would supply exactly the amount of yuan demanded per period. In Figure 20.1, \$0.20/¥ is the equilibrium exchange rate, and at that rate, the quantity supplied and quantity demanded are equal to ¥1,000 million per day (Point E).

3 The idea that there are identifiable ingredients that determine an "optimal currency area" is credited to Robert Mundell in "A Theory of Optimum Currency Areas," *American Economic Review*, 51:4 (1961), pp. 657–665.

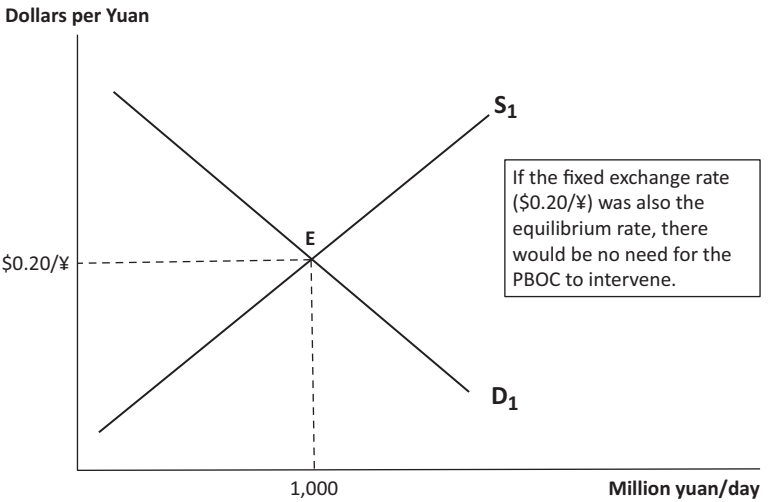

Figure 20.1: Fixed Exchange Rate Set at the Free-Market Equilibrium.

Fixing an Exchange Rate Below Equilibrium

Figure 20.2 shows the case where the PBOC fixes the value of the yuan *below* the free-market equilibrium, where the amount of yuan demanded per day exceeds the amount supplied per day. Suppose at $0.20/¥, the quantity demanded was equal to ¥1,100 million per day (Point B), but only ¥900 million per day were supplied (Point A). The PBOC would need a practical way to allocate the limited quantity of yuan supplied among the many willing buyers.

One way to allocate these yuan would be to discriminate among buyers based on their needs. For example, priority could be given to foreign companies that wanted to purchase yuan to buy targeted Chinese exports or bring high-tech operations to China. The limited supply of yuan might also be allocated on a "first come, first served" basis or by political favoritism. The only thing we know for sure is that allocating yuan at $0.20/¥ cannot be based solely on price.

Fixing an Exchange Rate Above Equilibrium

Figure 20.3 shows what happens if the PBOC sets the exchange rate *above* the free-market equilibrium. Suppose at $0.20/¥, only ¥800 million per day were demanded (Point A), but ¥1,200 million per day were supplied (Point B). The central bank would need a practical way to determine whose yuan could be purchased because only ¥800 million of the ¥1,200 million offered would be bought. Preference might be given to those who are supplying yuan (i.e., demanding dollars) to import necessities, rather than luxury goods, or to

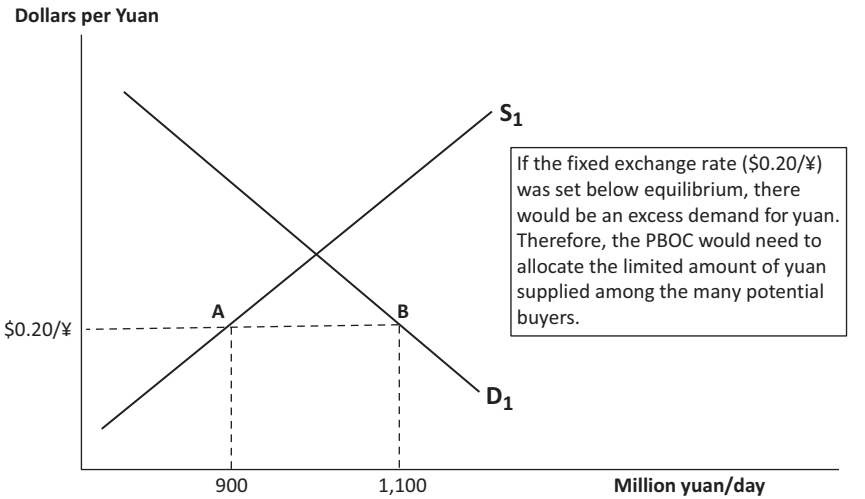

Figure 20.2: Fixed Exchange Rate Set Below the Free-Market Equilibrium.

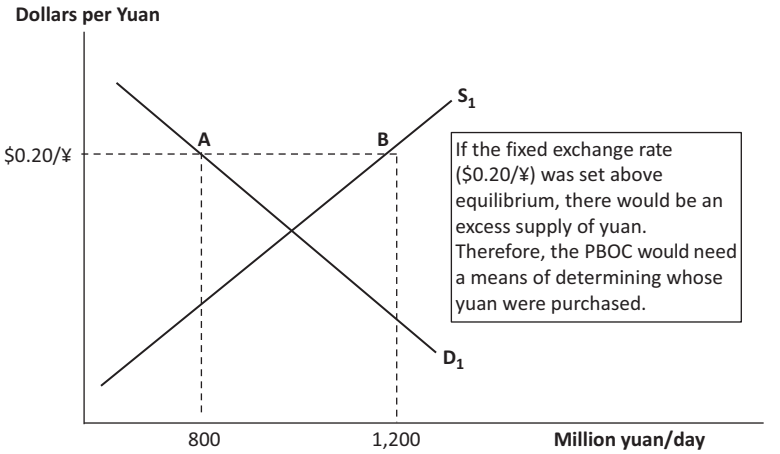

Figure 20.3: Fixed Exchange Rate Set Above the Free-Market Equilibrium.

those who wish to acquire, invest in, or develop foreign resources for Chinese use, rather than speculative financial investments. The limited selling rights could also be allocated by nonmarket alternatives, such as political or economic favoritism or first come, first served.

Fixing Currency Values by Foreign Exchange Market Intervention

A more familiar, market-oriented way for central banks to fix exchange rates is by intervening in the foreign exchange market.

Intervention to Keep the Yuan Undervalued

Suppose the PBOC fixed the yuan's value below the free-market equilibrium (i.e., it undervalued the yuan and overvalued the U.S. dollar) in order to promote exports. In Figure 20.4, if supply and demand were S_1 and D_1, respectively, and the central bank fixed the exchange rate at \$0.20/¥, the resulting shortage would be equal to ¥200 million per day (B − A = ¥200 million/day). To keep the exchange rate fixed at \$0.20/¥, the central bank would need to act as the seller of last resort and supply ¥200 million per day to the foreign exchange market. These transactions would increase the supply of yuan from S_1 to S_2. Therefore at \$0.20/¥, the quantity demanded per day (¥1,100 million) would equal the amount supplied per day by the market (¥900 million) and central bank (¥200 million).

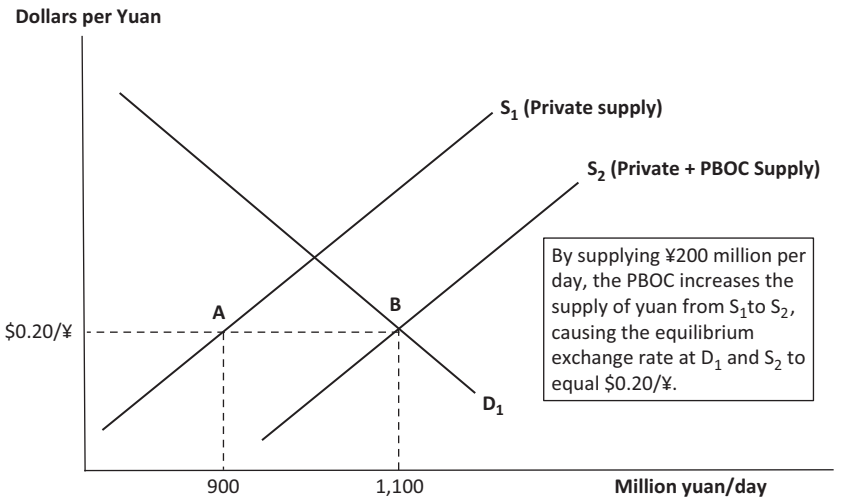

Figure 20.4: Central Bank Intervention to Keep the Yuan Undervalued.

It is important to remember that central bank intervention in the foreign exchange market changes the domestic and foreign monetary bases. Figure 20.5 shows that, to keep the \$0.20/¥ exchange rate, \$40 million per day[4] must cross

4 \$40 million = ¥ 200 million × \$0.20/¥

above our imaginary horizontal line in exchange for ¥200 million, which flow below the line. As a result, China's monetary base rises by ¥200 million, the U.S. monetary base falls by $40 million, and China's international reserves rise by $40 million (see Figure 20.5).

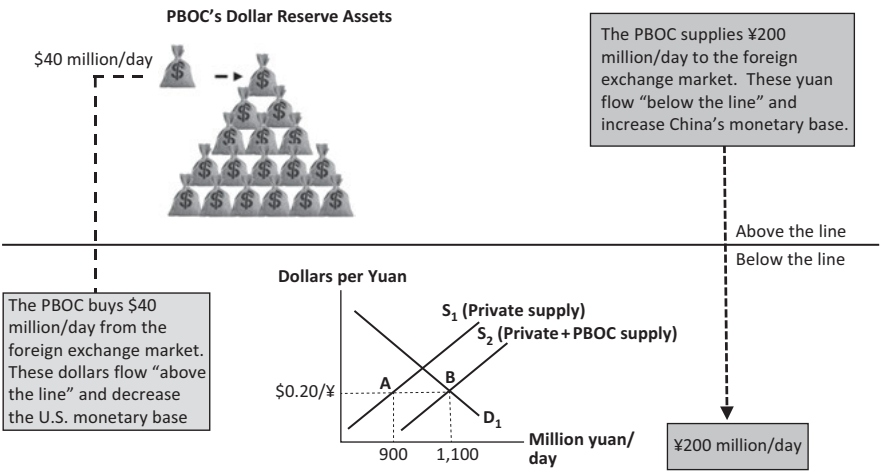

Figure 20.5: China's Monetary Base Increases If It Supplies Yuan to Buy Dollars. (Imagery used: © belchonock/123rf)

Intervention to Keep the Yuan Overvalued

Suppose the PBOC tried to fix the dollar price of the yuan above the free-market equilibrium (i.e., it overvalued the yuan and undervalued the U.S. dollar) in order to control inflation by reducing net exports and aggregate demand. In Figure 20.6, if private demand and supply were D_1 and S_1, respectively, then an exchange rate of $0.20/¥ would create an excess supply of yuan equal to ¥400 million per day (B − A = ¥400 million). To keep the exchange rate fixed at $0.20/¥, the PBOC would need to intervene by acting as the *buyer of last resort* (i.e., purchasing the excess yuan with dollars), thereby increasing demand from D_1 to D_2 as shown if Figure 20.6.

Such purchases would decrease China's international reserves by $80 million per day,[5] increase the U.S. monetary base by $80 million per day, and reduce China's monetary base by ¥400 million per day (see Figure 20.7).[6]

5 $80 million = ¥400 million × $0.20/¥

6 The effects that PBOC intervention have on China's and the United States' monetary bases are identical, regardless of whether the PBOC deals with domestic or foreign residents.

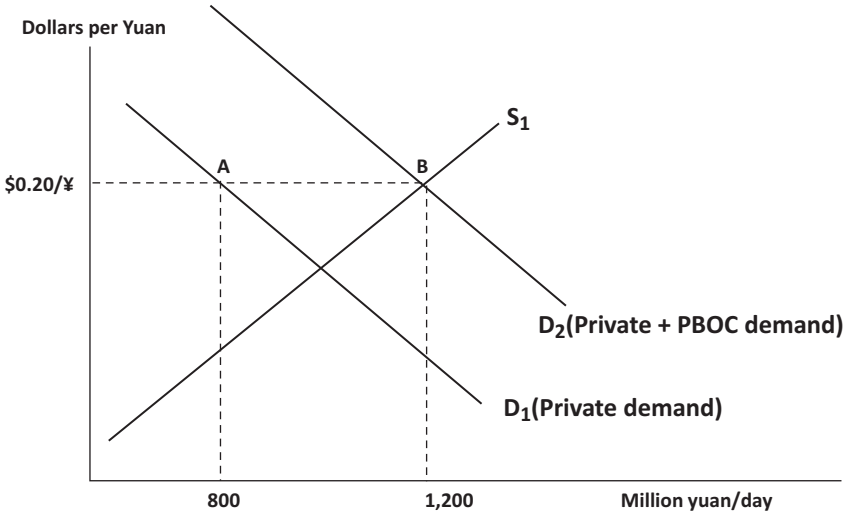

Figure 20.6: Central Bank Intervention to Keep the Yuan Overvalued.

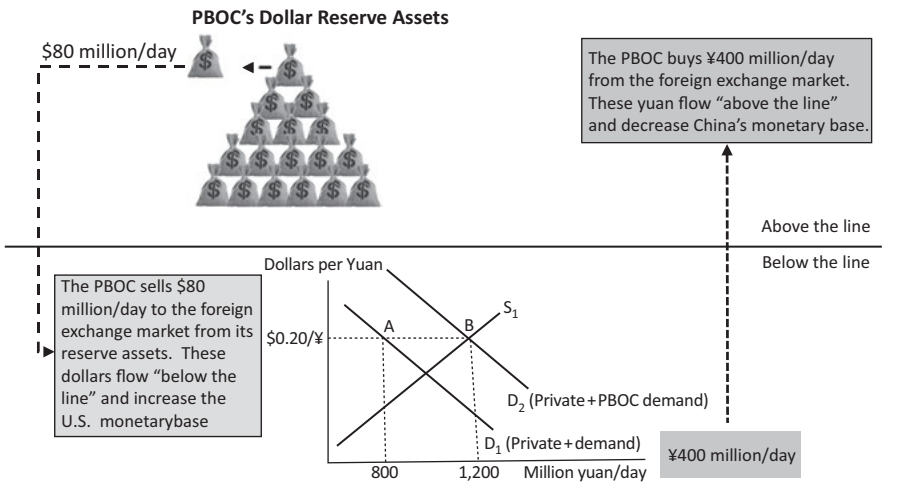

Figure 20.7: China's Monetary Base Decreases If It Buys Yuan with Dollars. (Imagery used: © belchonock/123rf)

Because further coverage of this topic is more specialized in nature, it is covered in *The Rest of the Story* section of this chapter.

Let's use our knowledge of fixed exchange rates to determine the effects of expansionary fiscal policy. Afterward, we will apply it to evaluate the effects of expansionary monetary policy.

Effects of Expansionary Fiscal Policy

Suppose you own a growing business in Denmark, with sales split evenly between the domestic and euro area (EA) markets. With your factories running near capacity and the expectation of continued growth in the future, you are in the process of planning the best way to expand operations and renovate existing production facilities. If all goes well, construction could start within the next year.

One of your concerns is a recent announcement that the Danish government intends to raise its spending to reduce the nation's growing unemployment rate and to stimulate economic growth. You realize that increased government spending will probably boost your domestic sales, but what effect, if any, might it have on your export sales to the euro area?

In a 2000 referendum, Danish voters rejected, by a margin of 53% to 47%, joining the euro area. As a result, the nation has continued to use the krone (kroner in plural) as its national currency. Despite this decision, Denmark has remained part of the 1999 Exchange Rate Mechanism Part II, which requires its central bank to restrict the krone's movements to a +/− 2.25% band around the euro. Let's assume the Danish central bank maintains a fixed exchange rate of 0.13 euro per Danish krone (€0.13/DKK), which is about 7.7 Danish krone per euro (DKK7.7/€).

You are confident that the krone will stay pegged at its fixed rate during the capital-budgeting period, which relieves possible apprehensions about adverse exchange rate movements reducing your exports sales. At the same time, you realize that Denmark's central bank, Danmarks Nationalbank (DN), will have to intervene in the foreign exchange market to keep the krone fixed. Your concerns center on the economic effects of this intervention.

To move forward, you realize that consideration should be given to financing the capital budgeting project. You have no fears about your company's ability to tap the domestic credit market for the required funds, but there is a timing issue. If government spending is going to increase, should you borrow now in anticipation of rising real interest rates or wait until later, expecting them to fall?

Given this scenario, let's use the Three-Sector Model to analyze the expected effects of expansionary fiscal policy (with fixed exchange rates) on Denmark's real GDP (RGDP), GDP Price Index (P), real interest rate (r), quantity of real credit per period (RC/t), and quantity of krone traded in the foreign exchange market per

period (DKK/t). Once we understand how increased government spending affects these major economic variables, your investment decisions may be easier to make.

Step 1: Describe the Economic Setting of Denmark's Three Major Markets
As usual, we will begin our analysis by characterizing Denmark's economic setting in the real goods and services, real credit, and foreign exchange markets.

Denmark's Real Goods and Services Market: Economic Setting
The Danish government is concerned about the nation's high unemployment rate and slow real GDP growth. Let's assume the country is on the relatively elastic portion of its aggregate supply curve (i.e., relatively close to the Keynesian range), shown in Figure 20.8.

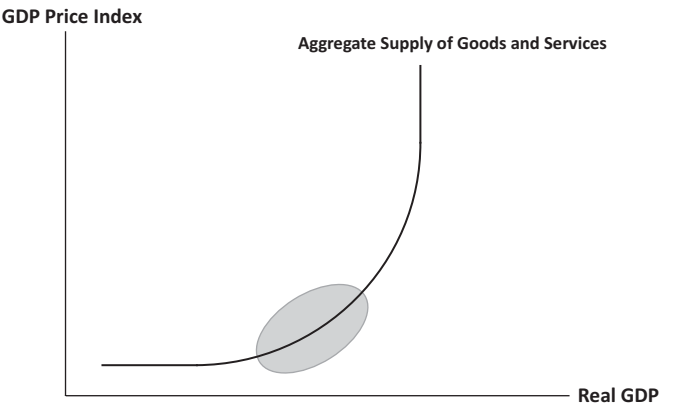

Figure 20.8: Economic Setting in Denmark's Real Goods and Services Market.

Denmark's Real Credit Market: Economic Setting
No information has been given about Denmark's capital markets; so, let's assume, simply, that the supply and demand for real credit are normally shaped, with an upward-sloping supply and downward-sloping demand for real credit per period (see Figure 20.9).

Denmark's Foreign Exchange Market: Economic Setting
Figure 20.10 shows the euro-krone foreign exchange market. To fix the exchange rate at €0.13/DKK, Danmarks Nationalbank must intervene whenever there is pressure on the krone. Therefore, a dashed, horizontal line is drawn across Figure 20.10 at €0.13/DKK as a reminder of this fixed-rate

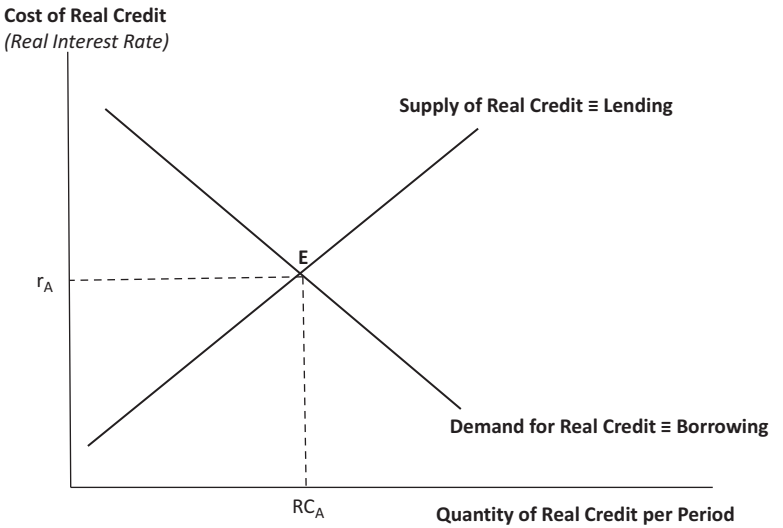

Figure 20.9: Economic Setting in Denmark's Real Credit Market.

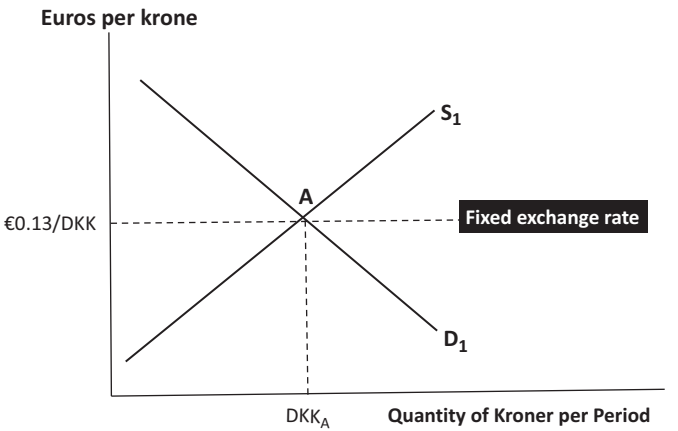

Figure 20.10: Economic Setting in the Euro-Krone Market.

commitment. We assume the foreign exchange market starts in equilibrium at €0.13/DKK.

With Denmark's economic setting in mind, let's identify the direct (exogenous) shock that sets off the chain of economic reactions and then analyze its economic consequences.

Step 2: Identify the Exogenous Shock (or Expected Shock)

The exogenous shock in this analysis is the expected increase in government spending, but this spending raises a financing issue. From where will the Danish government get its funding?

Step 3: Analyze the Chain Reaction of Economic Interactions

Using Guideline #3, "Show me the money!" we will begin our analysis in the real credit market because the Danish government must first borrow before it can spend.

Economic Effects in the Real Credit Market

The increase in government borrowing raises the demand for real krone credit. In Figure 20.11, when demand increases from D_1 to D_2, Denmark's real interest rate rises from r_A to r_B, and the equilibrium quantity of real credit (i.e., the amount borrowed and lent) per period rises from RC_A to RC_B. Notice that the increase in demand from D_1 to D_2 is caused by a *direct* (exogenous) shock, which is also a *primary* change because it shifts the entire curve.

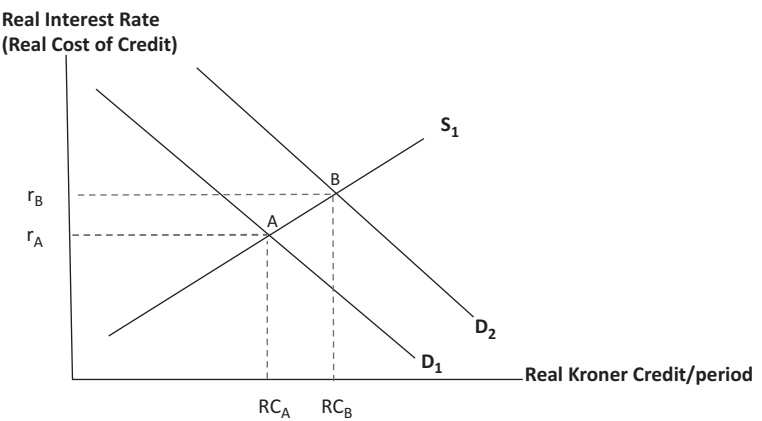

Figure 20.11: Effect of Increased Government Borrowing on the Credit Market.

As the real interest rate rises, part of the increased government demand is offset by reductions in household consumption and business investment expenditures. Nevertheless, net borrowing increases, from RC_A to RC_B, which means that crowding out does not entirely offset the rise in government spending. Remember that the fluctuations in consumption and investment, which are

due to the higher real interest rate, are secondary changes because the rising real interest rate causes movements along the real credit demand curve.

Economic Effects in the Real Goods and Services Market

In Denmark's real goods and services market, there is a direct (exogenous) increase in government spending. If there were no crowding out, aggregate demand would increase by the full amount of government borrowing and spending times the fiscal multiplier, but we must also consider the indirect impacts from the real credit market. In the real credit market, increased government borrowing raises the real interest rate and reduces consumer and business borrowing. As a result, the expansionary effects of increased government spending are partially offset by the reduction in consumption and investment. Remember that, in the real credit market, the *primary* effect was greater than the *secondary* effect, and net borrowing increased. Therefore, in the real goods and services market, the effect of increased government spending is to increase aggregate demand, but the increase is less than the change in government spending, due to crowding out. Figure 20.12 summarizes these effects.

Expansionary fiscal policy	G↑	AD↑	Direct impact
Real interest rate↑	C↓ and I↓→ Borrowing↓	AD↓	Indirect impact from the real credit market
Net Effect	**(C+ I+ G+ NX)↑**	**AD↑**	**Direct impact > indirect impacts**

Figure 20.12: Direct and Indirect Impacts in the Real Goods and Services Market.

Figure 20.13 shows that the net increase in Denmark's aggregate demand from AD_1 to AD_2 causes the nation's prices to rise from P_A to P_B and real GDP to increase from $RGDP_A$ to $RGDP_B$ (Point A to Point B).

Economic Changes in the Foreign Exchange Market

Let's complete our analysis of expansionary fiscal policy by determining what Danmarks Nationalbank has to do to keep the exchange rate fixed at €0.13/DKK. To analyze these effects, we will organize our thoughts, as we did in the last chapter, around the supply and demand forces that occur in Denmark's current account (CAX), financial account (FAX), and reserves and related items (RRIX). Changes in Denmark's GDP Price Index and real GDP affect CAX, and changes in Denmark's real interest rate relative to other countries affect FAX. Finally, central bank intervention affects RRIX.

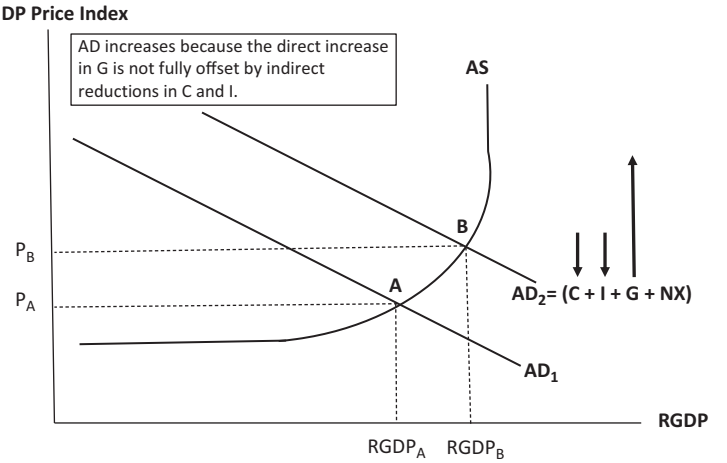

Figure 20.13: Effect of a Net Increase in AD on the GDP Price Index and Real GDP.

If the CAX and FAX forces put upward pressure on the krone, Danmarks Nationalbank will intervene to lower the exchange rate back to the fixed rate. Conversely, if the net pressure from CAX and FAX forces puts downward pressure on the krone, the central bank will use its reserves to lift the exchange rate back to the fixed level.

CAX-Related Supply and Demand Forces in the Foreign Exchange Market

Expansionary fiscal policy increases Denmark's real GDP and GDP Price Index. Let's analyze their CAX-related impacts in the foreign exchange markets.

Indirect Impacts of Real GDP Changes on CAX: As Denmark's real GDP increases, imports from the euro area rise. Before purchasing euro area products, Danish importers must first buy the euro. Therefore, the demand for euros increases, which causes the supply of kroner in the foreign exchange market to rise (see Figure 20.14). This increased supply, from S_1 to S_2, depreciates the kroner, from €/DKK_A to €/DKK_B. (i.e., a movement from A to B).

Indirect Impacts of Relative Price Level Changes on CAX: At the same time, higher Danish prices relative to the euro area increase the nation's imports and decrease its exports. As Figure 20.15 shows, the increased imports raise the supply of kroner from S_1 to S_2, which puts downward pressure on the krone (Point A to Point B). Similarly, falling Danish exports reduce the demand for

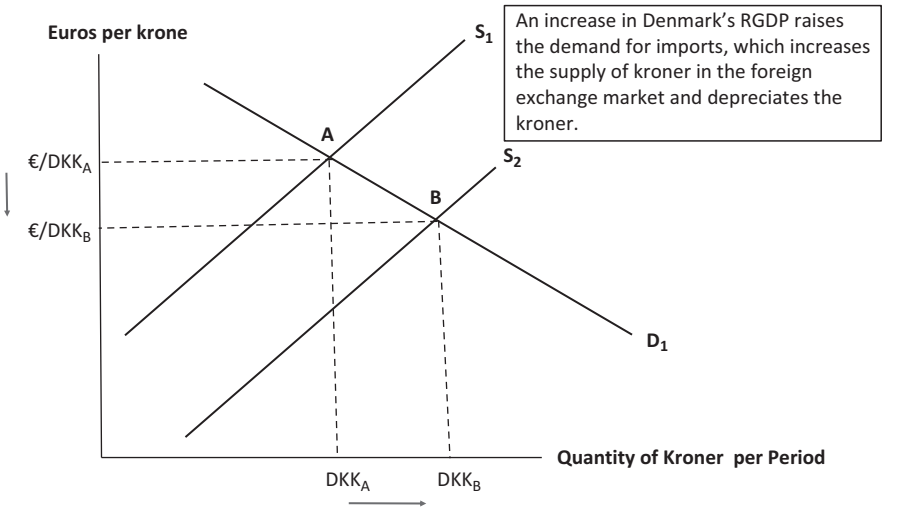

Figure 20.14: Effects of Denmark's Rising Real GDP on the Krone's Value.

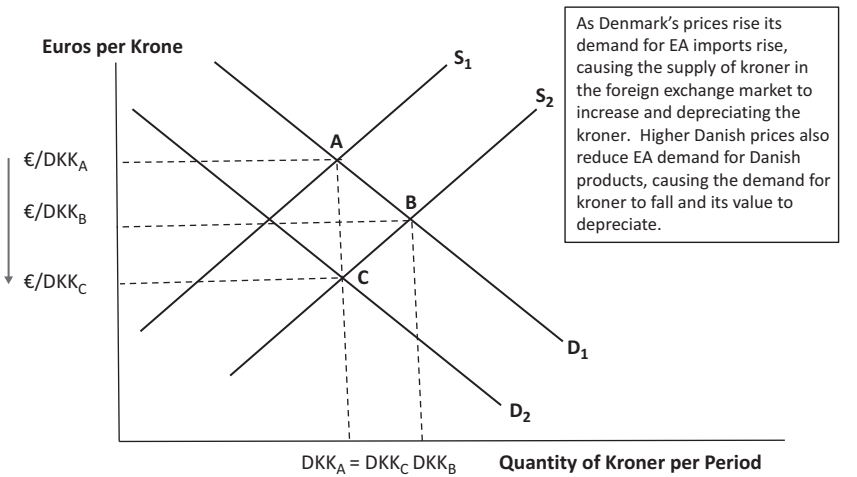

Figure 20.15: Effects of Denmark's Rising Prices on the Krone's Value.

kroner, from D_1 to D_2, which also puts downward pressure on the krone (Point B to Point C).

Even though the qualitative change in Denmark's exchange rate is certain, the net change in the quantity of kroner traded per period is ambiguous. An increase in supply raises the equilibrium quantity per period, and a

decrease in demand reduces the equilibrium quantity per period. Figure 20.15 shows the two forces canceling each other, but there is no reason for this to be true in all cases.

FAX-Related Supply and Demand Forces in the Foreign Exchange Market

As Denmark's real interest rate increases, foreign investors are attracted to the relatively high returns on krone-denominated investments. Accordingly, they increase their demand for kroner. In Figure 20.16, this is shown as a shift in demand from D_1 to D_2.

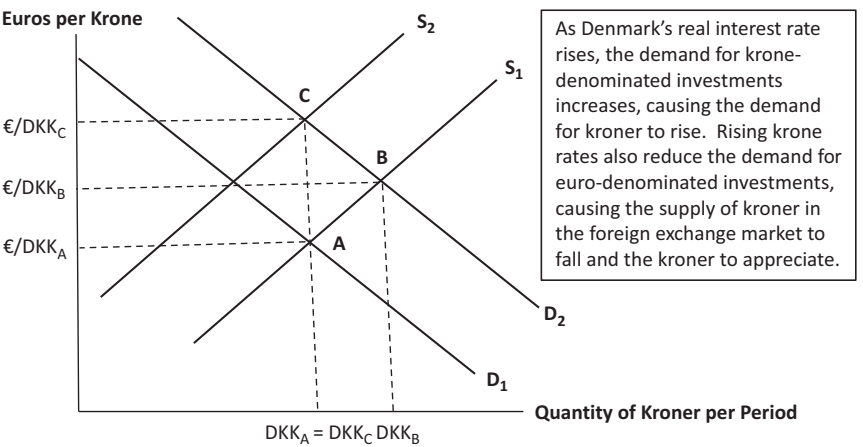

Figure 20.16: Effects of Denmark's Rising Real Interest Rate on the Krone's Value.

At the same time, Danish investors adjust the composition of their investment portfolios away from euro-denominated assets and toward krone-denominated investments. Therefore, the supply of kroner in the foreign exchange market falls from S_1 to S_2. The increased demand and reduced supply cause the krone to appreciate from €/DKK_A to €/DKK_B to €/DKK_C (from A to B to C).

Again, the net change in equilibrium quantity per period is uncertain. A higher demand raises the quantity per period, and a reduced supply lowers it. Figure 20.16 shows the two forces canceling each other, but this is not always the case. The net movement depends on the relative changes in supply and demand.

RRIX-Related Supply and Demand Forces in the Foreign Exchange Market

Determining whether and how Danmarks Nationalbank has to intervene in the foreign exchange market depends on whether the combined CAX and FAX

forces put upward or downward pressure on the krone. CAX forces cause the value of the krone to fall, but the FAX forces cause it to rise.

Denmark's financial, capital, and trade markets are open. Therefore, we can safely assume it has high-mobility international capital markets. As a result, the FAX forces dominate the CAX forces, putting net upward pressure on the krone.

Figure 20.17 summarizes the supply and demand shifts in the foreign exchange market.[7] Because the FAX forces dominate, there is a net increase in the demand for kroner from D_1 to D_2, which puts upward pressure on the krone (Point A to Point B). To relieve this pressure, Danmarks Nationalbank must intervene by supplying kroner to the foreign exchange market. When it does, the supply increases from S_1 to S_2, and the krone's equilibrium value falls from €/DKK$_B$ to €/DKK$_C$, which is equal to €0.13/DKK (i.e., €/DKK$_A$)—Point B to Point C.

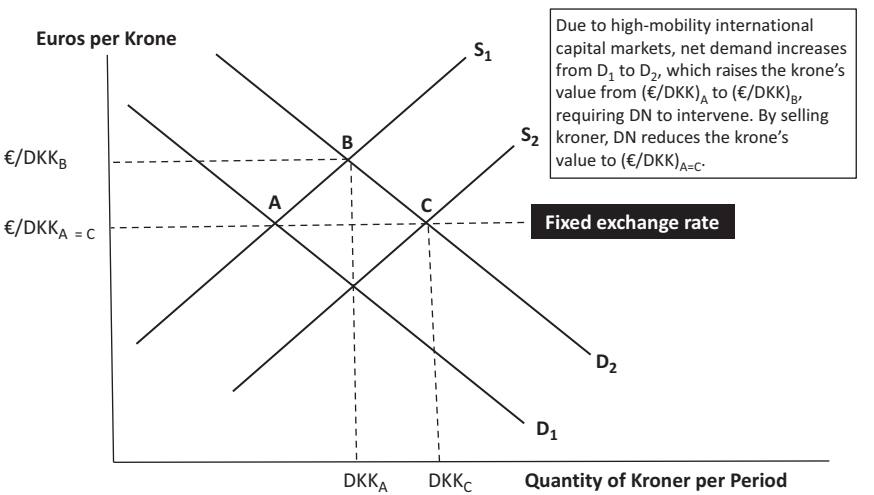

Figure 20.17: Danmarks Nationalbank Intervenes to Fix the Krone's Value.

By supplying kroner to the foreign exchange market, Danmarks Nationalbank increases its mountain of reserve assets and Denmark's monetary base. Figure 20.18 shows DKK 77 million flowing below our imaginary horizontal line, and €10

7 Figure 20.17 shows only the increased demand for kroner per period and not the reduction in supply, which would also raise the krone's value. Including the supply change is more accurate but complicates the graph and does not change the conclusion in terms of what the central bank must do to fix the exchange rate.

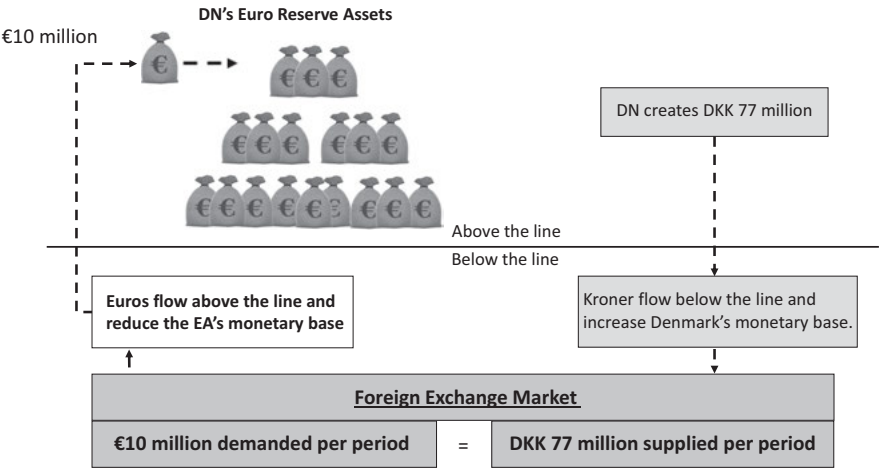

Figure 20.18: Danmarks Nationalbank Increases Its Reserves and Denmark's Monetary Base. (Imagery used: © nerthuz/123rf)

million flowing above it.[8] Therefore, Denmark's monetary base rises by the krone amount, and the euro area's monetary base falls by the euro amount.

Changes in Denmark's Balance of Payments

What happens to Denmark's balance of payments? An increase in Danish prices and real GDP cause the current account to fall, as net exports decrease. An increase in the real interest rate causes the financial account to fall, as Denmark's net foreign investments (i.e., foreign assets) decrease and net liabilities to foreigners increase. Finally, central bank intervention causes Denmark to gain reserve assets. Increases in a nation's reserve assets relative to the rest of the world are recorded in the balance of payments as positive values. Therefore, reserves and related items increase. All of these effects are summarized in Figure 20.19.

Summary of Economic Effects

Now that we have completed our analysis, let's summarize the results and see how they might affect your business decisions during the upcoming capital-budgeting period.

8 (€10 million) ÷ (€0.13/DKK) = DKK77 million, and DKK77 million × €0.13/DKK = €10 million.

	Balance of Payments Accounts and the Economic Variables Affecting Them	Causes	Changes in Denmark's Balance of Payments	Net Effect
1	**Current Account (CA)**	→	**Net exports ↓**	**CA decreases**
	Real exchange rate ↑	→	Net exports ↓	
	GDP Price Index ↑	→	Exports ↓ and Imports ↑	
	Nominal exchange rate = 0	→	No change	
	RGDP ↑	→	Imports ↑ → Net exports ↓	
2	**Financial Account (FA)**	→	**Net financial capital inflows ↑**	**FA decreases**
	Real interest ↑	→	Financial capital inflows ↑ Financial capital outflows ↓	
3	**Reserves and Related Items (RRI)**	→	**International reserves ↑**	**RRI increases**
	Central bank intervention *Due to high-mobility international capital markets, FAX > CAX*	→	DN buys euros and sells kroner	

Figure 20.19: Changes in Denmark's Balance of Payments with High International Capital Mobility.

GDP Price Index Rises, Real GDP Rises, and Nominal GDP Rises

The increased government spending raises Denmark's aggregate demand, causing the nation's GDP Price Index and real GDP to rise. Because nominal GDP (NGDP) is the sum of all newly produced, final goods and services per period times their prices, Denmark's nominal GDP also increases. The average business should be able to raise its prices by the rate of inflation. Because your business is growing, you might expect the same. Moreover, when real GDP rises, the domestic demand for your products should also increase.

Unemployment Rate Falls, Employment-to-Population Ratio Rises, Real Wages Rise, and Nominal Wages Rise

The increase in Denmark's real GDP should create more jobs, thereby decreasing the unemployment rate and increasing the employment-to-population ratio. As labor markets become tighter, competition for workers should increase. Therefore, staffing should become more challenging. There will be a greater need for human resources departments, executive boards, and the boards of directors to make sure that succession planning has been carefully considered—especially for skilled workers, R&D staff, and managers.

Rising stars (especially those in vital positions) should be identified, and care should be taken to ensure that their salaries and benefits are competitive. As the economy improves, individuals will have more opportunities to switch jobs. Companies should expect increased turnover, and they should expect to pay higher real wages to attract and retain competent workers.

Real Interest Rate and Nominal Interest Rate Rise

The increase in government borrowing causes Denmark's real interest rate to rise. Therefore, you should consider borrowing any needed funds earlier rather than later or hedging so that a rate can be locked in before they rise.

Nominal interest rates should also increase because the real interest rate and inflation rate are both expected to increase. Nevertheless, it is the real interest rate that should be of particular concern because, on average, you should be able to offset the added burden of the expected inflation by raising your product prices.

Monetary Base Rises and M2 Rises

To keep the exchange rate fixed at €0.13/DKK, Danmarks Nationalbank has to supply kroner to the foreign exchange market. As these kroner cross below our imaginary line, Denmark's monetary base increases, thereby enlarging the domestic money supply by a multiplier effect.[9]

Denmark's money supply will also change as a result of fluctuations in the money multiplier because the higher real interest rate will alter the nation's preferred asset ratios. A higher real interest rate will reduce two preferred asset ratios, namely, the currency-in-circulation-to-checking deposits (CC/D) and the ratio of excess-reserves-to-checking deposits (ER/D). As a result, the M2 money multiplier will rise. It will also increase the preferred asset ratio of near-money-to-checking deposits (N/D), thereby reinforcing the increase in Denmark's M2 money multiplier.[10]

Nominal Value of the Krone Does Not Change but the Real Value of the Krone Rises

Due to central bank intervention, the nominal value of the krone remains unchanged. By contrast, Denmark's real exchange rate changes. If the nominal

9 Remember that $\Delta M2 \equiv \Delta(\text{M2 Money Multiplier} \times \text{Monetary Base})$.

10 The actual change in the M2 money multiplier is likely to be very small because Denmark's rising real money supply will subsequently put downward pressure on the real interest rate.

exchange rate is stated as euros-per-krone (€/DKK), then the real exchange rate must be constructed as shown below. Because Denmark's nominal exchange rate remains constant and its GDP Price Index increases, the real exchange rate rises, reflecting Denmark's reduced competitive position.

$$\text{Real exchange rate} \equiv \frac{\text{Nominal Exchange Rate}_{(€/\text{DKK})} \times \text{Average Price Level}_{\text{Denmark}}}{\text{Average Price Level}_{\text{Euro Area}}}$$

CA Falls, FA Falls, and RRI Rises

Denmark's current account becomes more negative as rising real GDP and higher GDP Price Index increase imports and reduce exports. Governments often link current account deficits (or reduced current account surpluses) with the loss of jobs.[11] In this environment, protectionist legislation is easier to pass. Therefore, you should be sensitive to political pressures that could increase tariffs and quotas because such measures can be met with severe international retaliation.

Denmark's financial account falls due to the higher real interest rate relative to the euro area. As international capital (mainly financial capital) flows toward Denmark to purchase krone-denominated investment assets, the nation's liabilities to foreigners increase, and these flows are recorded in the balance of payments as negative values. Similarly, as Danish residents (households and businesses) reduce their purchases of foreign investment assets, Denmark's net foreign assets fall, causing the financial account to turn negative.

The financial account deficits are not usually the focus of front-page news stories, but they can be when foreign investments are made for the purchase of natural resources, strategic (e.g., defense-related) companies, landmarks (e.g., Rockefeller Center), and other sensitive direct investments. Some critics associate foreign ownership of domestic properties and companies with the potential for exploitative colonialism. This perception can become a political lightning rod, resulting in unfortunate legislation that puts restrictions on international capital flows.

Finally, the increase in Denmark's international reserves, due to central bank intervention, is recorded in the nation's reserves and related items as a positive balance. If it is overdone, the addition of international reserves could create an inflation problem as the central bank increases the nation's monetary base and money supply.

11 Frequently, these arguments are couched in terms of the current account.

Effects of Low-Mobility International Capital Markets

How would our results change if Denmark faced low-mobility international capital markets? Figure 20.20 shows that the qualitative changes in the current account and financial account are the same, but with low international capital mobility, the CAX-related forces in the foreign exchange market would be stronger than the FAX-related forces. As a result, Danmarks Nationalbank would need to intervene to raise the value of the krone.

	Balance of Payments Accounts and the Economic Variables Affecting Them	Causes	Changes in Denmark's Balance of Payments	Net Effect
1	**Current Account (CA)**	→	**Net exports ↓**	**CA decreases**
	Real exchange rate ↑	→	Net exports ↓	
	GDP Price Index ↑	→	Exports ↓ and Imports ↑	
	Nominal exchange rate = 0	→	No change	
	RGDP ↑	→	Imports ↑ → Net exports ↓	
2	**Financial Account (FA)**	→	**Net financial capital inflows ↑**	**FA decreases**
	Real interest ↑	→	Financial capital inflows ↑ Financial capital outflows ↓	
3	**Reserves and Related Items (RRI)**	→	**International reserves ↓**	**RRI decreases**
	Central bank intervention *Due to low-mobility international capital markets, CAX > FAX*	→	DN sells euros and sells kroner	

Figure 20.20: Changes in Denmark's Balance of Payments with Low International Capital Mobility.

Central bank sales of its euro reserves reduce the nation's monetary base and supply of real credit. As the supply of real credit falls, the real interest rate rises and amplifies the increase in the real interest rate that was caused by greater government borrowing. As a result, there is even more incentive to lock in current interest rates.

Graphical Summary of Expansionary Fiscal Policy Effects

Figure 20.21 and Figure 20.22 summarize all the significant economic effects of expansionary fiscal policy. Figure 20.21 shows the effects when a nation faces high-mobility international capital markets. The analysis reveals that, in the short term, expansionary fiscal policy can be an effective tool for increasing

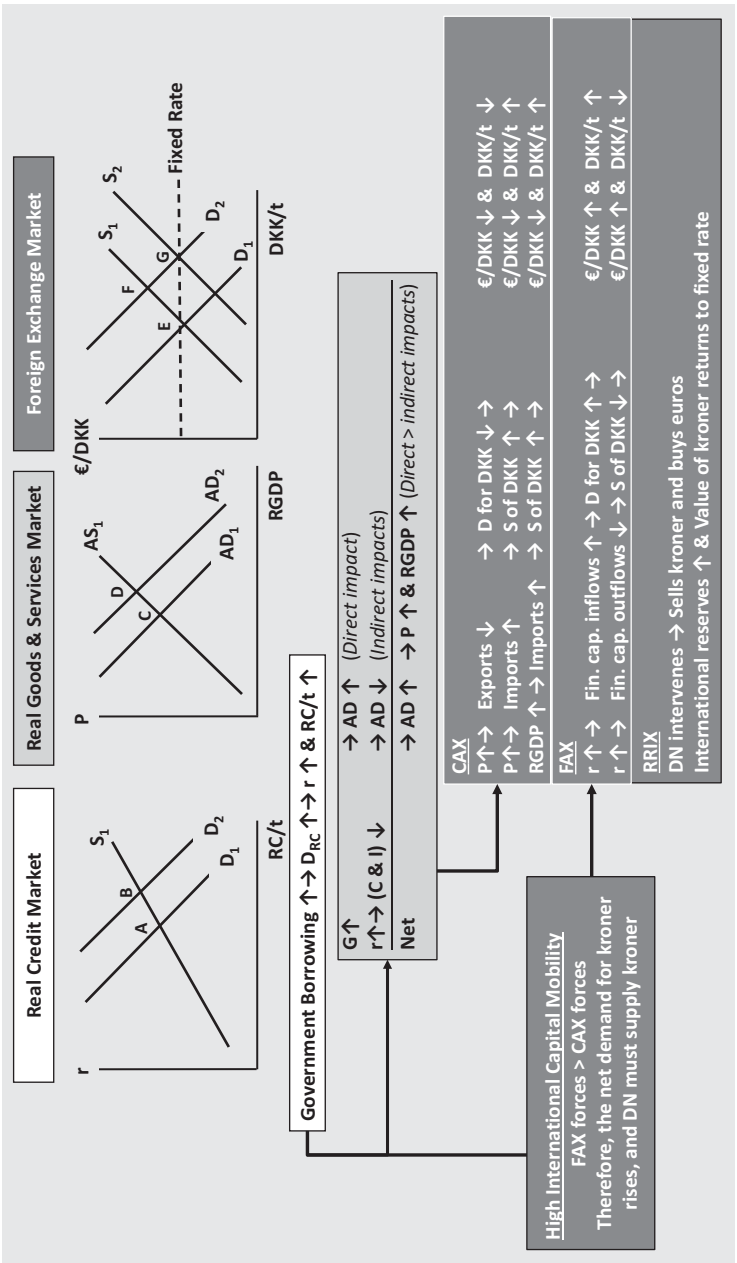

Figure 20.21: Expansionary Fiscal Policy with Fixed Exchange Rates and High International Capital Mobility.

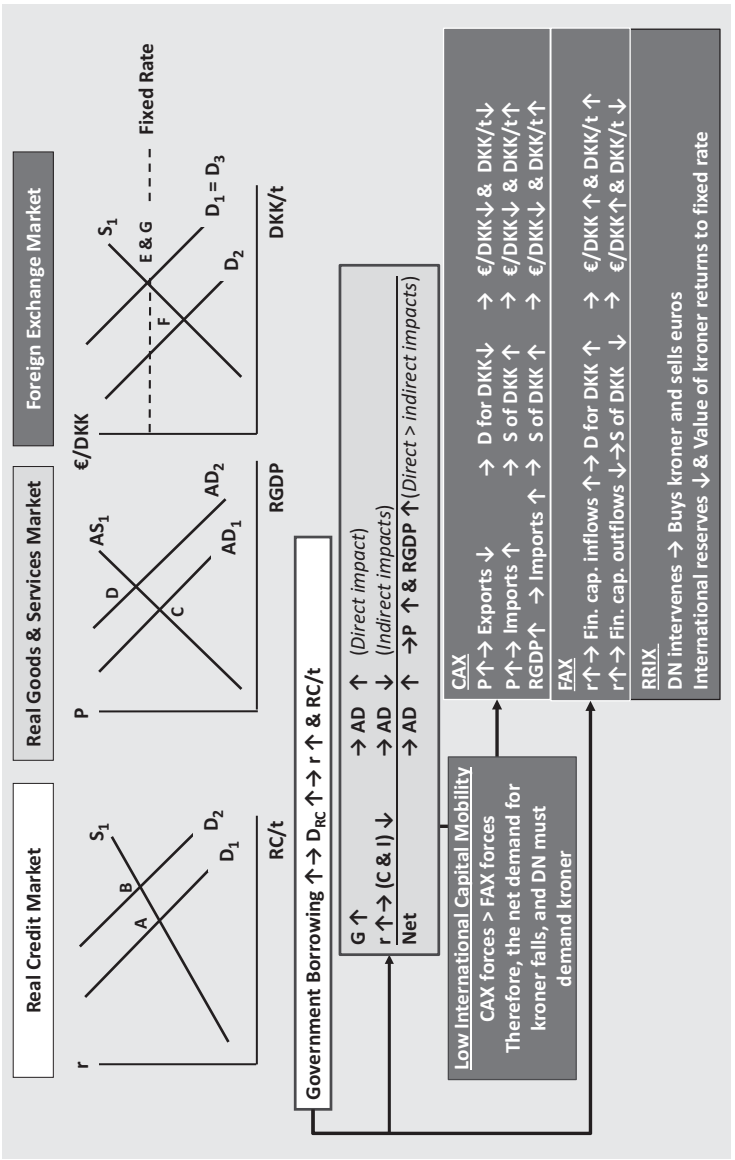

Figure 20.22: Expansionary Fiscal Policy with Fixed Exchange Rates and Low International Capital Mobility.

aggregate demand. Moreover, with high-mobility international capital markets, expansionary fiscal policy causes the central bank to intervene in the foreign exchange market to lower the value of the domestic currency. This intervention raises the nation's monetary base and money supply, which reinforces the effects of expansionary fiscal policy.

Figure 20.22 shows the effects when a nation confronts low-mobility international capital markets. In this case, central bank intervention in the foreign exchange market lowers the nation's supply of real credit and, therefore, reinforces the upward climb in the real interest rate. As the real interest rate rises, private borrowing falls, thereby weakening some, but not all, of the stimulus from expansionary fiscal policy.

Effects of Expansionary Monetary Policy

Assume that you own the same growing business in Denmark as described in the last section, but this time, your concern is over the possible economic effects of expansionary monetary policy. Suppose you just finished listening to an interview with the chairperson of Danmarks Nationalbank in which she indicated the central bank's intention to increase Denmark's money supply by lowering the reserve ratio. Realizing that the effects of expansionary monetary policy will be different from expansionary fiscal policy, you conduct a Three-Sector Model analysis to help build a strategy for dealing with the possible future changes.

Step 1: Describe the Economic Setting of Denmark's Three Major Markets

Denmark's economic setting is the same in this analysis as it was for expansionary fiscal policy. Therefore, the country is on the relatively flat portion of its aggregate supply curve (see Figure 20.8), its supply of and demand for real credit are normally shaped (see Figure 20.9), and the nominal exchange rate is pegged at €0.13/DKK (see Figure 20.10).

Step 2: Identify the Economic (or Expected) Shock

The exogenous shock in this analysis is the discretionary increase in Denmark's money supply, which will be implemented by reducing the required reserve ratio.

Step 3: Analyze the Chain Reaction of Economic Interactions

An increase in Denmark's money supply will have its most immediate impact on the nation's real credit market, so let's begin our analysis there.

Economic Effects in the Real Credit Market

By increasing the real money supply, Danmarks Nationalbank expands the supply of real credit. In Figure 20.23, an increased supply of real credit from S_1 to S_2 causes Denmark's real interest rate to fall (from Point A to Point B). The lower cost of real credit causes gross private domestic investment (I) and personal consumption expenditures (C) to rise, thereby increasing the amount of real credit borrowed.

Economic Effects in the Goods and Services Market

The lower real interest causes household and business borrowing to increase, which raises the aggregate demand in the real goods and services market. In Figure 20.23, an increase in aggregate demand from AD_1 to AD_2 causes Denmark's GDP Price Index and real GDP to rise from Point C to Point D. Notice that the change in aggregate demand is due to *indirect* impacts from the credit market.

Economic Effects in the Foreign Exchange Market

To analyze the exchange rate effects of expansionary monetary policy, let's consider the CAX-, FAX-, and RRIX-related supply and demand forces. Figure 20.24 summarizes these cause and effect relationships.

CAX-Related Supply and Demand Forces in the Foreign Exchange Market

Rising real GDP increases Denmark's imports from the euro area, which increases the supply of kroner in the foreign exchange market and puts downward pressure on the krone's value. Moreover, an increase in Denmark's GDP Price Index (relative to the euro area) boosts imports and reduces exports. As imports rise, the supply of kroner in the foreign exchange market increases, putting downward pressure on the krone. Similarly, lower Danish exports reduce the demand for kroner, thereby exerting even greater downward pressure on the value of the krone. In summary, the CAX forces put downward pressure on the value of the krone by increasing the supply of kroner and decreasing the demand.

FAX-Related Supply and Demand Forces in the Foreign Exchange Market

Denmark's real interest rate falls as a result of the increased supply of real credit. Therefore, the demand for kroner in the foreign exchange market falls, as foreign investors reduce their purchases of relatively low-yielding krone-denominated assets. In addition, the supply of kroner in the foreign exchange

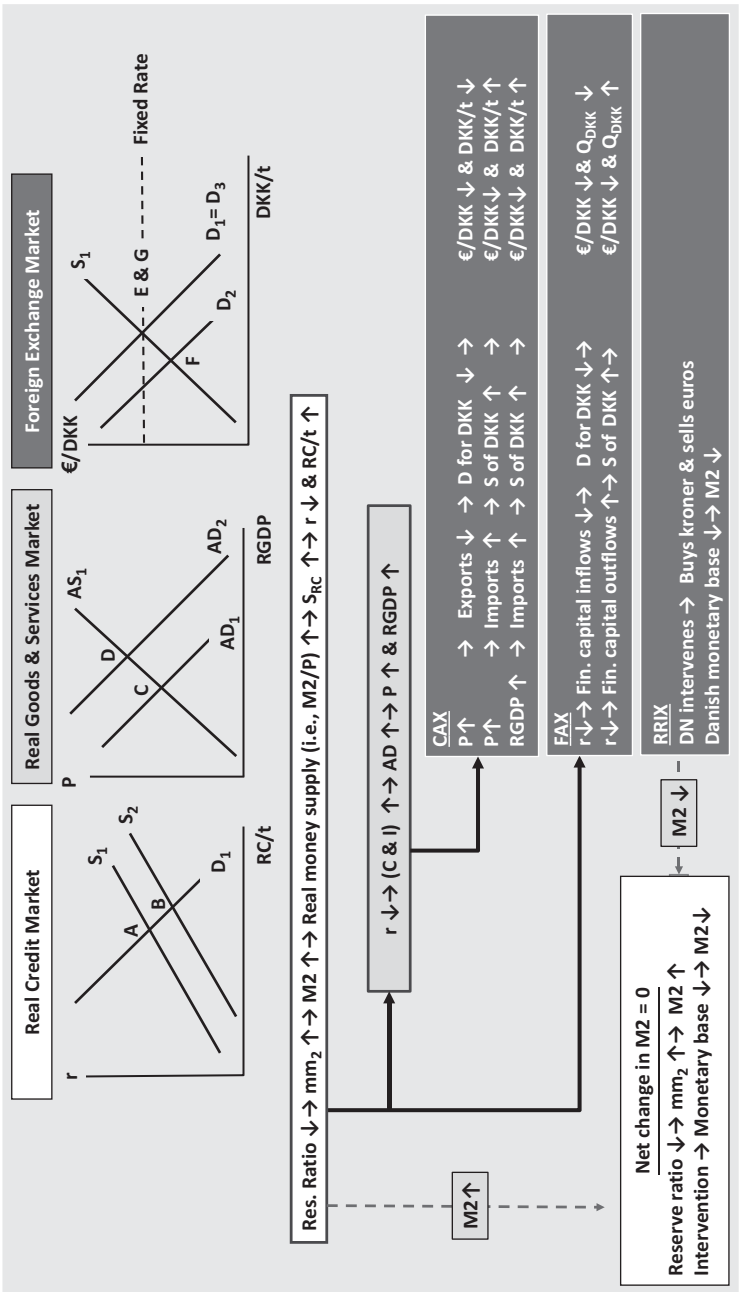

Figure 20.23: Effects of Expansionary Monetary Policy with a Fixed Exchange Rate.

	Sources of Change	Causes	Changes in Supply or Demand	Net Effect
1	**CAX-Related Forces**	→	**Net exports ↓**	**Krone depreciates**
	GDP Price Index ↑	→	Exports ↓→ D_{Kr} ↓	
		→	Imports ↑→ S_{Kr} ↑	
	Nominal exchange rate = 0	→	(Exports & Imports) = No change	
	RGDP ↑	→	Imports ↑→ S_{Kr} ↑	
2	**FAX-Related Forces**	→	**Net financial capital inflows ↑**	**Krone depreciates**
	Real interest ↓	→	Financial capital inflows ↓→ D_{Kr} ↓ Financial capital outflows ↑→ S_{Kr} ↑	
3	**RRIX-Related Forces**	→	**International reserves ↓**	**Krone appreciates**
	Central bank intervention	→	DN sells euros and buys kroner	

Figure 20.24: Changes in the Krone's Value Due to Expansionary Monetary Policy.

market rises as Danish investors purchase relatively more attractive euro-denominated investments. These factors cause the krone to depreciate.

RRIX-Related Supply and Demand Forces in the Foreign Exchange Market

The CAX-induced and FAX-induced changes in supply and demand put downward pressure on the value of the krone. Denmark's fixed exchange rate system obligates Danmarks Nationalbank to offset this downward pressure. To accomplish this, Danmarks Nationalbank must purchase kroner with its euro reserves. Therefore, intervention causes a reduction in Danmarks Nationalbank's mountain of international reserves.

To simplify the graphical analysis (but not our qualitative conclusions), Figure 20.23 shows only the reduction in demand for kroner, from D_1 to D_2, and not the increase in supply, which is caused by the CAX and FAX forces. As noncentral bank demand falls from D_1 to D_2, Danmarks Nationalbank must intervene by increasing the demand for kroner from D_2 to D_3.[12]

Unlike expansionary fiscal policy, the CAX and FAX forces associated with expansionary monetary policy are reinforcing and not offsetting. Therefore, intervention by the central bank does not depend on the degree of international capital mobility. High international capital mobility only causes the krone's nominal value to depreciate further than it would with low-mobility international capital

12 Note that $D_1 = D_3$.

markets. This means that more central bank intervention would be required and a more substantial portion of its mountain of international reserves would be used.

Suppose Danmarks Nationalbank wanted to peg the kroner at €0.13/DKK (i.e., DKK 7.7/€), and to do so, it sold €10 million of its euro reserve assets into the foreign exchange market. As Figure 20.25 shows, this intervention would reduce Denmark's monetary base by DKK 77 million and reduce the M2 money supply by a multiple of that amount.

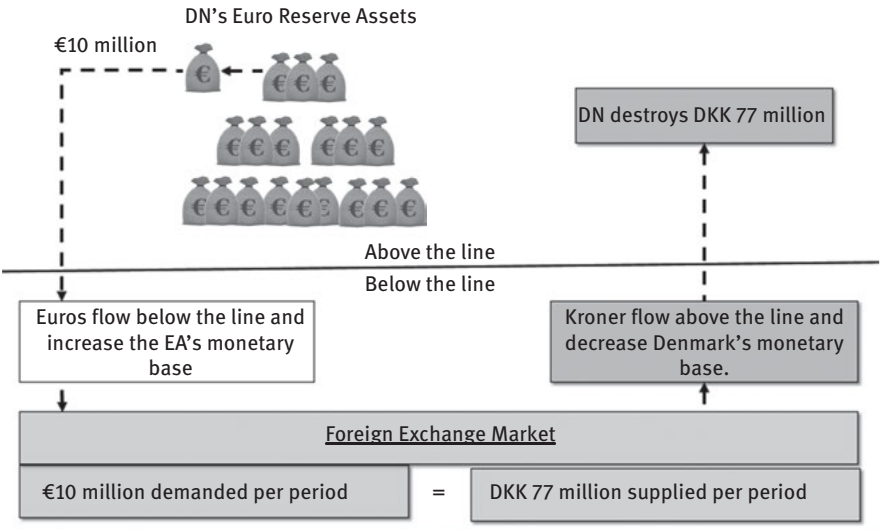

Figure 20.25: Effects of Intervention by Danmarks Nationalbank to Raise the Krone's Value. (Imagery used: © nerthuz/123rf)

An interesting (and very important) conclusion from our analysis is that, overall, Denmark's M2 money supply does not change because the increased M2 money multiplier, caused by the reduced reserve ratio, is precisely offset by the decrease in monetary base. The next section discusses this point in detail.

Effectiveness of Monetary Policy for Nations with Fixed Exchange Rates

Let's pause here to consider the effectiveness of monetary policy for countries with fixed exchange rates. More specifically, the issue is whether expansionary monetary policy can be effective at all. If a central bank tries to increase the nation's money supply but is unable to do so because required foreign

exchange market intervention interferes, then monetary policy is ineffective, and another policy tool, such as fiscal policy, should be considered.

It is tempting to think that the initial increase in Denmark's money supply, which is caused by the reduction in the reserve ratio, is the direct impact, and therefore the one that dominates all the subsequent indirect impacts, but there is a problem with this conclusion. An increase in Denmark's real money supply causes changes in the nation's price level, real GDP, and real interest rate, and fluctuations in these economic variables affect the value of the krone, which *forces* Danmarks Nationalbank to intervene. Central bank intervention is a second direct impact, which stops only when there is no longer any pressure on the exchange rate to change. In this case study, downward pressure on the krone ends only when Denmark's prices, real GDP, and the real interest rate return to their original levels or rates, but this happens only when the initial increase in the nation's money supply is entirely offset by central bank intervention. In short, a new equilibrium is established only when the net change in the money supply is equal to zero.[13]

If the Danish markets were completely frictionless, the offsetting effects of central bank intervention would occur immediately. Under these circumstances, there would not be even a brief interval when monetary policy was effective. Of course, economic frictions could delay, for a short period, the offsetting effects of central bank intervention, but this lag is not likely to be long, and its duration would dwindle as the public became more familiar with the effects of monetary policy. For this reason, most macroeconomic analyses evaluate the effects of monetary policy after considering the offsetting effects of central bank intervention.

Impossible Trinity

Our conclusions lead us to an important macroeconomic law, called the *Impossible Trinity*, which is easiest to understand in the context of a nation's desire to attain three economic goals, which are:

1. A fixed exchange rate
2. Free and open international trade and capital markets
3. Monetary independence

13 In the context of the Three-Sector Model, an alternative (perhaps easier) way to understand this conclusion is by putting the foreign exchange market analysis directly after (to the right of) the real credit market analysis in Figure 20.23 and then putting the real goods and services market directly after (to the right of) the foreign exchange market. The economic analysis reveals that intervention sterilizes changes in the real money supply, which means there are no indirect impacts on the real goods and services market.

The Impossible Trinity tells us that it is possible for a nation to achieve any two of these goals, but it is impossible to achieve all three simultaneously.

Denmark is a perfect illustration of the Impossible Trinity. The country adopted fixed exchange rates (Goal 1) and had free, open international trade and capital flows (Goal 2), but as a result, the central bank lost control of the nation's money supply (Goal 3). We know this because Danmarks Nationalbank tried to increase the money supply by lowering the reserve ratio, and this policy was unsuccessful. Money that was created when the money multiplier rose was destroyed by a reduction in the monetary base due to central bank intervention in the foreign exchange market. The Impossible Trinity tells us that, if Denmark wanted to regain independent control of its money supply, it could do so only by adopting a flexible exchange rate or imposing onerous restrictions on international trade and capital flows.

Summary of Economic Effects

If the net change in Denmark's money supply is zero, then the nation's most important macroeconomic variables remain constant. The only significant changes are in the nation's monetary base, money multiplier, and two balance of payments accounts.

No Change in the Real Interest Rate, RGDP, NGDP, GDP Price Index, Unemployment Rate, Employment-to-Population Ratio, Real Wages, Nominal Wages, Nominal Krone Value, and Real Krone Value

With no *net* change in Denmark's money supply, there would be no change in the supply of real credit and, therefore, no change in the real interest rate or net borrowing. As a result, aggregate demand would remain constant, and there would be no change in Denmark's GDP Price Index or real GDP.

With no change in real GDP, there would be no change in Denmark's unemployment rate or employment-to-population ratio. As a result, the demand for labor would remain constant, and there would be no pressure for Denmark's real or nominal wage rates to change.

Due to central bank intervention, Denmark's nominal exchange rate would remain constant. Finally, the nation's real exchange rate would remain constant because neither the nominal exchange rate nor the domestic price level would change.

M2 Multiplier Rises, Monetary Base Falls, and M2 Money Supply Does Not Change

The reduction in the nation's reserve ratio increases the nation's money multiplier, but central bank intervention reduces the monetary base. In the end, these two direct impacts are self-cancelling. Therefore, Denmark's money supply remains constant.

CA Does Not Change, FA Rises, and RRI Falls

Expansionary monetary policy causes Danmarks Nationalbank to lose international reserves due to its intervention in the foreign exchange market. The loss of international reserves decreases Denmark's reserves and related items.

Denmark's relative prices have not changed, and neither has its real GDP or exchange rate. Therefore, there is no economic reason for Denmark's current account to change. Similarly, Denmark's relative real interest rate has not changed; so, there is no economic reason for the financial account to change. If this is the case, then where is the entry that counterbalances the negative entry in the reserves and related items because we know from the Balance of Payment Identity that (CA + KA) ≡ (FA + RRI)?

When Danmarks Nationalbank intervenes in the foreign exchange market, the transactions below the line involve changes in bank checking accounts, which are recorded in the financial account. As a result, Denmark's negative reserves and related items would be counterbalanced by a positive financial account.[14]

Figure 20.26 summarizes the effects of expansionary monetary policy on Denmark's balance of payments and why central bank intervention simultaneously changes the financial account and reserves and related items in opposite directions. Danmarks Nationalbank's counterparties could be either foreign or domestic residents. If they are foreign residents, then Danmarks Nationalbank's intervention decreases Denmark's liabilities to foreigners, as foreign residents lose their Danish bank accounts. If domestic residents are Danmarks Nationalbank's counterparties, then Denmark gains assets (i.e., checking accounts) in foreign nations. The balance of payments records both decreases in liabilities to foreigners and increases in Denmark's holdings of foreign assets as positive values. Therefore, the financial account rises as reserves and related items fall.

14 *The Rest of the Story* portion of this chapter explains, in more detail, balance of payments accounting and central bank intervention.

	Balance of Payments Accounts and the Economic Variables Affecting Them	Causes	Changes in Denmark's Balance of Payments	Net Effect
1	**Current Account (CA)**	→	**Δ Net exports↓**	**No change in CA**
	Δ Real exchange rate = 0	→	Δ Net exports =0	
	Δ GDP Price Index= 0	→	Δ Exports & Δ Imports = 0	
	Δ Nominal exchange rate = 0	→	Δ Exports & Δ Imports = 0	
	Δ RGDP = 0	→	Δ Imports = 0	
2	**Financial Account (FA)**	→	**Net financial capital inflows ↑**	**FA increases**
	Δ Real interest = 0	→	Δ Financial capital inflows = 0 Δ Financial capital outflows = 0	
	Counterparty to DN's intervention	→	Due to DN's intervention, Denmark's net investments abroad increase or net foreign investments in Denmark fall.	
3	**Reserves and Related Items (RRI)**	→	**International reserves ↓**	**RRI decreases**
	Central bank intervention	→	DN sells euros and buys kroner, causing Denmark's net foreign assets to fall.	

* Δ stands for "change in."

Figure 20.26: Changes in Denmark's Balance of Payments with Low International Capital Mobility*.

The Rest of the Story

Balance of Payments Accounting and Central Bank Intervention

This section considers two examples of foreign exchange market intervention. In the first example, Danmarks Nationalbank's counterparty is a foreign resident, and, in the second, a Danish resident is the counterparty. We will find that the effects on the nation's balance of payments and monetary base are the same in both cases.

Effects of Intervention When Central Bank's Counterparty Is Not a Danish Resident

Suppose Danmarks Nationalbank sells €10 million of its euro reserve assets in the foreign exchange market, and Volkswagen, a large German automobile manufacturer, is the counterparty. Because the value of the krone is fixed at €0.13/DKK, the value of the euro is fixed at DKK 7.7/€. Therefore, the krone value of the €10 million deal is DKK 77 million.

Let's follow the accounting steps of these transactions and then follow up with the balance of payments analysis.

1. Assume that Danmarks Nationalbank's euro reserves are held on deposit at the European Central Bank (ECB). By intervening, Danmarks Nationalbank's reserve assets fall by €10 million, and the European Central Bank's liability to Danmarks Nationalbank falls by €10 million. See the two entries marked #1 in Figure 20.27
2. Suppose Volkswagen's kroner transactions are done through Copenhagen-based Danske Bank A/S, and its euro transactions are done through French-based BNP Paribas. Therefore, Volkswagen's deposits at Danske Bank A/S fall by DKK 77 million, and its deposits at BNP Paribas rise by €10 million. See the two entries marked #2 in Figure 20.27.
3. Once the euro side of this transaction is cleared, BNP Paribas's deposits at the European Central Bank rise by €10 million, and the European Central Bank's liability to BNP Paribas increases by €10 million. Notice how this transaction increases BNP Paribas's reserve assets and, therefore, raises the Euro Area's monetary base. See the two entries marked #3 in Figure 20.27.
4. Finally, when the krone transaction clears, Danske Bank A/S loses reserve assets worth DKK 77 million at Danmarks Nationalbank, and Danmarks Nationalbank loses a DKK 77 million liability to Danske Bank A/S. Notice that the reduction in Danske Bank A/S' reserve assets causes Denmark's monetary base to fall. See the two entries marked #4 in Figure 20.27.

Analysis

The €10 million reduction in Danmarks Nationalbank's reserve assets in the European Central Bank are recorded in Denmark's reserves and related items as a negative DKK 77 million figure because it represents a loss of assets relative to foreign nations. The reduction in Danske Bank A/S's liabilities to Volkswagen (a foreign resident) is recorded as positive DKK 77 million in Denmark's financial account because it represents a reduction in liabilities to foreigners. Figure 20.28 summarizes these results.

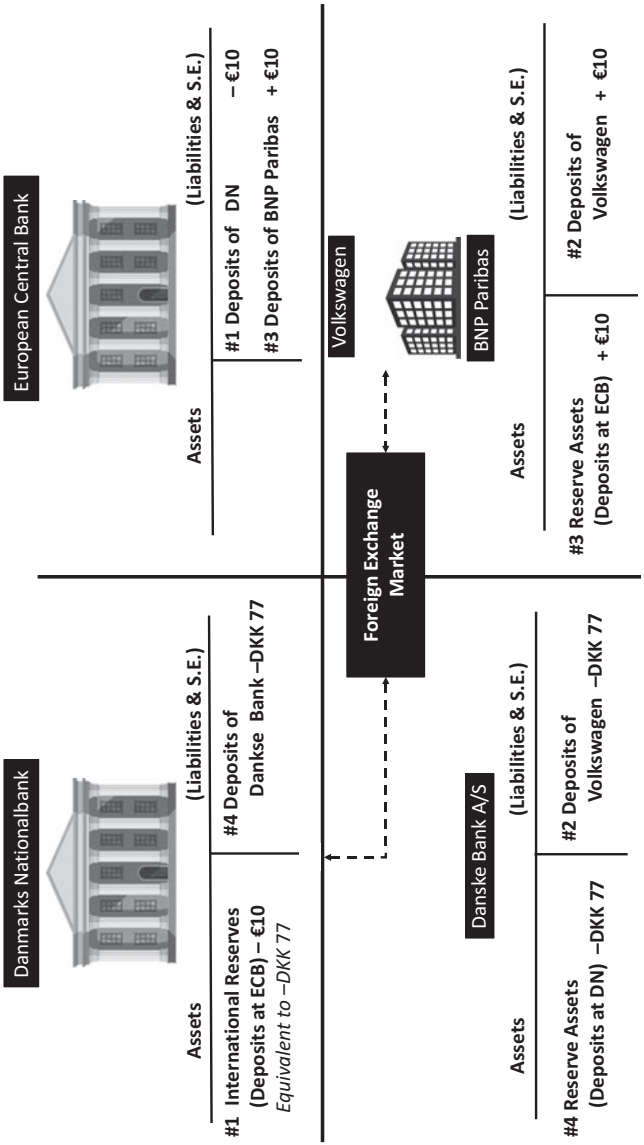

Figure 20.27: Accounting Entries When Danmarks Nationalbank Sells Euros in the Foreign Exchange Market to Foreign Residents. (Imagery used: © MicroOne/Shutterstock; © Sompop U-kong/123rf)

Δ Current Account Transactions	=	0
Δ Capital Account Transactions	=	0
Δ Financial Account Transactions	=	+ DKK 77 million
Δ RRI (Central Bank) Transactions	=	– DKK 77 million

* Δ stands for"change in."

Figure 20.28: Balance of Payments Effects of Central Bank Intervention When the Counterparties Are Foreign Residents.

Effects of Intervention When Central Bank's Counterparty Is a Danish Resident

Let's take the same example as before, but this time, we will assume that A. P. Møller – Mærsk (i.e., Mærsk), Denmark's largest private company, is the counterparty to the central bank transaction. Suppose Mærsk also uses Danske Bank A/S, for its kroner-related transactions and BNP Paribas for its euro-related transactions. Figure 20.29 shows the accounting entries connected to these transactions. Notice that all the entries are the same as in our previous example, except the deposits of Mærsk rather than Volkswagen change.

1. As was the case in the previous example, Danmarks Nationalbank's reserve assets, which are held on deposit at the European Central Bank, fall by €10 million. Therefore, the European Central Bank reduces its deposit liabilities to Danmarks Nationalbank by €10 million. See the two entries marked #1 in Figure 20.29.
2. Because Mærsk purchases €10 million with DKK 77 million, its account at BNP Paribas rises by €10 million, and its deposit at Danske Bank A/S falls by DKK 77 million. See the two entries marked #2 in Figure 20.29.
3. When the euro side of the transaction clears, BNP Paribas's deposits at the European Central Bank increase by €10 million, and therefore, the liabilities of the European Central Bank to BNP Paribas increase by €10 million. Notice that these transactions increase the euro monetary base. See the two entries marked #3 in Figure 20.29.
4. Finally, when the krone transaction clears, Danske Bank A/S loses deposits worth DKK 77 million at Danmarks Nationalbank, and Danmarks Nationalbank reduces the Danske Bank A/S' deposits by DKK 77 million. Notice that the reduction in Danish bank reserves causes Denmark's monetary base to fall. See the two entries marked #4 in Figure 20.29.

The €10 million reduction in Denmark's reserve assets is recorded in reserves and related items as negative DKK 77 million because it represents a net loss of

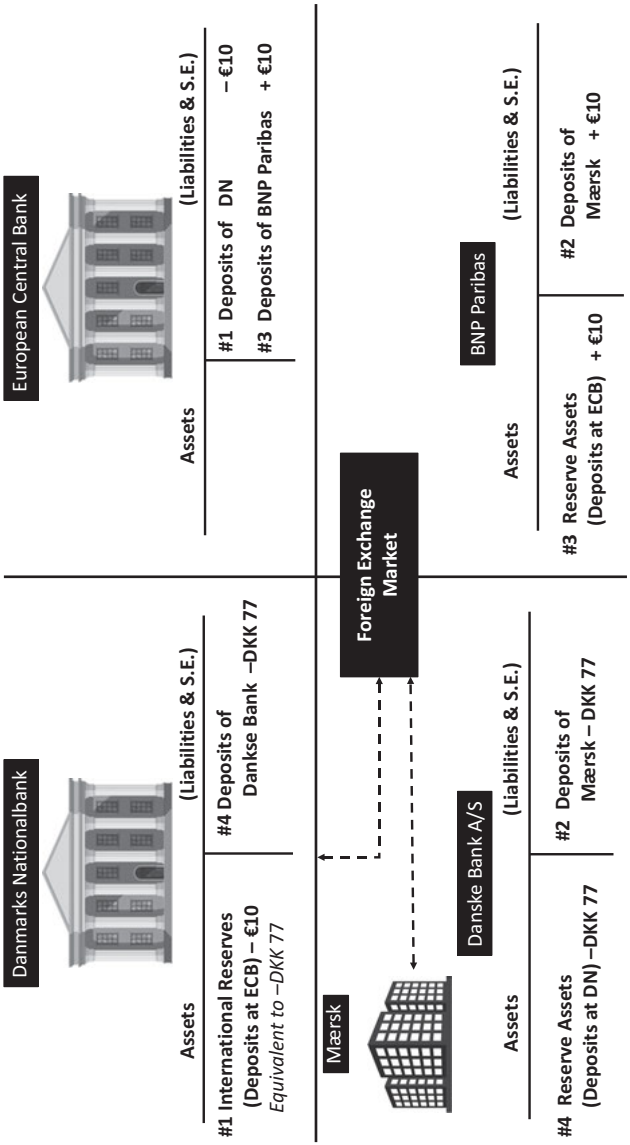

Figure 20.29: Accounting Entries When Danmarks Nationalbank Sells Euros in the Foreign Exchange Market to Domestic Residents. (Imagery used: © MicroOne/Shutterstock; © Sompop U-kong/123rf)

Denmark's foreign-owned assets. At the same time, the €10 million increase in Mærsk's deposit in BNP Paribas is recorded as a positive item in the financial account because it represents an increase in Denmark's foreign assets. These effects are summarized in Figure 20.30.

Δ Current Account Transactions	=	0
Δ Capital Account Transactions	=	0
Δ Financial Account Transactions	=	+ DKK 77 million
Δ Reserves and Related Items Transactions	=	– DKK 77 million

* Δ stands for "change in."

Figure 20.30: Balance of Payments Effects of Central Bank Intervention When the Counterparties Are Danish Residents.

Conclusion

This chapter provided a framework for analyzing short-term changes in economic conditions for nations with fixed exchange rates. Two exogenous shocks were analyzed—first, expansionary fiscal policy and second, expansionary monetary policy. Our analysis provided strong support for the conclusion that fiscal policies can be very effective for nations with fixed exchange rates and open international trade and capital markets. At the same time, monetary policies are very ineffective, unless the nation imposes strong international trade and investment controls. From our investigation, we learned that it is impossible for a nation to simultaneously have a fixed exchange rate, free and open international trade and capital markets, and independent control of its money supply. This conclusion, called the Impossible Trinity, is an essential takeaway from any study of international macroeconomics.

Our analysis also showed that a nation choosing a fixed (or managed) exchange rate during turbulent times might force its central bank to intervene regularly in the foreign exchange market. This intervention can cause significant changes in the nation's monetary base, money supply, and international reserves. If intervention requires a central bank to sell its reserves, then this support can continue only as long as the nation has reserves available or has access to them.

Key Points

- No exchange rate system is appropriate for all nations at all times.
- Fluctuating exchange rates are like economic shock absorbers.
  - They can absorb part or all of the impact of rising foreign prices.
  - They give nations the ability to pursue independent monetary policies. Fixed exchange rates take away this power.
  - Fixed exchange rates are often adopted by nations that have lost confidence in their own central banks or want to reduce exchange rate-related risks associated with international trade and investment transactions.
- Fixing a currency's value means the central bank offsets *net* CAX-related and FAX-related forces.
  - Central bank intervention in the foreign exchange markets changes a nation's monetary base.
  - Fiscal policies for countries with fixed exchange rates and open international trade and capital flows are more effective the higher the nation's international capital mobility.
  - Monetary policies for countries with fixed exchange rates and open international trade and capital flows are ineffective.
  - Impossible Trinity: A nation can simultaneously achieve two, but never all three, of the following goals: (1) a fixed exchange rate, (2) free and open international trade and capital markets, and (3) monetary independence.
- When a central bank intervenes in the foreign exchange market, the results are the same if the counterparty is a domestic or foreign resident.

Review Questions

1. Suppose a bipartisan bill is proposed to the U.S. Congress, which imposes a 25% tariff on all U.S. imports from China, unless the Chinese national government takes action to prevent unfair trade and investment practices. Use the Three-Sector Model to explain the effect this 25% tariff would have on *China's* GDP Price Index, real and nominal GDP, real and nominal interest rates, and real exchange rate against the U.S. dollar. Assume the dollar-yuan exchange rate is fixed.
2. Using the Impossible Trinity, explain whether you agree or disagree with the following statement. "If a central bank sets a nominal exchange rate target, then it abandons control of the domestic money supply and nominal interest rate."
3. Suppose Thailand's central bank fixes the value of the baht (THB) relative to the U.S. dollar, but the dollar can float freely relative to other nations. If the U.S. dollar increases in value, what should happen to Thailand's exports to other Asian countries?
4. Suppose the U.S. Treasury Secretary makes a trip to China to discuss currency manipulation charges against the People's Republic Bank of China. China refuses to bend on its fixed exchange rate policy relative to the dollar but agrees to liberalize its current account and financial account controls. Explain the effect this agreement should have, if any, on China's ability to control its M2 money supply.

5. The West African Economic and Monetary Union has eight member countries. Its currency, the CFA franc, is pegged to the euro, and many analysts feel that central bank intervention has caused the franc to become significantly overvalued relative to the euro. Exchange rates are set by the forces of supply and demand. What do analysts mean when they say that the CFA franc is "overvalued"?
6. If there are financial capital inflows into a country with a fixed exchange rate, should fiscal policy be contractionary or expansionary to offset the effects of exchange rate intervention? Explain.
7. Suppose the value of India's international reserves rose from $430 billion to $500 billion.
   a. Can we conclude that the Indian central bank intervened in the foreign exchange market? Explain.
   b. Explain whether the Indian exchange rate was higher or lower than it would have been under a flexible exchange rate regime.
   c. Explain whether foreign exchange intervention caused the Indian monetary base to rise, fall, or not change.
8. Suppose you work as an Asian investment analyst and are asked to provide a brief report on the Japanese economy during the coming two years. Use the Three-Sector Model to explain the effects an increase in China's real GDP should have on the *Japanese* economy. Remember that if China's real GDP rises, the nation will import more from Japan. Assume that Japan and China have high-mobility international capital markets, and Japan fixes the yen's value relative to the yuan.
9. At the beginning of 2018, Saudi Arabia imposed its first-ever value-added tax (VAT) of five percent on the consumption of most goods and services. Burdened by large and persistent government budget deficits, the Saudi government imposed the VAT to help deal with the lack of tax revenues. Use the Three-Sector Model to explain the effects the Saudi VAT (i.e., a *consumption tax*) should have on the nation's real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal exchange rate of the Saudi riyal (SAR) against the U.S. dollar, and quantity of riyal traded per period. Assume the riyal is fixed to the U.S. dollar. Once you have completed your Three-Sector Model analysis, please answer the following questions.
   a. Explain the (direct and indirect) impacts and effects that the VAT should have on Saudi Arabia's M2 money supply, real exchange rate against the dollar, and balance of payments accounts (i.e., current account, financial account, and reserves and related items).
   b. In an effort to curb corruption, the Saudi government imposed hefty fines as punishment. Suppose Saudi royals and businessmen moved their wealth outside the country in an effort to avoid fines. If the riyal were fixed to the U.S. dollar, how, if at all, would these actions affect the Saudi monetary base and M2 money supply?
   c. *Challenge Question*. Explain the (direct and indirect) impacts and effects that the VAT should have on Saudi Arabia's structural and cyclical government budget deficits.
10. Bolivia relies heavily on exported commodities. Assume the nation has a fixed exchange rate against the U.S. dollar. Use the Three-Sector Model to explain the effects that *falling* commodity prices (e.g., the prices of mineral fuels, ores, and precious metals) should have on Bolivia's real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal exchange rate of the boliviano (BOB) against the dollar,

and quantity of bolivianos traded per period. Once you have completed your analysis of the Three-Sector Model, please address the following points.

a. Explain the direct and indirect impacts and effects that falling commodity prices should have on Bolivia's M2 money supply, real exchange rate against the U.S. dollar, and balance of payments (i.e., current account, financial account, and reserves and related items).
b. *Challenge Question*. Explain the effects this shock should have on the Bolivian government's budget deficit.

11. In 2017, the U.S. Department of Homeland Security announced the expiration date for Honduran citizens living in the United States under Temporary Protected Status (TPS). Initially, the expiration date was set for January 5, 2018, but an extension was granted. The Trump Administration also set TPS expiration dates for citizens from Nicaragua (January 2019), Sudan (May 2019), Haiti (July 2019), and El Salvador (September 2019).

    Hondurans living in America send part of their earnings home to Honduras in the form of remittances. The total amount is significant relative to Honduras' GDP. If these expatriates return to Honduras, this flow of remittances will end.

    Assume that (1) the families receiving these remittances from the United States use them for consumption, (2) transfers are made in dollars and converted into Honduran Lempira (HNL), and Honduras' central bank (Banco Central de Honduras) fixes the value of the Lempira to the U.S. dollar. Use the Three-Sector Model to explain the effects that a *drop in remittances* should have on Honduras' real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal exchange rate of the Lempira against the U.S. dollar, and quantity of Lempira traded per period. Focus your answer on the elimination of transfer payments from residents living in the United States to Honduras. Once you have completed your Three-Sector Model analysis, please answer the following questions.

    a. Explain the (direct and indirect) impacts and effects that *the elimination of transfer payments* should have on Honduras' M2 money supply, real exchange rate against the dollar, and balance of payments (i.e., current account, financial account, and reserves and related items).
    b. Analyze the effect of having significant numbers of Honduras citizens returning to their native country and entering the workforce. Use the real goods and services market (only) to explain the effect this should have on Honduras' economy.
    c. *Challenge Question*. Explain the (direct and indirect) impacts and effects that the elimination of transfer payments should have on Honduras' structural and cyclical government budget deficits.

12. From 2011 to 2015, the Swiss National Bank pegged its currency, the franc, to the euro (see Figure 20.31). The purpose of the peg was to prevent the franc from appreciating and further reducing Swiss exports to the euro area. In 2015, the European Central Bank pursued "quantitative easing," which lowered euro interest rates. As a result, the Swiss National Bank (SNB) unpegged the franc from the euro. To understand the SNB's rationale for unpegging the franc from the euro, assume the central bank kept the peg in place. Assuming the nation has a fixed exchange rate, answer the following questions.

    a. Use the Three-Sector Model to explain the consequences that reductions in the euro's real interest rates would have had on the Swiss economy. In particular, explain the effects on Switzerland's real interest rate, quantity of real credit per period, GDP Price

Figure 20.31: Dollar-Swiss Franc Exchange Rate: December 2010 to February 2015.

Index, real GDP, nominal exchange rate against the euro, and quantity of Swiss francs traded per period.

b. Explain the (direct and indirect) impacts and effects that falling euro real interest rates would have had on Switzerland's M2 money supply, net exports, real exchange rate against the euro, and balance of payments (i.e., current account, financial account, and reserves and related items).

c. Many Swiss banks imposed a negative interest rate on the Swiss franc deposits of foreign residents. Explain why Swiss banks imposed such penalties. Despite the negative interest rates, deposits of foreign residents rose. Provide an explanation for why foreign depositors would accept a negative interest rate.

13. Use the Three-Sector Model to determine the effects that higher Chinese real estate prices, which increase household wealth, should have on the China's real GDP, GDP Price Index, real exchange rate (yuan relative to U.S. dollars), quantity of yuan or dollars traded per period, real and nominal interest rates, quantity of real credit per period, reserve assets, and M2 money multiplier. Use both graphical analysis and brief explanations to support your answers. Assume the China's (a) exchange rate is fixed relative to the dollar, (b) international capital markets are highly mobile, (c) aggregate supply curve is in the intermediate range, and (d) government currently has a budget deficit.
14. Suppose the Swiss federal government in Bern proposes building a high-speed train line from Zurich to Geneva. Instead of taking the normal 2.5 hours to get from Zurich to Geneva, the new line would reduce travel time to only 55 minutes. In doing so, Zurich residents could commute and work in Geneva and vice versa. Similarly, tourists would have much quicker access to cities in the nation's northeast and southwest regions. The estimated cost of the project is CHF 5 billion, which the government intends to finance from domestic capital markets.

a. Is this policy an example of fiscal policy, monetary policy, or is it a combination of policies?
b. Use the Three-Sector Model to determine the effects this government spending project should have on Switzerland's real and nominal GDP, GDP Price Index, real and nominal exchange rates, quantity of Swiss francs traded per period, real and nominal interest rates, and quantity of real credit per period. Use both graphical analysis and brief explanations to support your answers. Assume: (1) the Swiss National Bank commits itself to fix the exchange rate at 1.20 Swiss francs per euro (i.e., CHF1.2/EUR, which is EUR0.833/CHF); (2) Switzerland's international capital markets are highly mobile; (3) Switzerland is in the intermediate range of its aggregate supply curve; and (4) the Swiss national government has a budget deficit before the policy change.

15. Suppose that turmoil in Turkey causes nervous investors to sell $3.5 billion worth of Turkish-lira bonds and invest the proceeds in euro-denominated securities. Assume that the central bank maintains a fixed exchange rate between the Turkish lira (TRY) and euro (EUR). Explain the effect these transactions should have on Turkey's current account, financial account, and reserves and related items. What effect, if any, should these transactions have on Turkey's monetary base, money supply, and M2 money multiplier?
16. Suppose the Korean government implements policies that modernize plant and equipment, promote innovation, and enhance labor productivity. As a result, the nation's aggregate supply rises without increasing aggregate demand. Assume Korea has a fixed exchange rate relative to the U.S. dollar. Use the Three-Sector Model to determine the effect Korea's policies should have on the nation's GDP Price Index, real interest rate, nominal interest rate, real and nominal GDP, balance of payments accounts, real exchange rate of the won (KRW) relative to the dollar (USD), unemployment rate, and level of international reserves.
17. Gesundheit Technologie AG is a German-based company with affiliates around the world. Suppose you are working as Gesundheit's finance manager in Khartoum, Sudan. A recent business report explains that the Sudanese government is planning on raising personal income taxes to help reduce inflation and correct the nation's large government budget deficit. Using the Three-Sector Model, explain how an increase in personal income taxes should affect Sudan's economy. Assume the Sudanese pound (SDD) is fixed against the dollar at $0.020 per Sudanese pound, and Sudan faces relatively low-mobility international capital markets.

Discussion Questions

18. Suppose the Russian government promotes inflows of foreign direct investments by reducing or eliminating bureaucratic restrictions. Assume (1) the Russian ruble is fixed relative to the U.S. dollar at $0.02/RUB; (2) foreign investors borrow outside Russia and convert their funds into ruble, and (3) international capital markets between the United States and Russia are highly mobile. Use the Three-Sector Model to explain the effect these investment inflows should have on Russia's real interest rate, quantity of

real credit per period, real exchange rate, monetary base, M2 money multiplier, current account, financial account, and reserves and related items.

a. *Challenge Question*. Would these international capital flows be more or less stimulatory or contractionary if Russia's consumption expenditures (C) and gross private domestic investment (I) had very low interest-rate elasticities? Explain.

19. Suppose political, military, and social unrest in Syria sparks many individuals to flee the Syrian pound (SYP) in favor of other, more stable, currencies and currency systems.
    a. In preparation for their flight to other currencies, individuals and businesses move funds from time deposits to checking accounts. From there, they intend to purchase other currencies. Explain the effect (if any) the movement of funds from Syrian time deposits to checking deposits has on Syria's monetary base, M2 money multiplier, and real interest rate.
    b. If the Syrian central bank decides to intervene in the foreign exchange market as this capital flight takes place, explain the effect (if any) these massive capital outflows should have on Syria's monetary base, real interest rate, and reserve assets.
    c. If the Syrian central bank decides not to intervene in the foreign exchange market as this capital flight takes place, explain the effect (if any) these massive capital outflows should have on Syria's monetary base, real interest rate, and reserve assets.
20. Nigeria's high dependency on imports occasionally causes dollar scarcity problems. To alleviate them, suppose the government imposes restrictions on the importation of certain consumer goods. Assume that these restrictions are effective in reducing the amount of Nigerian imports. Use the Three-Sector Model to explain the effects *a decrease in imports* should have on: Nigeria's real interest rate, quantity of real credit per period, GDP Price Index, real GDP, nominal exchange rate of the Nigerian naira (NGN) against the U.S. dollar (USD), and quantity of naira traded per period. Assume that the central bank maintains a *fixed exchange rate* against the U.S. dollar.
    a. Explain the (direct and indirect) impacts and effects that a decrease in imports should have on Nigeria's M2 money supply, nominal interest rate, real exchange rate against the U.S. dollar, and balance of payments (i.e., current account, financial account, and reserves and related items).
    b. *Challenge Question*. With supply and demand, explain how there can be a *shortage* of dollars in Nigeria. In this context, explain how black markets arise. Why might the presence of a black market for dollars contradict the Nigerian central bank's claims that it is not intervening to support the naira? In the context of supply and demand, explain how currency controls allocate scarce dollars.

Chapter 21
Causes, Cures, and Consequences of the Great Recession

From December 2007 until June 2009, the United States suffered its worst financial and economic downturn since the Great Depression of the 1930s. Due to the depth and duration of the decline, it became known as the *Great Recession*. Causes were multiple, but the tipping point was America's subprime mortgage crisis,[1] which started in early 2007 and escalated into a broader economic calamity by summer and fall of the same year. Even though subprime mortgages amounted to only about $1.2 trillion of the approximate $11 trillion U.S. mortgage market, its venom spread quickly through densely intertwined domestic and international financial arteries to poison overleveraged and overexposed financial institutions.[2]

At the beginning of the recession, the signals were mixed. The United States was clearly embroiled in a financial crisis because well-established financial institutions, such as Bear Stearns, Lehman Brothers, and Merrill Lynch, were fighting for their lives. Nevertheless, the nation's unemployment rate and real gross domestic product (RGDP) appeared to be holding steady. It was reasonable to ask if the United States had reached a stage in its economic growth and development at which disruptions in the real credit market could be contained or cauterized so they did not affect the real goods and services market or foreign exchange markets.

Macroeconomic indicators told a similar story in foreign countries. Financial disruptions in the United States seemed to have little or no initial effect on the economic growth and prosperity of its major trade and investment partners. Even skeptics wondered if developed nations, such as those in the European Union (EU) and Asia, might be strong enough to withstand the cratering U.S. financial markets. Answers to these queries came swiftly and unpleasantly during the third quarter of 2008, when the U.S. financial crisis began battering both the domestic and foreign real goods and services markets, as well as the foreign

1 Subprime mortgages are real estate loans made to borrowers with relatively low creditworthiness, as measured by their credit ratings and other indicators of borrowing capacity. To compensate for this added risk, lending institutions typically charge higher rates on subprime mortgages than on prime mortgages.

2 In *The Rest of the Story* portion of this chapter, the section entitled "Chronology of Major Events: 2007–2009," shows the trail of destruction left by the Great Recession.

https://doi.org/10.1515/9781547401437-021

exchange markets. If we learned anything from this crisis, it was the folly of believing that calamities can occur in the real credit market without affecting the other macro markets. As Figure 21.1 shows, the gears of the major macroeconomic markets are closely interconnected.

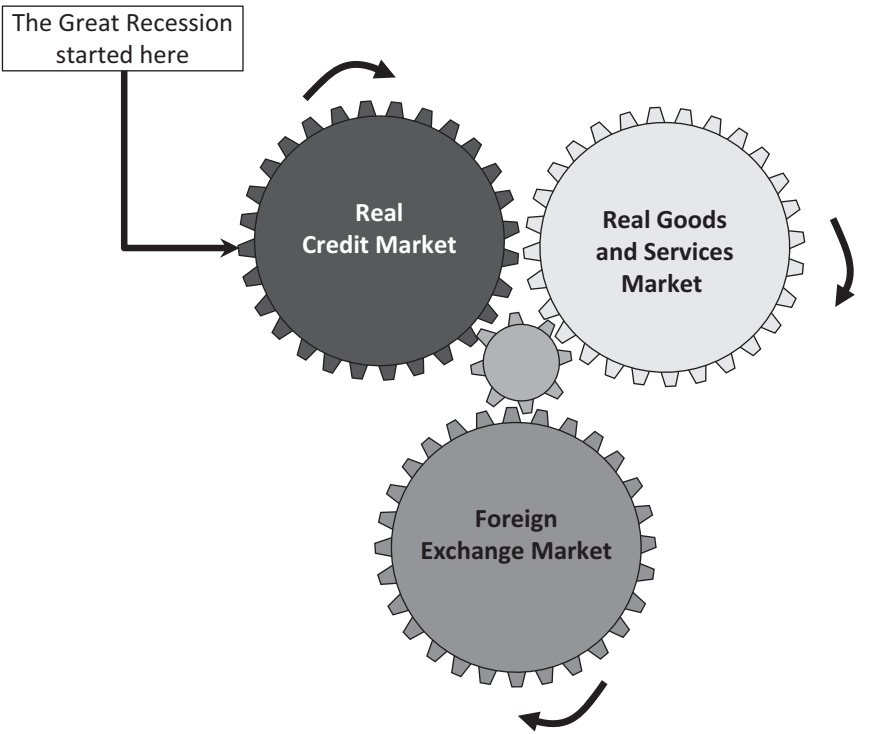

Figure 21.1: Major Macroeconomic Markets and the Start of the Great Recession.

This chapter begins by reviewing the macroeconomic measures of devastation from 2007 to 2009 and goes on to explain the incentives that caused this financial and economic calamity. After the Great Recession struck, two problems needed to be solved. One was figuring out how to stop the hemorrhaging, which meant rebuilding trust in the U.S. financial system. The other was how to kickstart the faltering U.S. economy. This chapter discusses how the U.S. government and Federal Reserve diagnosed these problems and tried to solve them. It ends by looking back, after more than a decade, to appraise the net results.

The Basics

Measures of Economic Devastation

The Great Recession began in the real credit market but soon spilled over to affect real economic growth, unemployment, inflation, and exchange rates, as well as trade and investment relations with foreign nations. Traditional macroeconomic performance measures indicated that a significant sickness, with staying power, had struck. Hidden beneath these deteriorating indicators were millions of real-life stories about individuals who had lost their jobs and homes and were waging fierce battles to maintain living standards that they and their families once enjoyed.

Declining Real GDP

Between October 2007 and April 2009, real GDP in the United States plunged by almost 6%, wiping out hundreds of billions of dollars in goods and services. Based on the annual percentage decline in real GDP, it was the deepest recession since the Great Depression of the 1930s.

Rising Unemployment

The U.S. unemployment rate rose from 5% in December 2007 to 9.5% by June 2009, resulting in the loss of more than 7 million jobs. Even after the Great Recession officially ended in June 2009, the U.S. unemployment rate continued rising to 10% by October 2009, with 15.4 million people actively seeking, but without, work.

Other measures of labor market health were equally, if not more, dispiriting. The U.S. employment-to-population ratio fell from 62.7% to 59.4%, its lowest level since April 1984. At the same time, the mean unemployment duration (i.e., the average number of weeks an unemployed individual is out of work) rose to its highest levels in more than 60 years. Not all sectors suffered the same burdens because job losses were unevenly spread. For example, the construction, leisure, hospitality, and manufacturing sectors were especially hard hit, while employment remained relatively healthy in the government, health services, and educational services sectors.

Falling Inflation Rates

The combination of ever-increasing job losses and falling incomes reduced household and business demand, causing inflation rates to fall—during some

months, below zero. In the past, the United States had gained experience learning to adjust to moderate-to-high inflation rates, but it had no recent experience with deflation. There were concerns that deflation could pose serious problems, such as those that have plagued nations like Japan for decades.

Declining Wealth

The Great Recession wiped out years of accumulated wealth and savings, forcing baby boomers and many others to reconsider important decisions, such as retirement. Between 2006 and 2009, nominal and real home prices fell in the United States by approximately 30% and 35%, respectively.[3] Stock market prices fared no better. Between the beginning of December 2007 and the end of June 2009, the Dow Jones Industrial Average and Standard and Poor's Index fell by 37% and 38%, respectively, wiping out trillions of dollars of financial wealth.

U.S. Housing Market and the Great Recession

Many factors aided and abetted the U.S. economic meltdown, which is now called the Great Recession. Each had a distinct influence. The tipping point was the U.S. housing market collapse, which caused rapid and dramatic reductions in household wealth. Understanding why housing prices fell and how they threatened the solvency of America's most revered and (formerly) most successful financial institutions helps demystify this economic upheaval. Similarly, understanding the effect falling housing prices had on household wealth and consumption expenditures clarifies how problems in the real credit market can spread quickly to the real goods and services market.

U.S. Mortgages

From the end of World War II until the late twentieth century, U.S. mortgages were financed mainly by savings and loan associations (S&Ls). These debts were secured by the real estate they funded. If debtors defaulted,[4] lenders foreclosed their ownership rights and sold the properties, usually at auction, for what they were worth. If a property was sold for less than the outstanding mortgage, the bank suffered the loss, which weakened its equity position. Significant losses could threaten the bank's solvency. In cases of default,

3 Figure 21.2 shows this price compression and puts it into a broader perspective.

4 A default occurs when a borrower fails to meet his/her contractual responsibilities to make timely principal and interest payments.

American states have different rules regarding the rights of banks to recover losses from borrowers. *Nonrecourse* states prohibit banks from going after other assets or the income of defaulting borrowers. *Recourse* states permit it.

Since the early 1930s, U.S. mortgages have had features that have made them both appealing and affordable to homeowners. Among them have been 30-year maturities, self-amortizing payment schedules,[5] fixed interest rates, and regular, standardized monthly payments (e.g., 360 equal amounts on a 30-year loan). To reduce the likelihood of losses, due to default, lenders required borrowers to have skin-in-the-game by making substantial down payments (often 20%). Banks required borrowers without sufficient down payments to purchase mortgage guaranty insurance, which reimbursed lenders when borrowers defaulted.[6]

U.S. Housing Prices: 1980 to 2013

Figure 21.2 shows U.S. housing prices from 1980 to 2013. Regardless of whether the increase is measured in nominal or real terms, home prices became grossly out of line with historical trends from 2000 to 2006, reaching unsustainable heights.

U.S. Housing Bubble

What caused the housing bubble, and why did it burst after 2006? Answers to these questions lie in the particular set of incentives that coalesced in the early part of the twenty-first century and caused financial institutions and individuals to take excessive risks. Players in this financial tragedy acted rationally to the incentives they faced. Unfortunately, the excitement of illusory wealth creation silenced the whistles that typically warn of impending dangers.

Five significant factors caused the U.S. housing market to collapse. They were:

1. Changing government regulations and incentives to homeowners
2. U.S. monetary policies
3. Wealth destruction
4. Moral hazard
5. Illiquidity

5 "Self-amortizing" means the monthly payment includes both principal and interest so that, at the end of the 30 years, the debt is extinguished. During the early part of the twentieth century, mortgage loans had much shorter maturities, carried variable rates, and required total repayment of the loan at maturity (i.e., borrowers paid only interest until maturity). This mortgage structure led to defaults and a lack of liquidity during the Great Depression. See Robert Kolb, *The Financial Crisis of Our Time* (Oxford: Oxford University Press, 2011).

6 Private mortgage insurance is typically limited to 20% to 25% of the outstanding mortgage value.

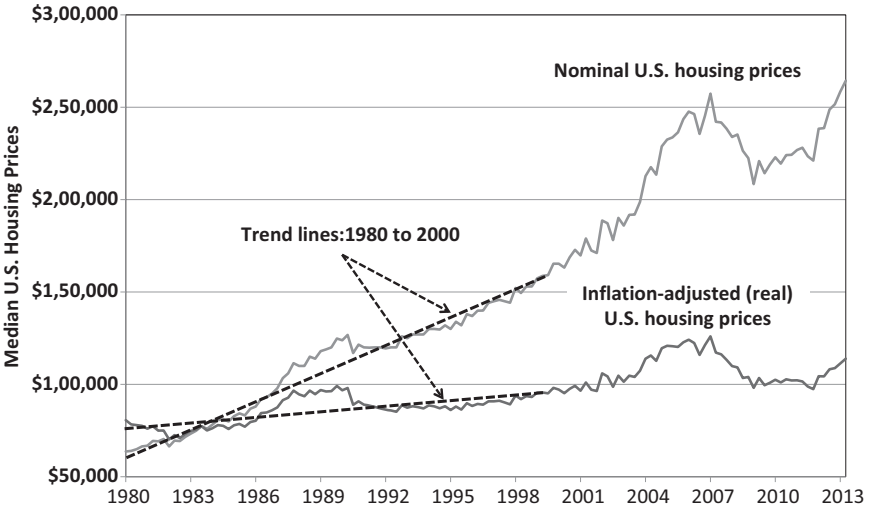

Figure 21.2: Nominal and Real U.S. Housing Prices: 1980 to 2013.
Source: Economic Research, Federal Reserve Bank of St Louis, FRED® Economic Data, http://research.stlouisfed.org/fred2/ (accessed August 29, 2019).

Understanding each of them in isolation is insightful, but appreciating them together as a broader mosaic helps provide a better understanding of the misguided incentives that created this crisis.

Changing Government Regulations and Incentives to Homeowners

The U.S. government's fingerprints were all over the scene of this financial crisis. Two areas deserve special attention. The first was the change in U.S. financial regulations, and the second was the set of government incentives that encouraged homeownership.

Changing Government Regulations

During the 77 years between 1930 and 2007, U.S. financial regulations changed dramatically. The period from 1933 to 1980 was one with relatively heavy controls on financial institutions and their activities. To better understand the financial environment, it is helpful to roll back the clock to the 1930s when the *Great Depression* prompted U.S. legislation that more stringently regulated financial institutions. One prominent example was the Glass-Steagall Act of 1933, which created the Federal Deposit Insurance Corporation, that controlled interest rates that U.S. banks could offer on deposits, and separated commercial

from investment banking. Another example was the Banking Act of 1935, which strengthened and centralized the Federal Reserve's powers.

From 1980 to 2010, the regulatory environment changed, as banks and other financial institutions were unshackled from government controls and given more freedom to compete.[7] Starting in 1980 with the Depository Institutions Deregulation and Monetary Control Act and continuing until the Gramm-Leach-Bliley Act in 1999, U.S. financial markets became progressively less regulated—able to engage in new and riskier activities, as well as merge and form alliances that were once forbidden.

President Reagan's election in 1980 was a catalyst for change, but financial deregulation was fundamentally a reaction to unsustainable economic conditions for mortgage lenders in the United States. For years, these financial institutions had made 30-year, fixed-rate mortgages at low, single-digit rates. During the James (Jimmy) Carter Administration (1977–1981), U.S. interest rates increased with rising inflation and mounting inflationary expectations. When the Fed restricted credit (starting in 1979), real interest rates rose, inflationary expectations remained high, and U.S. financial institutions found themselves financing low-earning mortgages with double-digit, short-term interest rates.

Restrictions on the deposit interest rates that banks could offer caused *financial disintermediation*, which occurs when market interest rates rise above bank-regulated limits and result in customers withdrawing funds from banks and investing them elsewhere, such as in U.S. government securities and offshore accounts. Financial disintermediation made funding expensive.

If properly implemented, financial deregulation might not have been a significant cause of the Great Recession, but proper implementation required market and government oversight that was capable of keeping the financial system on the road, while not taking control of the steering wheel. If something was lost in translation during the deregulation process, it was the belief that deregulation meant the absence of both regulations and market-disciplining systems.

Government Incentives to Homeowners

For many families, the *American Dream* has been to own a home. Since the Great Depression, this goal has been shared by numerous U.S. politicians, prominent among whom were Presidents Herbert Hoover, Franklin Roosevelt, and William (Bill) Clinton. Results of government and private efforts were

7 In *The Rest of the Story* portion of this chapter, the section entitled "Acts that Deregulated the U.S. Financial Industry" lists, in chronological order, the steps taken in the United States to deregulate its financial system between 1980 and 2000.

impressive, as the percentage of families owning homes rose from approximately 45% at the end of World War II to more than 65% in 1980.

In 1994, President Clinton reinvigorated this national campaign by initiating a program called the *National Home Ownership Strategy: Partners in the American Dream*, which was a public–private initiative that directed the U.S. Department of Housing and Urban Development (HUD) to increase U.S. homeownership to 67.5% by the end of 2000.[8] U.S. ownership rates were below this goal and falling —especially among low-income, young, and minority households. Consequently, President Clinton's strategy focused there. The *Home Ownership Strategy* program removed mortgage financing barriers for starter homes, rewarded creative, alternative home-buying techniques, provided housing subsidies, relaxed unnecessary underwriting standards, such as loan-to-value and down payment restrictions, and built partnerships between public and private institutions.

To increase homeownership, the U.S. government used a carrot-and-stick strategy on banks. The carrot was to give them easy access to Fannie Mae and Freddie Mac[9] (which are government-sponsored entities), whose mandate was to provide a secondary market for U.S. mortgages. Since 1992, Fannie and Freddie had been regulated by the Office of Federal Housing Enterprise Oversight (OFHEO) within HUD, which became responsible for setting these government-sponsored entities' goals regarding lending opportunities to low-income families and families in relatively neglected geographic areas of the country.

OFHEO's new mandate began in earnest in 1995, when purchases of securities backed by subprime mortgages were counted toward the government-sponsored entities' homeownership goals. By the early 2000s, regulators required the government-sponsored entities to devote more than 50% of their mortgage purchases to affordable housing. As a result, their acquisitions of subprime mortgages, between 2000 and 2004, rose ten-fold.

The stick applied to banks by the politicians and regulators was through the passage of legislation, such as the Community Reinvestment Act (CRA),[10] which set up rules and measures for licensing and relicensing banks. These new rules encouraged banks to increase their mortgage loans to individuals in low- and

8 United States, Department of Housing and Urban Development, The National Homeownership Strategy: Partners in the American Dream, May 1995, https://www.globalurban.org/National_Homeownership_Strategy.pdf (accessed August 29, 2019).

9 In *The Rest of the Story* portion of this chapter, the section entitled "Fannie Mae and Freddie Mac" explains these government-sponsored entities and the role they played in the Great Recession.

10 The Community Reinvestment Act was passed in 1977 but was updated in 1995.

moderate-income neighborhoods. The Riegle Neal Interstate Banking and Branching Efficiency Act (1994) and Gramm-Leach-Bliley Act (1999) reinforced this incentive structure by prohibiting branching and bank mergers if the financial intermediaries had unsatisfactory CRA compliance reports, thereby incentivizing banks to lend to individuals with relatively weak credit histories and questionable prospects to repay.

Due to these initiatives, homeownership flourished. To enable this borrowing, financial institutions needed to find ways to lend to individuals who would not have received loans under prior regulations. Many of them financed homes with mortgages that tested the limits of borrowers' financial abilities. When interest rates rose and the economy turned sour, these individuals and families were first in line to default, which put intense financial pressure on banks and other mortgage providers—more about this later.

U.S. Monetary Policies

Between 1995 and 2000, investors pumped billions of dollars into internet-related companies, resulting in the "dot.com bubble" (also called the internet Bubble), which increased internet-related stock prices wildly above realistic values. This bubble would surely have burst on its own, but it was helped along by the Federal Reserve, which raised U.S. interest rates repeatedly, six times between June 1999 and May 2000, to cool the U.S. economy. The bursting of the dot.com bubble ushered in a relatively short (eight month) recession, which lasted from March 2001 to November 2001. Trillions of dollars in wealth were destroyed as U.S. stock markets tanked and thousands of jobs were lost.

During the recession, the United States also suffered a financial panic in the aftermath of the September 11, 2001 terrorist attacks on New York City and Washington D.C. The U.S. Federal Reserve reacted to both shocks (i.e., declining economic activity and 9/11 attacks) by expanding the U.S. money supply and reducing interest rates in the hopes of spurring consumption and investment spending.

Declining U.S. interest rates were assisted by other macroeconomic forces, such as massive financial inflows from foreign countries with high saving rates—especially developing nations, such as China. Increased supplies of financial capital to the U.S. credit markets were also the result of exchange market intervention by foreign central banks, such as the People's Bank of China and Bank of Japan, which were purchasing dollars and then investing them to keep their currency values low. Finally, nominal U.S. interest rates fell and stayed low because inflationary expectations remained muted, partly due to cheap imports from developing nations in Asia—mainly China and India (see Figure 21.3).

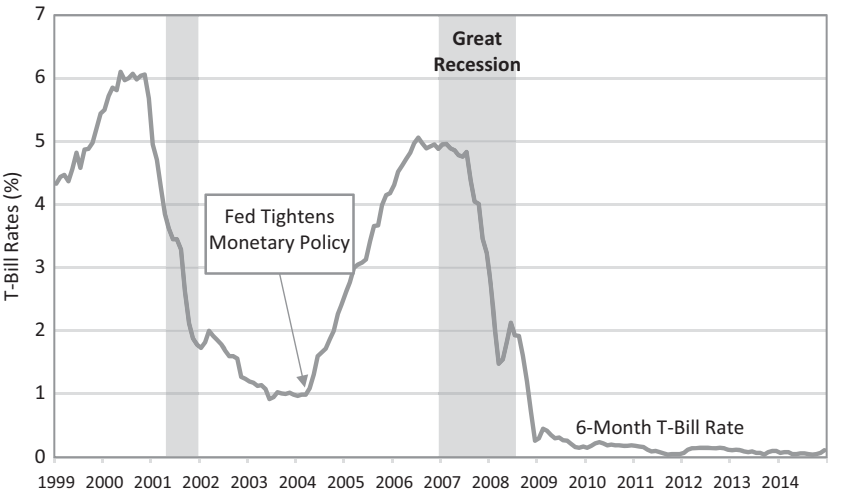

Figure 21.3: Six-Month U.S. Treasury Bill Rate: 1999–2014.
Note: Shaded areas represent U.S. recessions.
Source: Federal Reserve Bank of St. Louis, Economic Research, FRED® Economic Data, https://fred.stlouisfed.org/fred2/ (accessed August 30, 2019).

U.S. interest rates fell during the Great Recession (as they should have). The problem was that they remained low for too long afterward, thereby fueling demand. At times, nominal U.S. interest rates were below expected inflation levels, causing real U.S. interest rates to dip below zero. Borrowers responded by purchasing real estate, and they were encouraged to finance their purchases with adjustable-rate mortgages. As a result, a new bubble emerged in the housing market.

Low and declining interest rates increased competition among banks for alternative sources of profits. One of the most promising areas was in the real estate markets because rising housing prices were earning homeowners substantial capital gains. To gain entry and market share, banks lowered mortgage rates, reduced down payments, and relaxed qualifications for loan approval. They also increased approval speeds, modified terms on their variable-rate versus fixed-rate loans, and tried to compete on a host of other conditions that affect the eligibility of marginal borrowers. The perceived risks were low. Many banks felt that, even if borrowers were unable to repay their mortgages, rising real estate prices would enable them to recover the outstanding debts on foreclosed homes.

During the second quarter of 2004, the Fed began to tighten monetary policy (see Figure 21.3), causing interest rates to rise. As it did, the interest burden on

holders of variable-rate mortgages rose, forcing some to default on their loans. Rising mortgage rates also reduced the demand for houses, causing their prices to fall, and as they fell, new rounds of defaults and foreclosures occurred. Homes that were purchased on the thinnest down payments were soon *underwater* (i.e., their mortgage values exceeded their market values), prompting many homeowners to walk away from their loans, leaving banks to sell a rapidly increasing inventory of homes with depreciating values.

Wealth Destruction

Falling home prices and tumbling stock markets caused household wealth to evaporate quickly, which reduced consumption and aggregate demand. As a result, U.S. real GDP and the GDP Price Index fell, as the unemployment rate rose (see Figure 21.4).

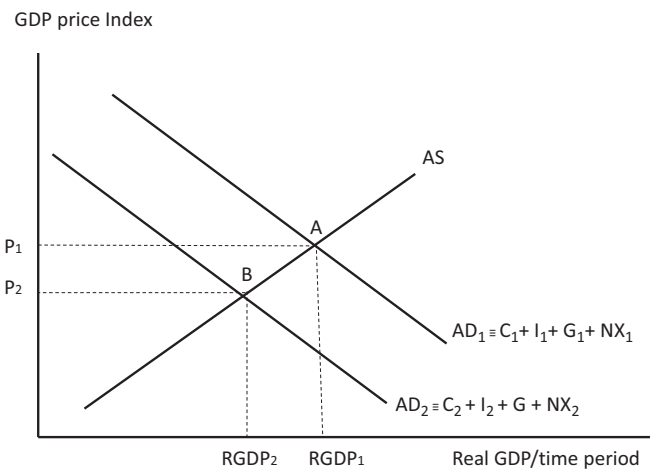

Figure 21.4: Declining Housing and Stock Prices Cause U.S. Aggregate Demand to Fall.

In 2008 alone, U.S. households lost more than $11 trillion in net worth, an 18% drop, bringing their total net worth to $51.5 trillion. The decline wiped out the previous five years of wealth expansion.[11] After five years of double-digit growth

11 Rex Nutting, "Household Net Worth Plunges 18% in 2008," *The Wall Street Journal*, Market Watch, March 12, 2012.

in debt, falling asset values encouraged households to reduce the assets they had purchased with borrowed funds (i.e., to de-lever their balance sheets).[12] During the fourth quarter of 2008, households paid off more debt than they acquired—for the first time since 1952. Declining home prices and plummeting stock markets plunged the United States into a recession.

Homes represent about one-third of the average American family's net worth, and many baby boomers and their parents were counting on selling their homes at profits and retiring on the capital gains. These plans had to be revised. Declining wealth provided incentives to save more and few incentives to spend, which depressed aggregate demand even more, and increased unemployment rates. Between January 2008 and July 2009, real personal consumption expenditures fell by more than $191 billion (–1.9%), and real gross private domestic investment fell by nearly $713 billion (–28.3%). Personal consumption comprised about 70% of U.S. GDP—when it dropped significantly, a recession was virtually inevitable.

U.S. housing market speculation and the government's attempts to increase home ownership fueled the housing bubble, but alone they would not have been powerful enough to cause it. The added ingredients needed were the moral hazard incentives created by reckless securitization.

Moral Hazard

Moral hazard occurs when individuals or institutions do not bear the full cost of their own mistakes, which provides incentives to take excessive risks. Two significant forces created an environment for moral hazard. The first was banks' decision to change from an *originate-to-hold* strategy to an *originate-to-distribute* strategy. The second was *mortgage securitization*, which is the process of originating, bundling, packaging, and selling mortgage-backed securities to investors.

Originate-to-Hold Strategy

Under an originate-to-hold strategy, banks and other mortgage originators hold on to the mortgages either until they mature or until the financed homes are sold and the debts are extinguished. Profits are earned only if monthly revenues are higher than the bank's financing and servicing costs, such as collecting monthly

12 To "de-lever" a balance sheet means to reduce liabilities used to fund income-earning assets.

principal, interest, tax, and mortgage insurance payments.[13] With this strategy, a mortgage lender might hold a loan for as long as 30 years, which provides strong incentives, at the beginning, to scrutinize each prospective borrower's creditworthiness. For this reason, lenders developed high-quality underwriting skills and procedures to determine an individual's or family's capacity to borrow, as well as its ability and willingness to repay loans. Done correctly, top-notch underwriting also protected homeowners from themselves by denying loans when there was no apparent capacity to repay.

Because the financed property serves as collateral for a mortgage loan, having an underwriting system with qualified appraisers narrows the potential gaps between a property's market value and asking price. Evaluating borrowers' creditworthiness usually involves (1) verifying their employment status, income, and net worth, (2) checking personal credit ratings,[14] and (3) making sure that principal, interest, property taxes, and insurance payments (i.e., PITI payments) do not exceed reasonable limits relative to the individual's before-tax income.

The originate-to-hold strategy made lenders the victims of their own mistakes, and, therefore, created incentives that promoted a healthy and sound financial system. This situation changed with the introduction of the originate-to-distribute strategy and securitization.

Originate-to-Distribute Strategy

One problem with the originate-to-hold strategy was that it became a financial straitjacket that limited the number and amount of new mortgages lenders could make. Loans deplete funds, tie up equity, and curtail a lender's ability to create new mortgages. Under an originate-to-distribute strategy, lenders sell their mortgages, rather than hold on to them until maturity or until the properties are sold. Once sold, the interest and principal payments on these mortgages flow to the new owners. Funds derived from these mortgage sales are subsequently used by mortgage originators to make new loans and collect new fees.

The originate-to-distribute strategy created a moral hazard problem because the ill effects of poor mortgage decisions shifted from mortgage originators to

13 "Servicing" will be discussed in *The Rest of the Story* portion of this chapter in the context of the section entitled "Securitization: From Mortgage Origination to Security Sales."

14 The most often used credit rating measure is the FICO score. FICO is an abbreviation for the Fair, Isaac and Company, a public U.S. corporation that was founded in 1956 and uses analytical methods to determine an individual's credit history. FICO scores are used by financial institutions (and many others) as an essential piece of information when evaluating an individual's willingness and ability to repay a loan.

investment banks and then to investors. As a result, banks became mortgage mills with incentives to increase quantity at the expense of quality.

Mortgage brokers became a significant part of the mortgage lending process, by acting as liaisons between potential mortgage borrowers and lenders. For fees paid by the borrower *and* lender, they also helped borrowers select appropriate loans and complete loan applications. They also helped lenders conduct credit checks on their customers. In 2005, independent mortgage brokers were responsible for originating approximately 65% of all subprime mortgages.[15]

Increasingly, assessing borrowers' creditworthiness seemed to be ignored, and the due diligence that one would expect from reputable (formerly conservative) financial institutions became a sham. "NINJA loan" was the expression coined to describe mortgages that banks made to borrowers with no incomes, no jobs, and no assets. In their anxious efforts to increase volume, some banks made loans on properties that did not exist because no one took the time to check the location. Maturities were lengthened, and innovative ways were found to reduce homeowners' monthly bills, such as interest-only mortgages. All of this was done to make homes more affordable to a broader distribution of individuals—and, of course, to increase lender profits.

Securitization: Large investment banks and government-sponsored entities, such as Fannie Mae and Freddie Mac,[16] purchased mortgages from their originators and securitized them by (1) bundling the mortgages together, (2) creating investor-friendly securities based on cash flows from the underlying mortgages, and, (3) selling the newly created securities to domestic and international investors. *Securitization* was a critical piece of the housing crisis puzzle because it incentivized mortgage originators, credit rating agencies, and others to shirk their due-diligence responsibilities.[17]

Purchases of mortgage-backed securities were ideal for anyone wishing to invest in the rapidly rising U.S. real estate market. Foreign financial institutions,

15 Antje Berndt, Burton Hollifield, and Patrik Sandås, *The Role of Mortgage Brokers in the Subprime Crisis*, Antje Berndt, Burton Hollifield, and Patrik Sandås. In *Market Institutions and Financial Market Risk*, Carey, Kashyap, Rajan, and Stulz. 2012, Journal of Financial Economics, 2012. For detailed information see National Association of Mortgage Brokers, Homepage: http://www.namb.org (accessed August 30, 2019)

16 In *The Rest of the Story* portion of this chapter, the section entitled "Fannie Mae and Freddie Mac" explains these government-sponsored entities and the role they played in the Great Recession.

17 In *The Rest of the Story* portion of this chapter, the securitization process is described step-by-step in the section entitled "Securitization: From Mortgage Origination to Security Sales."

without licenses or other footholds in the United States, were especially interested because these securities allowed them to take U.S. real estate positions without having a physical presence in the country and without making messy decisions about any particular borrower's creditworthiness.

When securitized issues have the same risks, returns, maturities, and payments as the underlying (bundled) mortgages, they are called *mortgage-backed securities* (MBS), *mortgage-backed obligations* (MBO), or pass-through securities. Clever investment bankers soon realized that the cash flows from underlying mortgages could be sliced and diced to create new securities with risks, returns, maturities, and payments that were quite different from the underlying mortgages. These new mortgage-backed securities are called *collateralized mortgage obligations* (CMOs). The basic idea behind collateralized mortgage obligations is to separate the mortgage-related cash flows into different tranches, with each having its own risk-return profile.

Tranches are like mini-pools, fed by a strong stream that flows into multiplateaued waterfalls. For a mortgage-backed obligation, the least risky pool is the first to be supplied by the stream of cash flows from the underlying mortgages. Flows to all the remaining tranches are subsequently made in their order of riskiness. For this reason, the least risky tranche often has a Triple-A rating. By contrast, the riskiest security might have junk-bond status because it is supplied last, after all the others have been paid. Returns to these lowest-rated securities are relatively high but so are the risks.

For a while, continuously high profits lulled investors into believing mortgage-backed securities and collateralized mortgage obligations were risk-free. Many relied too heavily on credit rating agencies and too lightly on self-analysis. As for the companies that insured mortgage-backed obligations and collateralized mortgage obligations, investors erred in believing these companies could not fail—but they did.

Originate-to-Distribute Strategy + Securitization = Subprime Loan Crisis

The change in U.S. bank strategy from originate-to-hold to originate-to-distribute, together with the reckless growth of securitization, primed the pump for the subprime crisis. Underwriting standards had sunk to all-time lows, and investors worldwide were seeking exposures to the U.S. real estate market. Figure 21.5 shows the meteoric rise in subprime mortgages between 2000 and 2005/2006 and then their swift retreat once the crisis struck in 2007. Many subprime loans were securitized and sold to investors, leaving them with substantial losses as these investments' market values eroded. There was little or no incentive to purchase real estate backed securities. Among the

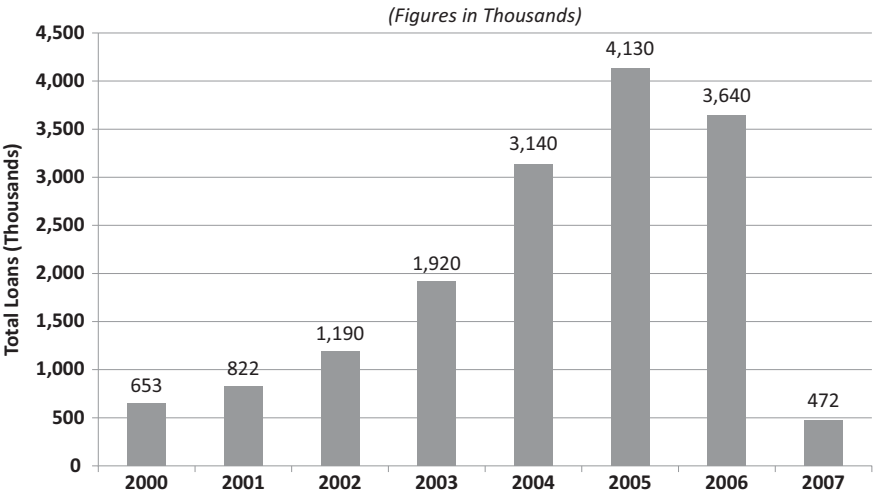

Figure 21.5: Subprime Mortgage Originations: January 2000–July 2007.
Source: Souphala Chomsisengphet and Anthony Pennington-Cross, A Look at Subprime Mortgage Originations: 2000–2007, May 29, 2008, p.3. https://www.ftc.gov/sites/default/files/documents/public_events/consumer-information-mortgage-market/cross_chomsisengphet_subprime_2008.pdf (accessed August 30, 2019).

potential investors were financial institutions, but they were working on wafer-thin equity-to-asset levels. Losses severely reduced their willingness and ability to extend new subprime loans and to purchase securities backed by the cash flows of subprime loans. As credit tightened around the world, borrowing fell, causing reductions in aggregate demand and real GDP. As a result, unemployment rates rose.

The subprime crisis began in January 2007 and by August had turned into a full-blown bank panic, as the undercapitalized U.S. banking system strained under the weight of losses, borrower bankruptcies, foreclosures, and falling asset values. Unhealthy banks were vulnerable to seizure by the Federal Deposit Insurance Corporation (FDIC).

Illiquidity

Another important cause of the Great Recession was illiquidity, which was exacerbated by a general lack of transparency among financial institutions. The problem was perceptions. Even healthy financial institutions were treated suspiciously. To reduce risks, many financial institutions used derivative instruments to hedge their positions, making their actual exposures much less risky

than they might have appeared, at first. Many of these derivative hedges were over-the-counter, which means there were no central clearinghouses that could verify the net (hedged) positions of financial institutions. As a result, it was easy to assume the worst about any financial company's economic status, which resulted in curtailed credit lines and restricted business with companies (even healthy ones) that needed financing. Overreaction caused a shortage of liquidity at the same time that security prices were falling. For many borrowers, credit availability became disconnected from market fundamentals. A psychosis of lending emerged as banks and other financial institutions cut credit lines with each other to defend their own liquidity needs. The lack of transparency led to funding difficulties in the repurchase agreement market (commonly called the "repo" market) and commercial paper market. Repos and commercial paper are essential sources of short-term liquidity to support business operations. Without these multi-trillion-dollar markets to fund their daily operations, the growth of financial and nonfinancial firms would be significantly impaired.[18] These markets nearly came to a standstill during the financial crisis because security prices fell so rapidly that no one knew exactly what they were worth as collateral.

Falling security values and concerns about defaults led to distrust and increased credit risks, causing numerous prudent lenders to withdraw from the markets. Many companies found it difficult to meet weekly payroll obligations, which left equally desperate households with the task of managing the trickle-down effects from employers in the throes of a liquidity panic.

Declining economic conditions and undercapitalized U.S. financial institutions caused many households and businesses to withdraw their funds from troubled banks, mutual funds, and hedge funds. These "runs" on the U.S. financial system were the result of investors seeking safe havens in financial assets, such as government securities. To meet the rising tide of withdrawals, financial institutions were forced to sell their assets in markets that were unwilling and unable to buy them. This set off a global search for value in complex financial assets having almost no historical record of performance and risk.

Liquidity also contracted as many financial institutions curtailed lending due to the losses they incurred from de-levering their balance sheets. As financial asset prices fell, so did the value of collateral backing existing loans, which led to reduced lines of credit, margin calls, and collective demands for more

18 They are called "repurchase agreements" because each deal involves the simultaneous sale and repurchase of a security. The sales price is lower than the repurchase price, making the difference an effective interest earned (paid) on this collateralized loan.

collateral. The desperate need for cash prompted massive asset sales (called "fire sales"), as companies and individuals tried to salvage whatever value they could under the circumstances. Those willing to accept collateral for repurchase agreements did so at significantly discounted prices.

Fixing the Credit and Goods and Services Markets

Initially, the crisis was confined to a few significant-sized financial institutions, but it soon spread industry-wide and beyond. The critical question was whether the United States was experiencing an illiquidity or insolvency crisis. The difference was significant because illiquidity problems are caused by a lack of funding to meet current expenditures. These problems have relatively easy and identifiable solutions and, therefore, tend to be short-lived. Frequently, central banks help nations over these periods of illiquidity by providing access to needed funds. One of the primary functions of central banks is to prudently adjust the availability of liquidity to varying levels of economic need.

By contrast, insolvency is a much thornier problem because in this case companies' assets are worth less than their liabilities, which calls for structural business solutions, such as equity infusions, asset liquidations, financial restructuring, management replacement, new strategies, and the elimination of redundancies (a euphemism for layoffs). Insolvency is problematic because it raises questions about which stakeholders will be most severely affected. Will it be creditors, workers, taxpayers, or will all of them bear an equal portion of the burden? Without recovery, every victory is sure to be pyrrhic, in the sense that there will be a loser for every winner and a bunch of losers without any winners.

Fixing the Credit Market

The Great Recession started in the credit market. Therefore, it made sense for the U.S. government and central bank to focus their initial recovery efforts there. Insolvency and illiquidity were two significant problems standing in the way of any meaningful U.S. recovery. Had their balance sheets been valued at market prices, some of the largest and most influential U.S. commercial and investment banks would have been insolvent. Economically speaking, they were *zombie financial institutions*—members of the living dead. The values of their mortgage and nonmortgage assets had fallen substantially and seemed to be in an endless downward spiral.

Dealing with illiquidity meant restoring trust, calming markets, and putting a floor under declining asset prices. The reluctance of financial institutions to lend to each other forced many to sell their liquid assets, which decreased their prices. Businesses also suffered liquidity problems, as their access to short-term bank loans and the commercial paper market was insufficient to finance basic working capital needs. As a result, many financial and commercial businesses were like healthy fish gasping for air in shallow puddles of water.

Curing the Insolvency Problem

To remedy the insolvency problem, commercial and investment banks had to reduce the toxic assets on their balance sheets and find ways to infuse new equity into their balance sheets. Had the struggling financial institutions sold their toxic assets for what they were worth, losses would have triggered numerous bankruptcies. Similarly, on the equity side, private infusions of new capital into these financial institutions were unlikely, given their precarious and ever-worsening performance and the fear of more to come.

As Figure 21.6 shows, toxic assets may not have been large relative to total assets, but they were large relative to equity.

With no private market solutions in sight, the government and central bank were left as the likely sources of bailout funding. Governments have the power to tax, borrow, and spend. Potentially, the U.S. government could have purchased banks' toxic assets and infused these financial intermediaries with equity. Central banks had the power to ease illiquidity problems by lending to financial institutions or purchasing the assets that they needed to sell. These solutions may seem obvious, but four troublesome problems were standing in the way.

Problem #1: Transferring the Problem Is Not Solving It

Purchasing toxic bank assets would have only transferred the problem from financial institutions to the federal government and central bank (see Figure 21.7). For the Fed, the situation would have been both ironic and problematic because these purchases could have transformed its conservative balance sheet into one looking more like a hedge fund.

Problem #2: Nationalization, Favoritism, and Nonconventional Policy

If the government ended up taking equity positions in financial institutions, cries of nationalization would have been raised. Many critics would have objected to

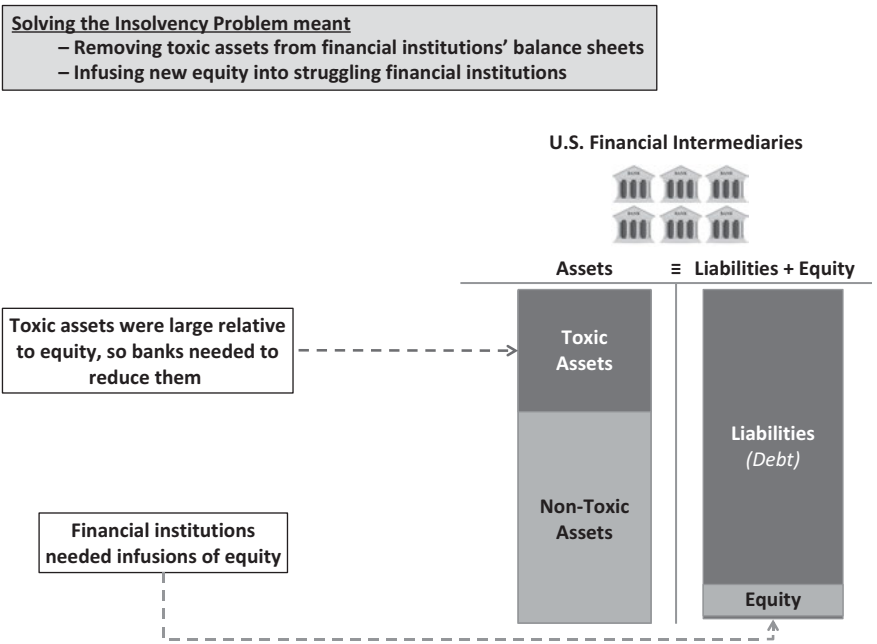

Figure 21.6: Solving the Insolvency Problem. (Imagery used: © Sarah Maher/123rf)

such actions, calling it *creeping socialism*. When the U.S. government intervened in precisely these ways (i.e., purchasing shares of nine large U.S. banks),[19] the conservative outcry was loud and expected.

Fear of political fallout was one of the strong reasons government officials, such as Henry Merritt "Hank" Paulson, Jr., U.S. Treasury Secretary under President George W. Bush, resisted purchasing bank equity. It smacked of industrial policy with the government choosing winners and losers, which the Republican administration wanted to avoid. Another concern was that needy banks might not participate, due to the stigma attached to any form of nationalization and fears of government meddling after the funds were distributed.

Problem #3: Funding Government Debt Can Increase Real Interest Rates

To purchase toxic bank assets or bank shares, the government needed funds, and two potential sources were through taxation and borrowing (see Figure 21.8).

19 The banks were Bank of America (including Merrill Lynch), Bank of New York, Citigroup, Goldman Sachs, JPMorgan Chase, Mellon, Morgan Stanley, State Street Bank, and Wells Fargo.

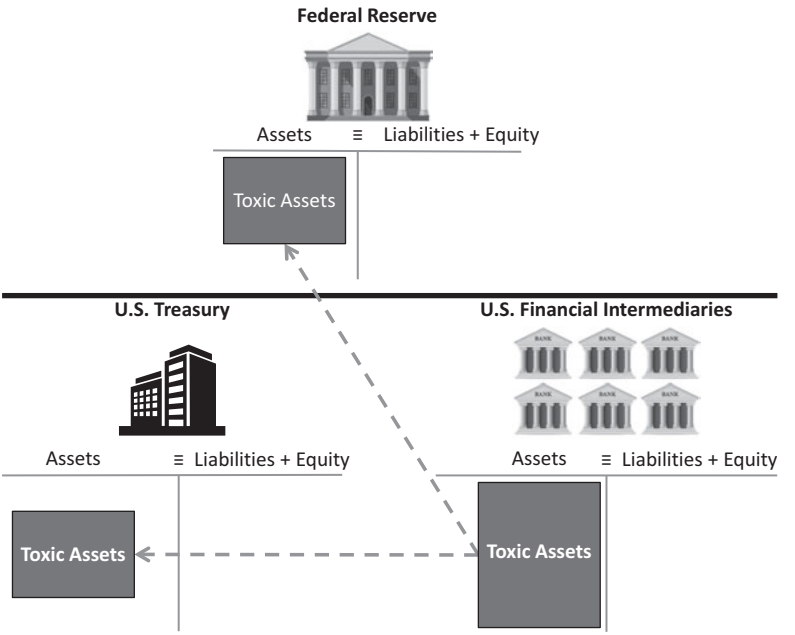

Figure 21.7: Transferring the Problem Is Not Solving It. (Imagery used: © MicroOne, nualicrea/Shutterstock; © Sarah Maher/123rf)

Increasing taxes in the middle of the Great Recession would have been political suicide and economically unwise for the effect it could have had on aggregate demand. A potential problem with government borrowing was that it could have put upward pressure on real U.S. interest rates. Fortunately, the tumbling U.S. economy took pressure off the real credit market; so government borrowing did not dramatically increase real interest rates, but the size of the government debt exploded due to the numerous spending programs passed to restore economic growth.

Problem #4: Central Bank Funding Increases the Monetary Base

Central bank purchases of banks' toxic assets carried a different set of financial risks because these actions increase the monetary base, which has the potential to increase the money supply, aggregate demand, and inflation (see Figure 21.9)—more about this later.

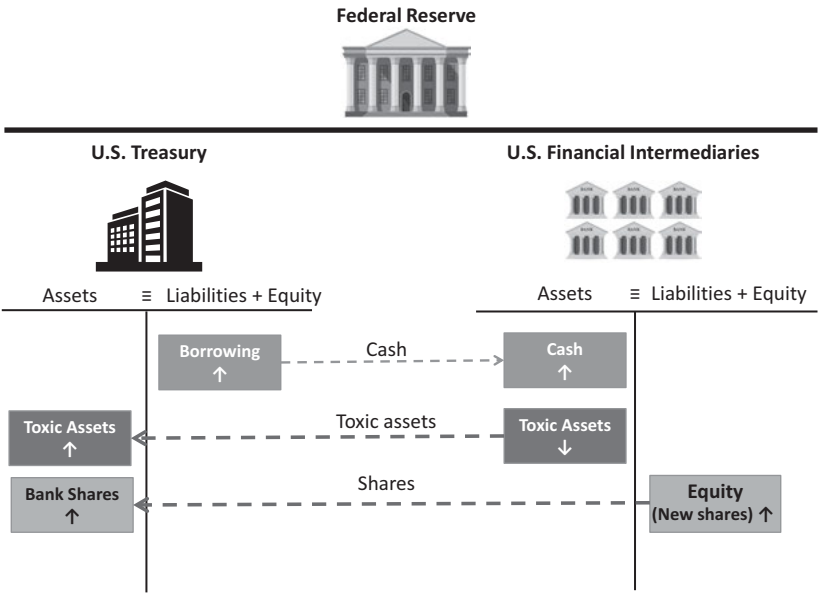

Figure 21.8: Purchasing Bank Stock and Toxic Assets Increased Government Debt and Borrowing. (Imagery used: © MicroOne, nualicrea/Shutterstock; © Sarah Maher/123rf)

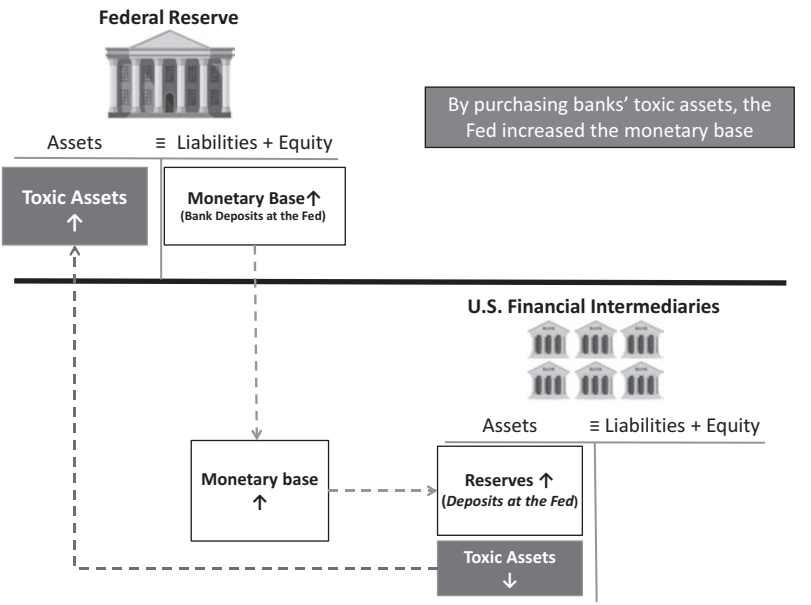

Figure 21.9: Financial Effects of Central Bank Purchases of Banks' Toxic Assets. (Imagery used: © MicroOne/Shutterstock; © Sarah Maher/123rf)

Curing the Illiquidity Problem

The repo and commercial paper markets had seized up and interrupted the flow of short-term funds to healthy financial and commercial businesses. To provide needed relief, the Fed conducted aggressive expansionary monetary policies. Nevertheless, just because there are more funds available does not mean financial institutions will be willing to lend them or businesses and households will borrow them. Trust and confidence were needed to restore sanity and calm the runs on banks.

The financial crisis put extreme pressures on weak banks and financial institutions, as depositors withdrew funds in massive amounts. Despite the $100,000 insurance guarantee of the Federal Deposit Insurance Corporation on customer deposits, withdrawals were rampant—especially by individuals whose deposit balances exceeded this limit and those who did not want to deal with the bureaucratic delays and problems that might accompany gaining access to their insured funds. Even those who were fully insured panicked as trust in the U.S. financial system evaporated. To reduce fears and, thereby, the risk of bank runs, the Federal Deposit Insurance Corporation, in 2008, increased (until December 31, 2010) the maximum Federal Deposit Insurance Corporation-insured deposits from $100,000 to $250,000. Congress extended this coverage in 2010 until year-end 2013.[20]

The Fed addressed the illiquidity problem in a second way by massively expanding the U.S. monetary base. From December 2007 (i.e., the official beginning of the Great Recession) until June 2009 (i.e., the official end), the Fed increased it by almost 100% (from $859 billion to $1,702 billion), with much more added in the subsequent months.[21]

Fixing the Real Goods and Services Market

Fixing the U.S. real goods and services market went hand-in-hand with fixing the nation's real credit market. When a nation is in the throes of a recession, the usual economic prescription is for the government to pursue expansionary fiscal policies by increasing spending and reducing taxes. The monetary prescription is to purchase government securities, lower reserve requirement ratios, and lower the discount rate, thereby increasing the money supply.

20 The Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) extended this coverage.

21 Figure 21.12 shows the increase in U.S. monetary base and puts it into a broader historical perspective.

Expansionary Fiscal Policies[22]

Expansionary fiscal policies have a direct effect on spending. By lowering personal income taxes, the government can encourage household consumption. By lowering business income taxes, it can foster business investments (see Figure 21.10). Standing in the way of successful taxation policies were pessimistic expectations about the future, which threatened to offset government tax incentives.

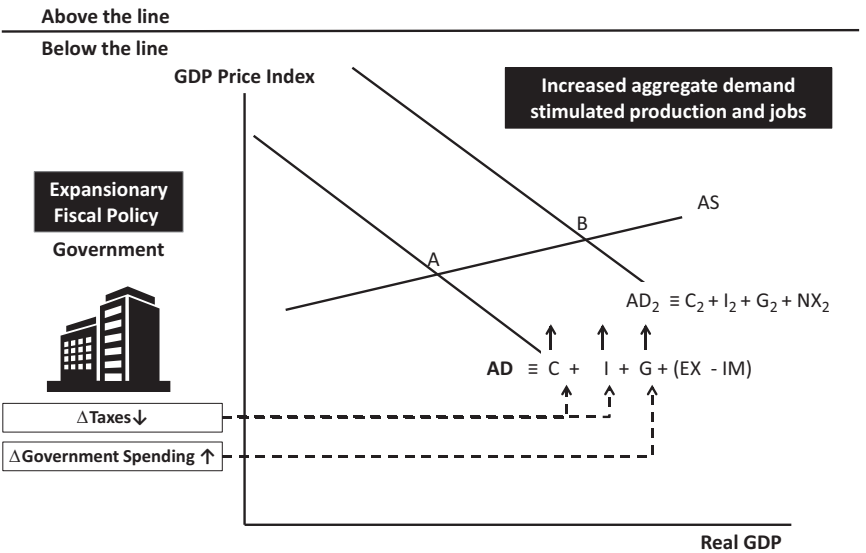

Figure 21.10: Effects of Expansionary Fiscal Policies. (Imagery used: © nualicrea/Shutterstock)

The other alternative was for the government to spend directly on final goods and services, thereby, increasing aggregate demand. As Figure 21.10 shows, government spending is a prominent component of aggregate demand. Increasing it, without offsetting reductions, can stimulate economic activity and kick-start the country back toward economic health.

22 In *The Rest of the Story* portion of this chapter, the section entitled "Abridged U.S. Government and Securities and Exchange Commission Actions: 2008–2009" lists, in chronological order, the steps taken by the U.S. government and the Securities & Exchange Commission to increase spending, expand the economy, decrease the unemployment rate, and reduce financial pressures.

One of the important issues with emergency fiscal spending was what to purchase. The Obama Administration took an interesting approach by asking, directly, town and city officials for suggestions of "shovel-ready" projects.[23] It reasoned that mayors, town councils, and selectmen were closest to the real needs of communities and would recommend productivity-enhancing projects with long-term benefits, such as infrastructure spending for roads, bridges, and communications.[24]

Congress passed and the president signed numerous pieces of legislation to get the U.S. economy moving. They included government spending increases, subsidies, tax breaks, import duties, and the expansion of unemployment compensation from 20 weeks to 79 weeks and, afterwards, to two years. The legislation also included novelty programs that targeted specific industries and particular individuals. Among them were an $8,000 tax break for first-time homeowners, a "cash for clunkers" (i.e., old cars) program, and an initiative that allowed businesses to claim back taxes using a carry forward provision.

Expansionary Monetary Policies and Quantitative Easing

Stimulating spending at a time when unemployment was rising and prospects looked dim was a daunting task for the Federal Reserve; so it used monetary tools that flooded the market with liquidity (see Figure 21.11).[25]

The Fed's policies caused the U.S. monetary base to rise rapidly (see Figure 21.12). Short-term U.S. interest rates tumbled close to zero (see Figure 21.3), creating a policy dilemma for the Fed.[26] If expansionary monetary policies increase consumption and investment by reducing real interest rates, what happens to their effectiveness when interest rates hit 0%? Answering this question led to a monetary policy called "quantitative easing," which, loosely translated, meant

23 There were more than 600,000 bridges in the United States, most built in the 1950s and 1960s, and their approximate lifespan was about 50 years. In 2005, the American Society of Civil Engineers estimated that 160,000 U.S. bridges were structurally deficient. In 2007, the I-35W Mississippi River Bridge (Bridge 9340) in Minneapolis collapsed, killing 13 people and injuring 145.

24 It was disappointing (but not surprising) when the list of suggested projects included tennis facilities, music halls, museums, anti-prostitution programs, waterpark rides, swimming pools, elevated catwalks, and fitness centers.

25 In *The Rest of the Story* portion of this chapter, the section entitled "Abridged Federal Reserve and Federal Deposit Insurance Corporation Actions: 2007–2009" lists, in chronological order, the steps taken by the U.S. Federal Reserve and FDIC to increase spending, expand the economy, safeguard the financial system, and reduce the unemployment rate.

26 The Fed targeted the nominal federal funds rate between 0% and 0.25%.

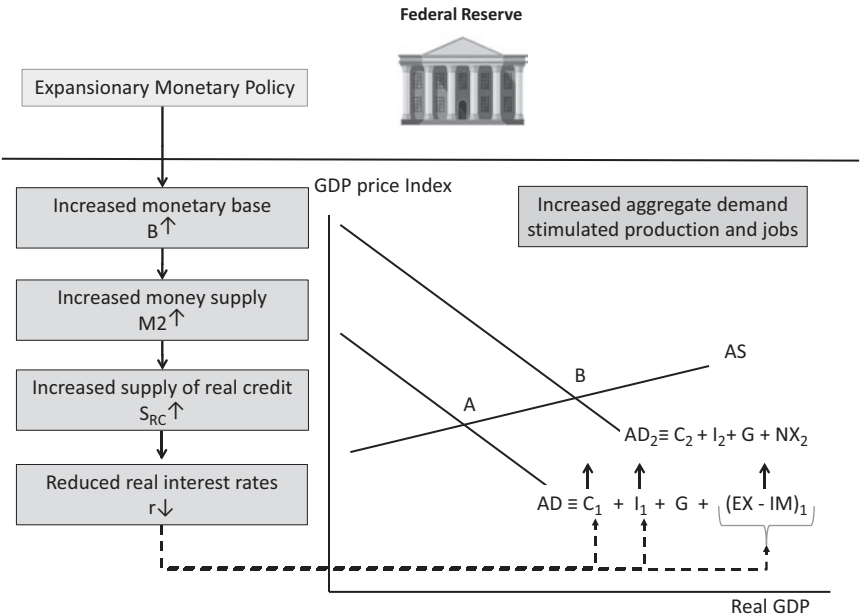

Figure 21.11: Effects of Expansionary Monetary Policies. (Imagery used: © MicroOne/ Shutterstock)

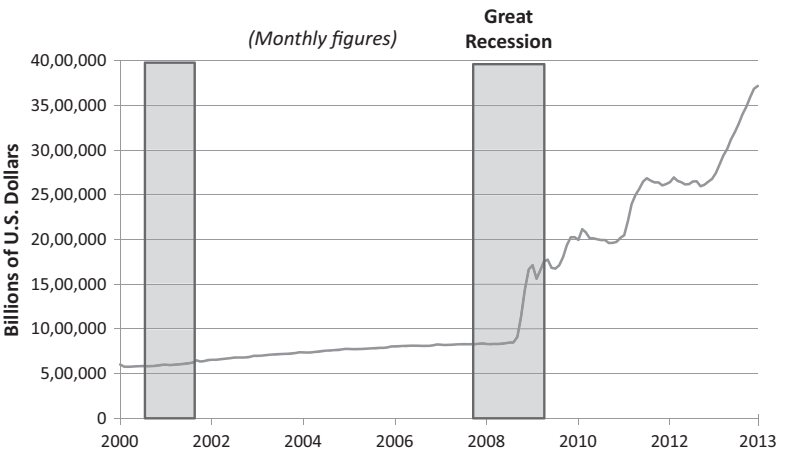

Figure 21.12: Increase in U.S. Monetary Base: January 2000 to December 2013.
Note: Shaded areas represent U.S. recessions.
Source: Economic Research, Federal Reserve Bank of St Louis, FRED® Economic Data, http://research.stlouisfed.org/fred2/ (accessed August 30, 2019).

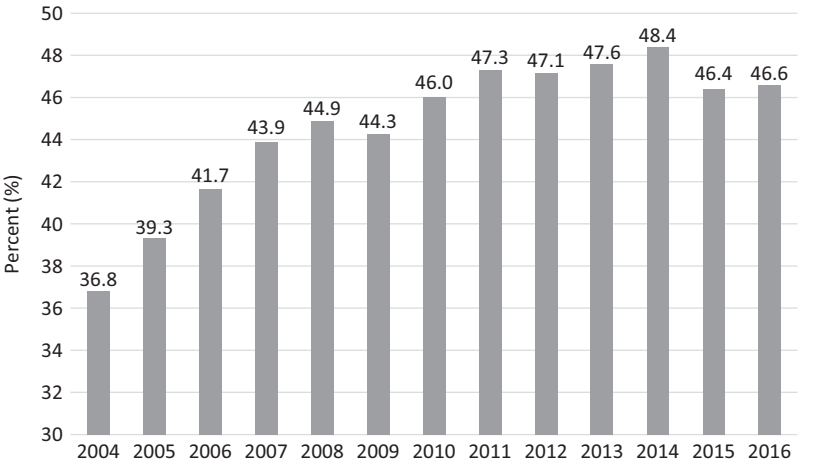

Figure 21.13: Top-Five Banks' Asset Concentrations for the United States: 2004–2016.
Source: Federal Reserve Bank of St. Louis, Economic Research, FRED® Economic Data, https://fred.stlouisfed.org/fred2/ (accessed August 30, 2019.)

flooding the market with money in the hopes that households and businesses would eventually spend it regardless of whether real interest rates fell or remained constant.

Of course, central banks have other means of stimulating their economies, such as trying to reduce long-term interest rates and lending directly to private companies, but there are risks with each of these solutions, as well.

Wall Street Reform and Consumer Protection Act

After the Great Recession ended, steps to improve the U.S. financial system were slow. In 2010, a significant piece of legislation was signed into law with passage of the Wall Street Reform and Consumer Protection Act (a.k.a., the Dodd-Frank Act). This 2,223-page document tried to address many of the perceived flaws in U.S. financial regulation. Among the most critical areas addressed by the Dodd-Frank Act were:

Measures to Reduce Systemic Threats to the U.S. Financial System

Congress created the Financial Services Oversight Council (FSOC) to monitor the U.S. financial system, as a whole, so that significant risks could be identified, market discipline promoted, and timely reactions to threatening conditions enacted. The Council consisted of 10 voting members and five nonvoting members, among whom were top federal and state financial regulators. Both FSOC and the Fed were given authority to impose regulations on nonbank financial institutions.

Measures to Address Financial Institutions Deemed "Too Big to Fail"

Both FSOC and the Fed were given authority to break up financial institutions that grew so large that their failure or imminent failure might touch off an adverse systemic reaction. Such decisions could be based on their absolute or relative size, systemic importance (i.e., interconnections), or role in key markets.

The Federal Deposit Insurance Corporation was also given the power to take over or close failing nonbank financial institutions, but only if they were large enough or in strategic positions that could cause systemic disruptions in the U.S. financial system. Again, these determinations could be based on absolute or relative size, systemic importance, or role in critical markets.

Measures to Supervise Credit Rating Agencies

The Office of Credit Ratings (OCR) was created as a part of the Securities and Exchange Commission (SEC) to protect investors, promote capital formation, and maintain fair, orderly, and efficient markets by monitoring and examining U.S. credit rating agencies that registered with the Securities and Exchange Commission as *nationally recognized statistical rating organizations*.

Measures to Prevent Financial Spillovers and Contagion

Financial holding companies that own banks were prohibited from investing in hedge funds. This rule tried to reduce the possibility of losses at large, speculative hedge funds weakening an affiliated bank or rendering it insolvent.

Measures to Ensure Securitizers Had "Skin in the Game"

Securitizers were required to hold on to a portion of their securitized portfolios to ensure they suffered losses if their underwriting was lax. The Dodd-Frank Act made exceptions to these *skin-in-the-game* provisions but only if the underlying assets in the security issue met specific standards, such as qualified residential mortgages in the housing industry.

Measures to Ensure Orderly Resolution of Financial Stress or Failure

Large U.S. holding companies (i.e., $50 billion or more in consolidated assets) and nonbank financial companies were required to submit yearly plans, called "resolutions" or "living wills," to the Fed and Federal Deposit Insurance Corporation, which described their strategies for dealing with material financial distress or failure.

More Than a Decade Later, Is Our Financial System Safer?

A decade after the Great Recession ended, economic growth had allowed many U.S. and foreign banks to recover both solvency and liquidity. Nevertheless, bankruptcy courts were still trying to settle claims from this financial travesty. For example, even though Lehman Brothers had filed for bankruptcy in 2008, sold thousands of assets, and paid out more than $130 million in claims, in 2019, the former financial services firm had still not settled all its court disputes. Banks, such as Bank of America and JPMorgan Chase, had paid billions of dollars in fines for overstating the quality of mortgages they sold.

U.S. government reforms focused mainly on reducing the financial system's vulnerability to liquidity and insolvency risks, and they empowered the government to better manage financial calamities that might occur in the future.

Global regulatory efforts were along the same lines. The Basel III Accord, which was passed in 2010, tried to address many of the financial and regulatory flaws exposed in the Great Recession. Its guidelines focused on improving capital requirements, liquidity levels, and leverage ratios, as well as stress tests to measure banks' financial stability. For the 30 global financial institutions deemed to be "global systemically important banks" (i.e., G-Sibs), there were requirements on loss-absorbing capital capacity, and leverage limits were instituted to help prevent financial contagion. Even though they were voluntary, these guidelines influenced financial regulations around the world, making banks less vulnerable to known risks.

Despite the public and private steps taken to stabilize and reinforce domestic and international financial systems, fears remained that another crisis might occur. Assessing whether the U.S. financial system is safer today, relative to 2007, can be addressed by considering banks' equity, liquidity, and ability to withstand significant macroeconomic stress. It can also be assessed by considering the intervention powers given to regulators.

Are U.S. Banks' Equity Levels Safer?

A decade after the Great Recession, U.S. banks had more and better quality equity, which was held in proportion to the riskiness of their assets. The more risk, the higher the equity requirement. For large banks, whose failure could result in systemic U.S. financial problems, equity surcharges were applied.

Are U.S. Banks More Liquid?

Because the Great Recession was largely a liquidity crisis, U.S. banks increased their liquidity buffers significantly since then.

Can U.S. Banks Pass Stress Tests?

Since 2009, large U.S. banks have been required to conduct yearly stress tests to determine how they might fare under an avalanche of adverse macroeconomic conditions. Initial results were disappointing. Of the 19 U.S. bank holding companies[27] tested, ten failed, with preliminary indications that they needed nearly $75 billion in additional equity funding. Since then, all of them have made the necessary adjustments for compliance.

Are U.S. Banks Less Concentrated?

The too-big-to-fail problem has not gone away. In fact, it may even be more acute today than a decade ago. Many U.S. banks, such as JPMorgan Chase, Bank of America, and Wells Fargo, are bigger now than they were before the Great Recession. A wave of mergers has helped concentrate the industry. Figure 21.13 shows concentration levels of just the top five U.S. banks, between 2004 and 2016, and the way they have been able to maintain or increase their market power.

Was the Fed Able to Reduce Its Balance Sheet and U.S. Monetary Base?

After more than a decade, the U.S. Federal Reserve's balance sheet was still swollen with assets (many of them risky) acquired when it was actively engaged in three rounds of quantitative easing. Efforts to reduce these assets, either by aggressively selling them or gradually allowing them to mature, were slow and politically sensitive, due to the constant fear that such measures could throw the United States into another recession.

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27 Each of these bank holding companies had assets greater than $100 billion, and together they accounted for about two-thirds of all U.S. bank holding company assets.

Were U.S. Monetary and Fiscal Policies Effective?

"V-U-L-W" is not an eye examination chart but rather the possible paths a nation's economy might take when recovering (or not) from a recession. "V" means a quick, steep recovery; "U" implies a slow, prolonged one; "L" means no recovery at all, and "W" stands for a double-dip recession. Of these four possibilities, the United States came closest to the "U."

Despite precedent-breaking fiscal and monetary stimuli, the U.S. economy did not recover quickly. Monetary policy reduced interest rates so far that it was difficult to comprehend how increased incentives could bring about recovery. It was much easier to understand how contractionary monetary policies could throw the nation into a tailspin.

Figure 21.14 shows that, despite its relatively slow speed, by 2019, the United States had recovered admirably, reaching almost Goldilocks-levels of unemployment and inflation. Between 2009 and 2019, the U.S. unemployment rate fell by 6.4% (from 10% to 3.6%), real GDP growth averaged 2.1%, and inflation hovered at or below 2%. Even critics, who believed that U.S. economic growth should have been stronger, had to admit that it had been consistently positive from quarter to quarter, with no signs of significant inflation and impressively low unemployment rates.

Did the Bailout Earn the U.S. Government a Return?

The U.S. government spent, loaned, and invested a total of $632 billion in bailing out the U.S. economy. Of that amount, $441 billion and $191 billion were related to the Emergency Economic Stabilization Act of 2008 (i.e., TARP) and the rescue of Fannie and Freddie, respectively.[28] Since then, only $390 billion has been repaid. At the same time, the U.S. Treasury has earned $349 billion in interest, dividend, and warrant returns, resulting in a net gain of $107 billion. Of the $191 billion used to bail out Fannie Mae and Freddie Mac, $297 billion had been repaid by February 2019. Table 21.1 summarizes the financial outflows, repayments, and earnings associated with the U.S. government's bailout.

28 A total of $700 billion was initially allocated for TARP, but that amount was later reduced to $475 billion, and, of that, only $441 billion were spent.

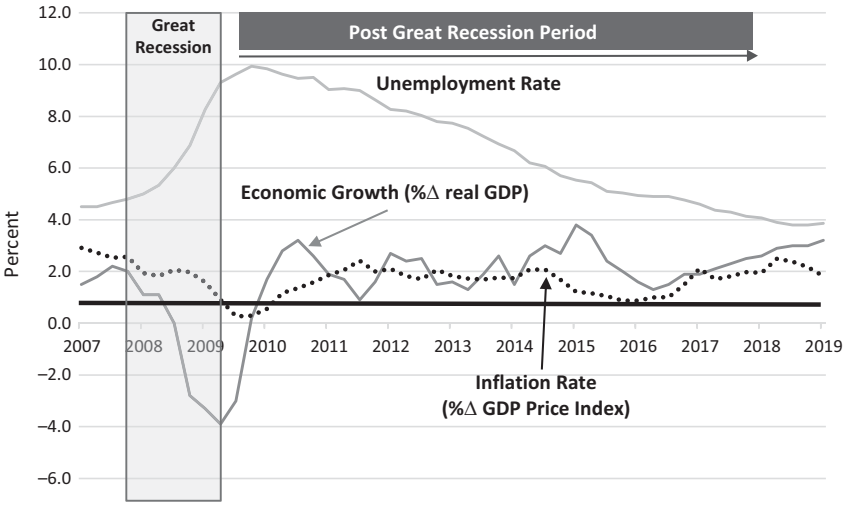

Figure 21.14: U.S. Unemployment, Growth, and Inflation Rates: 2007 to 2019.
Note: Shaded area represents the U.S. Great Recession.
Source: Economic Research, Federal Reserve Bank of St Louis, FRED® Economic Data, http://research.stlouisfed.org/fred2/ (accessed August 30, 2019).

The Next Financial Crisis

The chances of another financial crisis are positive and significant. Even though we learn from the past, doing so does not stop us from repeating the same mistakes or save us from new and unexpected causes. Could a trade war with China, a wave of global defaults sparked by the build-up of excessive debt levels, or the bursting of another asset price bubble trigger the next crisis? Might it be caused by new financial innovations that have unintended economic consequences? Could it be initiated by a massive decline in global stock market prices, collapsing housing prices, or the failure of corporations and consumers to repay their over-extended liabilities? The 2016 Brexit vote has added another complication to financial anxieties. Only time will tell, but to many, it is not a question of whether another crisis will occur but rather when and what its cause will be.

Paradoxes of the Great Recession

The Great Recession provided an excellent framework for explaining the Paradox of Leverage, Paradox of Thrift, and Paradox of Financial Innovation.

Table 21.1: Outflows and Inflows Associated with the U.S. Treasury's Great Recession Bailout.

Outflows	**Billions of Dollars**
Banks & other Financial Institutions	245.00
Fannie Mae and Freddie Mac	191.00
Auto companies	79.70
AIG	67.80
Mortgage Modification Program	19.90
Toxic Asset Purchases	18.60
State Housing Programs	9.16
Small Business Loan Aid	0.37
FHA Refinance Program	0.02
Net Outflows	**631.55**
Inflows	
Refunds	390.00
Dividends	318.00
Interest	1.83
Warrants	9.63
Other revenues	19.7
Net Inflows	**739.16**
NET RETURN	**107.61**

Source: ProPublica, Bailout Tracker, https://projects.propublica.org/bailout/ (accessed June 12, 2019).

Paradox of Leverage[29]

The Great Recession was caused, in large part, by excessively leveraged investment positions held by many large financial institutions and households, which amplified their gains and losses. Leverage occurs when individuals or

29 John E. Marthinsen, Chapter 9, "Four Paradoxes of the 2008–2009 Economic and Financial Crisis," in Robert W. Kolb (ed.), *Lessons from the Financial Crisis: Causes, Consequences, and Our Economic Future* (Hoboken, NJ: John Wiley & Sons, 2010).

businesses borrow to finance the purchase of new assets. A standard measure of leverage is the assets-to-equity ratio. As this ratio rises, financial risks rise.

To reduce their balance sheet risks during the Great Recession, financial institutions tried to sell assets and repay loans (i.e., to de-lever their balance sheets), which is a technique that works so long as an insignificant portion of the industry is doing so. It has less (or no) success when there is a mass exodus from the same financial markets.

Massive asset sales cause their prices to fall. As a result, attempts to reduce leverage can be thwarted by these shrinking market values, resulting in no change, an increase, or a less-than-expected decrease in leverage. This cause-and-effect relationship is called the *Paradox of Leverage*. An example helps clarify the enigma.

Suppose XYZ Inc. owned bonds worth $1,000 million and financed them with $100 million of equity and $900 million of debt (see Table 21.2, Base Case). If the company earned a $10 million profit, its return on equity would equal 10% (i.e., $10 million/$100 million = 10%), and its return on assets would be 1% (i.e., $10 million/$1,000 million = 1%). With an assets-to-equity ratio of 10-to-1, the company's return (and loss) on equity would be ten times larger than its return on assets.

Table 21.2: Paradox of Leverage.

(Figures in Millions of Dollars)						
Case	**Assets**	≡	**Debt**	**+**	**Equity**	**Leverage Assets-to-Equity Ratio**
Base	**$1,000**	≡	**900**	**+**	**100**	**$1,000/$100 = 19-to-1**
1	**900**	≡	**800**	**+**	**100**	**$900/$100 = 9-to-1**
2	**900**	≡	**850**	**+**	**50**	**$900/$50 = 18-to-1**
3	**450**	≡	**850**	**+**	**–400**	**Insolvent**

If XYZ successfully reduced its balance sheet risk by selling $100 million of financial assets and retiring $100 million of debt, its leverage would look like Case #1 in Table 21.2. After the sale and debt repayment, its assets, debt, and equity would be worth $900 million, $800 million, and $100 million, respectively. Therefore, XYZ's leverage would have fallen from 10-to-1 to 9-to-1, which is a less risky financial position.

Case #2 in Table 21.2 shows the Paradox of Leverage. Suppose XYZ and many other investors tried to de-lever their balance sheets at the same time, causing asset prices to fall. Suppose further that, when XYZ sold $100 million of its assets into this declining market, it received only $50 million in return, and used the proceeds to retire outstanding debt. These security sales and debt repayment transactions would cause XYZ's assets to fall by $100 million, and its liabilities and equity each to fall by $50 million. As a result, XYZ's revalued assets, liabilities, and net worth would equal $900 million, $850 million, and $50 million, respectively. Instead of falling, the company's leverage ratio would rise from 10-to-1 to 18-to-1 (i.e., $900 million/$50 million = 18.0), and this calculation is before revaluing, at current prices, the assets that remain on XYZ's balance sheet.

The increase in XYZ's leverage is due to the 50% reduction in the company's equity (the denominator of the leverage ratio) but only a 10% reduction in assets (the numerator of the leverage ratio). As a result of the plummeting stock market and housing prices during the Great Recession, U.S. households and financial institutions found themselves in a similar predicament. Attempts to escape from their leveraged prisons only served to incarcerate them in even harsher, less forgiving ones.[30]

You may be asking yourself: If sales of this sort end up increasing companies' (or individuals') leverage ratios (rather than lowering them), why would they do it? The answer has two parts. First, in declining markets, asset sales may be forced upon financial institutions and other companies because they need liquidity to meet customer withdrawals and collateral demands. Second, these results are supercharged, if companies are required to calculate their balance sheets at market values, which is a process called *marking to market*.

Consider the effects in Case 3 (Table 21.2), which assumes that asset values fall by 50%, XYZ is forced to sell $100 million of them, and accounting rules compel the company to revalue the remaining assets (i.e., $900 million) at market prices. After the sale and revaluation, XYZ's remaining assets would be worth $450 million (not $900 million), liabilities would be worth $850 million, and, therefore, equity would equal minus $400 million (i.e., $450 million – $850 million = –$400 million). XYZ would be technically insolvent!

When a company fails and is liquidated, shareholders stand last in line, recovering only what is left after creditors have been paid. Liquidated companies

30 See Hyman Minsky, "The Financial Instability Hypothesis: Capitalist Processes and the Behavior of the Economy," in Charles Kindleberger and J. Laffargue (eds.), *Financial Crisis: Theory, History, and Policy*, New York: Cambridge University Press (1982), pp. 13–38.

also affect debt holders, who are paid before shareholders, but they may receive little (or nothing) of what they are owed, if liquidated assets have little value.

Liquidations also affect workers who suffer layoffs, renegotiated contracts, and reductions in benefits, which typically accompany significant asset sales and business disruptions. Workers are especially vulnerable if we consider the financial, social, economic, and psychological ties they have to the companies for which they work. Job losses threaten these workers' economic livelihoods by reducing income, pensions, and other benefits. Furthermore, they take a human and emotional toll. This hierarchy of claimants changes if governments rescue failing companies (or industries) because taxpayers or interest-sensitive borrowers pick up the check for firm-specific errors, misjudgments, and excesses.

Paradox of Thrift

Benjamin Franklin once said, "A penny saved is a penny earned," implying that saving is an admirable personal quality. At the macroeconomic level, the verdict is still out concerning how wholesome increased saving is. It is correct that saving is necessary for nations to grow because it frees resources to move from the production of consumption-oriented products to investment-oriented ones. At the same time, higher saving means lower consumption spending, and lower spending reduces aggregate demand, which causes both real GDP and the GDP price index to fall. There is no guarantee that greater saving will reduce real interest rates and increase investment spending enough to offset the reduction in consumption.

Thrift is problematic because, by trying to save more, a nation may reduce its GDP, which means households may end up saving a more significant portion of a shrinking income. In the end, the actual amount saved may remain the same, rise slightly, or fall. An example helps clarify the point.

Suppose a nation's real GDP equals $1,000 billion, with consumption, saving, and taxes equaling $650 billion, $100 billion, and $250 billion, respectively. If saving increases from 10% of GDP to 25%, but due to spending reductions, real GDP falls from $1,000 billion to $400 billion, then total saving remains the same because 10% of $1,000 billion equals 25% of $400 billion. This logical, albeit disturbing, result is called the *Paradox of Thrift*.

Figure 21.15 shows the Paradox of Thrift and the role it played during the Great Recession. Declining U.S. housing and stock market prices pummeled household wealth, causing families to cut spending and increase saving rates to restore their retirement nest eggs and precautionary savings balances. By saving more substantial portions of their incomes, consumption and aggregate demand fell, causing a multiplied reduction in real GDP via the spending multiplier. As a

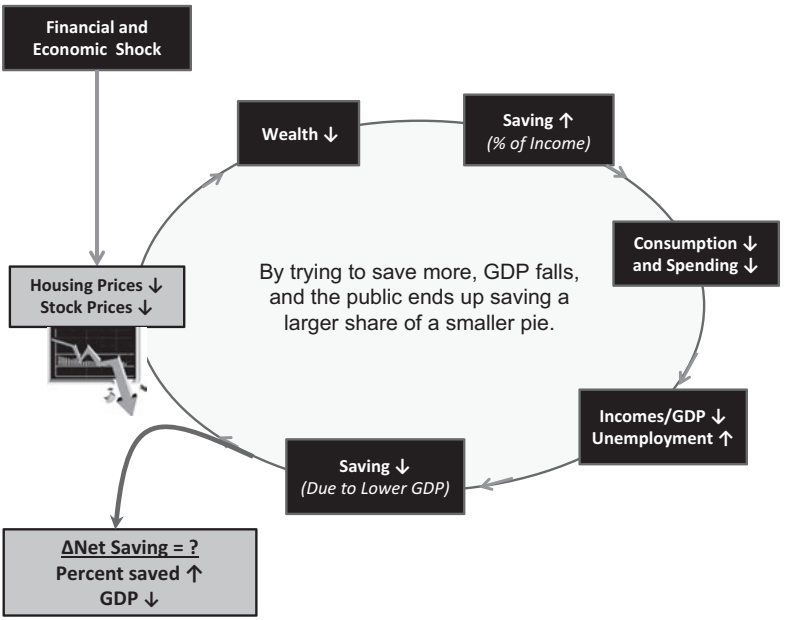

Figure 21.15: Paradox of Thrift.
Source: John E. Marthinsen, Chapter 9, "Four Paradoxes of the 2008–2009 Economic and Financial Crisis," in Robert W. Kolb (ed.), *Lessons from the Financial Crisis: Causes, Consequences, and Our Economic Future* (Hoboken, NJ: John Wiley & Sons, 2010).

result, the saving rate increased on a shrinking rate of income, causing net saving to languish.

Between 1999 and 2007, U.S. personal saving as a percentage of after-tax income fell dramatically, reflecting the wealth created by rising real estate prices and home-heavy U.S. portfolios. From an average rate of about 5% in 1999, the saving rate fell to a paltry 3.1% in November 2007—just before the Great Recession began (see Figure 21.16). The housing crisis and declining demand reversed the saving trend, causing it to rise to 8% by May 2008 and 8.1% in May 2009. To understand just how significant such a change could be, consider that personal consumption expenditures in the United States were about $10 trillion, which was approximately 70% of the nation's $14 trillion GDP. Assuming no secondary (e.g., spending multiplier or credit market) effects, for every 1% increase in the annual U.S. saving rate, household incomes fall by about $100 billion. Therefore, an increase in the U.S. personal saving rate by 5.0% (i.e., from 3.1% to 8.1%) implies annual income reductions of about $500 billion.

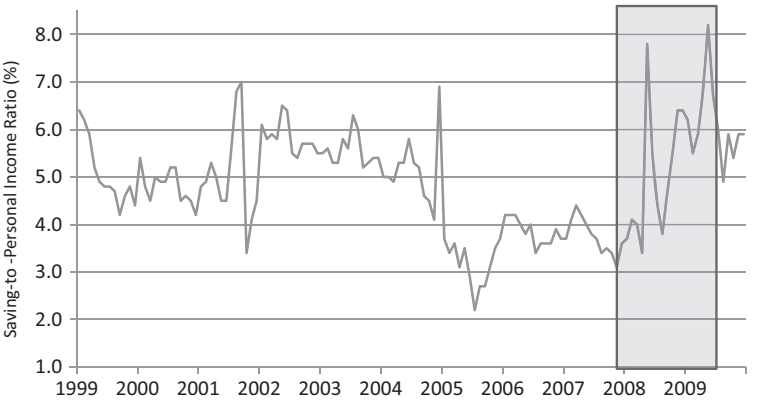

Figure 21.16: U.S. Saving as a Percent of Personal Income: 1999–2009. (Imagery used: © Sarah Maher/123rf)
Source: Economic Research, Federal Reserve Bank of St Louis, FRED® Economic Data, http://research.stlouisfed.org/fred2/ (accessed August 30, 2019).

Paradox of Financial Innovation

Financial products, such as bonds, can be combined with derivatives in many different ways to create hybrids with risk-return profiles that are difficult to understand, track, and hedge. In some cases, these hybrid financial products are specially engineered to moderate the risk-return concerns of buyers and sellers, but things do not always work out as planned. The *Paradox of Financial Innovation* states: If not fully understood by users and regulators, financial products designed to optimize and moderate risk/return tradeoffs, can unravel, spill over, and threaten the stability of the financial system as a whole.[31]

Such was the case when subprime mortgages were securitized into collateralized mortgage obligations. Without detailed price histories and experience, decisions became rudderless concerning risk levels and the speed with which they might change. Before the Great Recession, rising real estate prices created a frenzied demand for financial instruments with mortgage backing and also derivative products, such as credit default swaps. The existing supply of securitized mortgages met only part of this demand. Therefore, banks turned to subprime mortgages. The above-average risk of default made these loans nonconventional, inducing lenders to charge higher rates of interest on them.

31 John E. Marthinsen, Chapter 9, "Four Paradoxes of the 2008–2009 Economic and Financial Crisis," in Robert W. Kolb (ed.), *Lessons from the Financial Crisis: Causes, Consequences, and Our Economic Future* (Hoboken, NJ: John Wiley & Sons, 2010).

Approximately 80% of all subprime mortgages had adjustable rates, which made their owners vulnerable to interest rate risk.[32]

When the U.S. interest rates began to rise in 2004 (see Figure 21.3), these costs were initially absorbed by borrowers, expecting to earn capital gains when they sold their homes. The rapid decline in U.S. housing prices after mid-2006 poured icy water on these hopes. As adjustable-rate mortgages reset at continually higher rates and housing prices fell, mortgage delinquencies skyrocketed. The results were predictable. Collateralized mortgage obligations fell in value, and bankruptcies increased, which were aided and abetted by plummeting stock markets.

Conclusion

Financial crises are not new to the world, and they will surely be infrequent and unwanted visitors in the future.[33] The Great Recession was the result of a confluence of economic forces connected to problems of moral hazard, U.S. regulatory changes, and government incentives to homeowners, and monetary policy changes. Underlying all of these causes were incentives that coalesced to create one of the most significant U.S. economic calamities in the past century. The problem was one of mispriced risks, which encouraged excessive borrowing and speculation. Leverage ratios became so extreme that any economic or financial downturn was bound to have significant negative consequences. When problems did arise, they were concentrated in the largest and most sophisticated financial institutions, which contributed to a systemic decline in real estate prices, securitized financial asset values, and wealth.

From its start in 2007, the world witnessed the massive destruction of wealth as financial malaise spread from IndyMac to Bear Stearns to Lehman Brothers to financial institutions, industries, governments, and countries around the world.

Governments and central banks responded to the *financial* crisis by recapitalizing financial institutions and providing them with easy access to liquidity. Similarly, governments and central banks responded to the *economic* crisis by

32 Geetesh Bhardwaj and Rajdeep Sengupta, "Where's the Smoking Gun: A Study of Underwriting Standards for U.S. Subprime Mortgages," Federal Reserve Bank of St. Louis, Working Paper Series, October 2008.

33 See Charles P. Kindleberger and Robert Z. Aliber, *Manias, Panics and Crashes: A History of Financial Crises*, Sixth Edition (New York, NY: Palgrave Macmillan, 2011). See also, Charles Mackay, *Extraordinary Popular Delusions, and the Madness of Crowds* (New York: Three Rivers Press, 1980).

reducing taxes, increasing government spending, and pursuing expansionary monetary policies that decreased interest rates, in some countries, nearly to zero.

As with long-term inflation, the burst in business and consumer demand for real estate would have been much more difficult without sufficient liquidity to support it. For this reason, the U.S. Federal Reserve was the focus of critical scrutiny during and after the financial crisis. To revive the U.S. economy, the Fed made unprecedented increases in the U.S. monetary base, which continued well after the recession ended. The long-term effects of having so much monetary base in the banking system may haunt the United States for years.

The Rest of the Story

Fannie Mae and Freddie Mac

Fannie Mae and Freddie Mac are called government-sponsored enterprises (GSEs) or quasi-government enterprises because they were created for a public purpose but are run as private companies. Their social goal has been to foster secondary markets for U.S. real estate mortgages, which is where mortgages are bought and sold after they are initially made. With implicit guarantees that the U.S. government would step in if anything threatened their solvency or liquidity, Fannie and Freddie were able to borrow at lower interest rates than purely private institutions, such as investment banks.

Origins and Mandate

The Federal National Mortgage Association (commonly known as Fannie Mae) was created by Congress in 1938, near the end of the Great Depression. In 1968, its charter was changed to a government-sponsored enterprise. The Federal Home Loan Mortgage Corporation (commonly known as Freddie Mac) was created by Congress in 1970 to assist in the development of secondary markets for U.S. mortgages.

Both institutions participate in the U.S. mortgage markets by borrowing, purchasing mortgages with the acquired funds, securitizing their mortgages, and selling them to investors. For a fee, they also sell credit risk insurance on the securities they package. These government-sponsored enterprises purchase only “conforming loans,” which are mortgages that meet specific requirements, such as maximum size. They also scrutinize borrowers to ensure they have acceptable credit scores and sufficient funds for the down payment, closing costs,

and two months of mortgage payments, as well as maximum loan-to-value ratios and total indebtedness relative to income ratios. Between 1970 and 2000, Fannie and Freddie's share of the market for residential single-family mortgages rose from 5% to nearly 40%, and from 1980 to 2003, these sister government-sponsored enterprises went from holding no mortgage-backed securities to owning more than $2 trillion of them.

Based on total assets, Fannie and Freddie were once the second and third largest companies in the United States.[34] Since their founding, Fannie's and Freddie's services have been valuable because they enabled financial institutions and investors to more easily adjust their real estate returns and exposures. Before the Great Recession, these government-sponsored enterprises seemed to function well, but a haunting question was always whether the private sector could have done the job better.

Controversy Surrounding Fannie and Freddie

For years, critics complained about the special treatment these government-sponsored enterprises got from borrowing at reduced government-supported rates. Opponents advocated Fannie's and Freddie's abolition and their replacement with private sector counterparts. The push for reform got a boost during the first few years of the twenty-first century when these government-sponsored enterprises came under scrutiny for accounting scandals that rocked their reputations. Freddie Mac was forced to pay a $50 million fine in 2003 for understating its profits for two of three years between 2000 and 2002. By contrast, Fannie was found to have overstated its 2006 earnings, allegedly to pay its executives more significant bonuses. During the proceedings, evidence showed that these government-sponsored enterprises spent approximately $175 million between 1998 and 2008 on lobbying activities, which only served to fuel flames of public resentment.

For many critics, Fannie and Freddie exemplified the problems that occur when governments become too tightly connected to politicians and too loosely connected to free-market competition. When their losses soared to critical levels during September 2008, Fannie and Freddie were placed into conservatorship, which meant they were supervised by the Federal Housing Finance Agency (FHFA).

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34 See W. Scott Frame and Lawrence J. White, "Fussing and Fuming over Fannie and Freddie: How Much Smoke, How Much Fire?" *Journal of Economic Perspectives*, Volume 19, Number 2, Spring 2005, pp. 161–162.

How Did Fannie and Freddie Fare During the Great Recession?

A quick look at Figure 21.17 is all that is needed to understand how severely these government-sponsored enterprises hemorrhaged cash, as their combined net incomes sunk from relatively healthy levels to losses above $100 billion. In 2008, the combined real estate positions of Fannie Mae and Freddie Mac totaled approximately $5.4 trillion, which was about half of the U.S. mortgage market. As real estate prices fell, the portfolio values of these government-sponsored enterprises dropped, and their insurance liabilities on mortgage-backed securities rose. Losses soon exceeded these institutions' equity positions, making them technically insolvent.

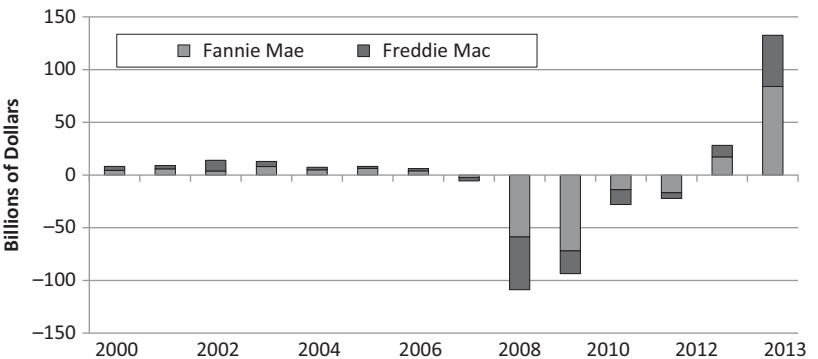

Figure 21.17: Net Income of Fannie Mae and Freddie Mac: 2000 – 2013. (Imagery used: © Sarah Maher/123rf)
Source: 10-K Reports for Fannie Mae and Freddie Mac, see http://www.fanniemae.com/portal/about-fm/investor-relations/annual-reports-proxy-statements.html and http://www.freddiemac.com/investors/financials/annual-reports.html (accessed August 30, 2019).

Fannie Mae and Freddie Mac tried, but failed, to raise sufficient equity. In November 2008, the U.S. government committed $600 billion to purchase assets from these government-sponsored enterprises. When they were finally taken over, each had been given $100 billion credit lines from the U.S. government. Soon after that, these credit lines were increased to $400 billion, but in 2011, they were still not out of trouble. Losses had moderated but remained firmly negative. By 2012, profits had returned, and during the second quarter of 2013, Fannie Mae reported record gains of $59 billion, while Freddie recorded healthy profits of $5 billion.

Securitization: From Mortgage Origination to Security Sales

Figure 21.18 shows that securitization is a process of many steps, and it is fair to say that, leading up to the financial crisis, elements of moral hazard and market failure occurred at each one. Let's review each stage of the process.

Mortgage Origination (Columns A and B)

On the far left side of Figure 21.18 (in Column A) are mortgage originators, such as thrift institutions (e.g., savings and loan associations and mutual savings banks), commercial banks, and mortgage brokers, whose job is to match mortgage borrowers to lenders (Column B).[35] Under the originate-to-hold strategy, these mortgages are held on the balance sheets of banks and thrift institutions, but under the originate-to-distribute strategy, they are originated, sold, pooled, and securitized.

Due Diligence and Mortgage Servicing (Column C)

An essential part of the securitization process is due diligence, much of which is conducted by companies that are hired specifically by securitizers to determine the quality of mortgages offered for bundling into securitized issues.[36] The due diligence process vets mortgages and prunes ones that do not meet certain quality standards. Mortgage originators that securitize their own issues have greater familiarity with the borrowers behind the loans; so they typically have less need for external due diligence services. By contrast, financial institutions that purchase mortgages from others rely on this (often outsourced) function to protect them against credit risk.

Mortgages need to be serviced until they mature, and many mortgage originators earn handsome profits from servicing activities, even if the loans they originate have been sold to others and securitized. Mortgage servicing involves all the administrative responsibilities involved with collecting monthly principal, interest, property tax payments, holding funds in escrow, collecting mortgage insurance payments, notifying borrowers of delinquencies, assessing penalties for late payments, tracking outstanding principal balances, taking charge of foreclosures, and (sometimes) negotiating debt modifications (i.e., workouts) in cases of threatened default. Mortgages that are securitized

35 65% of all sub-prime loans involved mortgage brokers.

36 At the time, among the most well-known due-diligence companies were American Mortgage Consultants, Bohan Group, Clayton Holdings, Fidelity Information Services, Opus Capital Markets Consultants, RR Donnelly, Watterson Prime, and 406 Partners.

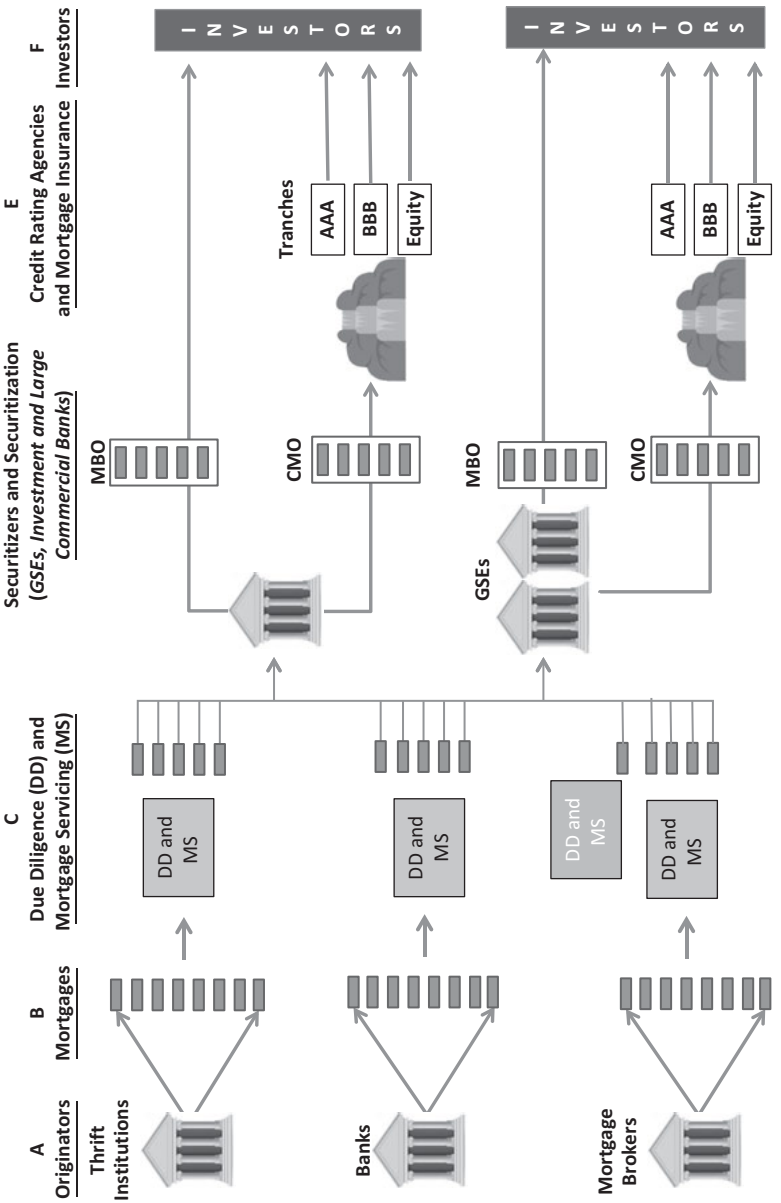

Figure 21.18: The Securitization Process. (Imagery used: © Sarah Maher, Ivan Ryabokon/123rf)

and sold in secondary markets (i.e., as mortgage-backed securities) may continue to be serviced by the financing bank for a fee.

Securitizers and Securitization (Column D)

Securitizers fund their mortgage purchases in three ways: borrowing, issuing equity to investors seeking real estate exposures, and generating positive cash flows from operations. Once purchased, these mortgages are bundled in ways that make their risks and cash flows most appealing to likely investors. Securities with the same risk-return profiles as the underlying mortgages are called mortgage-backed-obligations (MBO), mortgage-backed securities (MBS), or pass-through securities. Securities with risks, returns, maturities, and payments that are different from the underlying mortgages are called collateralized mortgage obligations (CMOs).

Figure 21.18 shows images of plateaued waterfalls to represent the various levels of risk associated with different collateralized mortgage obligations. The least risky collateralized mortgage obligations receive their returns and principal repayments before any other investors. The riskiest collateralized mortgage obligation securities receive their returns and repayments only after the other investors have been paid.

The largest mortgage securitizers were Fannie Mae and Freddie Mac, but during the subprime frenzy, investment banks took over an increasingly large share of the market. Unfortunately, their participation also ushered in a severe deterioration in underwriting quality and significantly increased the quantity of mortgage-backed obligations and collateralized mortgage obligations.

Credit Rating Agencies and Insurance (Column F)

Credit rating agencies evaluate the riskiness of mortgage-backed securities and collateralized mortgage obligations. One might think that, if the individual mortgages have already been vetted at the due diligence stage (Column C), why is there a need here? The answer is that securitizers are a bit like financial magicians, but instead of turning canes into scarves, they create collateralized mortgage obligations with risks that can range from Triple-A to junk-bond status. Before and during the Great Recession, Standard & Poor's and Moody's accounted for more than 90% of the credit risk-evaluation business, but Fitch, A.M. Best, and Egan-Jones Ratings Company were also active. The financial role of credit rating companies is to act as guardians-at-the-gates for investors, by evaluating mortgage-backed obligations and collateralized mortgage obligations and providing feedback on their levels of risk. If they fail to do an adequate job (which was the case), the consequences can be dire.

To further reduce default risks, many securitized issues were insured. Fannie Mae and Freddie Mac earn handsome fees from insuring their securitized issues, but there are (and have been) sizeable private insurance companies that do the same. AMBAC Financial Group and MBIA Inc. were among the largest, but between 2008 and 2010, MBIA's credit rating fell from Triple-A to speculative grade. Similarly, AMBAC's credit rating in 2008 was Triple-A, but in 2010, the company was forced to file for bankruptcy.

Using Taxpayer Money to Bail Out the Rich

One of the problems with using taxpayer dollars to bail out an insolvent financial sector is the disproportionate difference in compensation between the kingpins of large financial institutions and the average taxpayer. Table 21.3 shows why public concerns were raised when it seemed these high-flying denizens of corporate leadership would escape the mess they created without any meaningful personal financial sacrifices. While it is true that most of them lost their positions, it is also a fact that compensation clawbacks were rare and, many believe, too small. Notice how many years the average U.S. taxpayer would have had to work to earn just one-year's salary of these listed financial leaders.

Public concern was also raised when the Obama Administration found none of these financial leaders guilty of any crimes. The administration explained that the absence of prosecutions was due to these Wall Street barons engaging in greedy, stupid, and immoral conduct, without breaking any laws.[37]

Chronology of Major Events: 2007–2009

Table 21.4 shows, in chronological order, the trail of financial destruction caused by the collapsing U.S. housing market and the ensuing Great Recession. September 2008 was the most brutal of all months.

37 Peter Schweizer, "Why Can't Obama Bring Wall Street to Justice?" *Newsweek*, May 6, 2012, https://www.schwartzreport.net/why-cant-obama-bring-wall-street-to-justice/ (accessed August 30, 2019).

Table 21.3: Bailing Out the Leaders of Large U.S. Financial Institutions.

Measuring the Burden of Bailing Out the Leaders of Large U.S. Financial Institutions				
Name	**Position**	**Company**	**Compensation *(Most Recent ≈ 2008)***	**Years for the Average U.S. Worker to Earn the Equivalent***
Stan O'Neal	CEO	Merrill Lynch	$162 million	2,613
Richard Fuld	CEO	Lehman Bros.	$34.4 million	555
Jimmy Cayne	CEO	Bear Stearns	$32.1 million	502
Richard Syron	CEO	Freddie Mac	$19 million	306
Ken Thomson	CEO	Wachovia	$15 million	242
Martin Sullivan	CEO	AIG	$14.3 million	231
Daniel Mudd	CEO	Fannie Mae	$13.4 million	216
Angelo Mozilo	CEO	Countrywide Financial	$10.8 million	174
Kerry Killinger	CEO	Washington Mutual	$4.5 million	73
Allan Greenspan	Chairman	Federal Reserve	$180,100	3

* These figures assume the average yearly U.S. wage in 2008 was approximately $62,000.
Source: Joanna Chung, Greg Farrell, Francesco Guerrera, and Saskia Scholtes, "The Fallen Giants of Finance," *Financial Times*, December 23, 2008, p. 12.

Table 21.4: Chronology of Major Events: 2007–2009.

2007	
Freddie Mac stops purchasing most risky subprime mortgages and mortgage-related securities	February 27
New Century Financial Corporation, a subprime mortgage lender, files for bankruptcy protection	April 2
Standard & Poor's and Moody's downgrade numerous subprime-MBS	June—July
American Home Mortgage Company files for bankruptcy	August 6

Table 21.4 (continued)

2007	
Great Recession begins	December
2008	
Northern Rock is taken into state ownership by the U.K. Treasury	February 17
Carlyle Capital Corporation defaults	March 5
JPMorgan Chase acquires Bear Stearns & Co.	March 24
Bank of America takes over Countrywide Financial Corp.	June 5
Office of Thrift Supervision (OTS) closes IndyMac	July 11
Fannie Mae and Freddie Mac forced into conservatorship	September 7
Lehman Brothers files for bankruptcy and is sold to Barclays	September 15
American International Group (AIG) rescued by the Federal Reserve	September 16
Reserve Primary Fund's net asset value falls below $1	September 16
OTS closes Washington Mutual Bank (WAMU), and JPMorgan Chase acquires WAMU.	September 25
Wells Fargo acquires Wachovia Corporation	October 12
American Express and American Express Travel Related Services become bank holding companies	November 10
Lincoln National, Hartford Financial Services Group, and Genworth Financial become savings & loan associations	November 17
Bank of America acquires Merrill Lynch	November 26
PNC Financial Services acquires National City Corporation	December 15
CIT Group Inc. becomes a bank holding company	December 22
GMAC LLC and IB Finance become bank holding companies	December 24
2009	
OneWest acquires IndyMac	March 19
General Motors files for bankruptcy	June 1
CIT Group Inc. files for bankruptcy	November 1

Source: Federal Reserve Bank of St. Louis, The Financial Crisis: A Timeline of Events and Policy Actions, https://www.stlouisfed.org/financial-crisis/full-timeline (accessed August 30, 2019).

Acts That Deregulated the U.S. Financial Industry

Table 21.5 lists, in chronological order, the major pieces of U.S. legislation between 1980 and 1999 that deregulated the U.S. financial system. It starts with the Depository Institutions Deregulation and Monetary Control Act (1980) and ends with the Gramm-Leach-Bliley Act (1999).

Table 21.5: Acts That Deregulated the U.S. Financial Industry.

1980: Depository Institutions Deregulation and Monetary Control Act
– Reduced regulations on U.S. banks and S&Ls
– Abolished usury laws
– Abolished Regulation Q (i.e., interest ceilings on customer deposits)
– Allowed federally chartered banks and credit unions to make mortgage loans
– Allowed S&Ls to diversify into consumer loans
– Allowed credit unions and S&Ls to offer checking accounts
– Gave the Federal Reserve greater control over nonmember banks
1982: Garn-St. Germain Depository Institutions Act
– Allowed banks to offer adjustable-rate mortgages
– Allowed S&Ls to offer money market deposit accounts
– Liberalized the commercial and consumer loans that S&Ls could make
– Liberalized the assets S&Ls could hold
– Evened the playing field with commercial banks by allowing S&Ls to pay higher interest rates on deposits, borrow from the Fed, and issue credit cards
1982: Alternative Mortgage Transaction Parity Act
– Encouraged mortgage flexibility, such as adjustable-rate and interest-only loans
1989: Financial Institutions Reform, Recovery, and Enforcement Act
– Abolished the Federal Home Loan Bank Board
– Created the Office of Thrift Supervision
– Abolished the Federal Savings and Loan Insurance Corporation (FSLIC)
– Created the Savings Association Insurance Fund (SAIF)
– In 2005, the FDIC's Bank Insurance Fund (BIF) and SAIF were merged to form the Deposit Insurance Fund (DIF)

Table 21.5 (continued)

1989: Financial Institutions Reform, Recovery, and Enforcement Act
– Created the Federal Housing Finance Board to oversee the twelve federal home loan banks
– Formed the Resolution Trust Corporation to manage the closure and resale of bankrupt S&Ls
– Gave GSEs (Fannie Mae and Freddie Mac) the responsibility to support mortgages for low-income and moderate-income families
1994: Riegle-Neal Interstate Banking and Branching Efficiency Act
– Allowed nationwide branch banking, regardless of state law
– Allowed affiliate banks within bank holding companies to act as branches for each other (e.g., deposit acceptance, payment collection, and other customer services)
– Required a review of federally chartered banks wanting to expand to determine if they complied with the Community Reinvestment Act
1999: Gramm-Leach-Bliley Act
– Repealed the Glass-Steagall Act (1933) provision that separated commercial and investment banks

Source: FDIC Federal Deposit Insurance Corporation, Regulations & Examinations, http://www.fdic.gov/regulations/laws/rules/8000-4100.html (accessed August 30, 2019).

Abridged Chronology of U.S. Government Actions: 2007–2009

Table 21.6 lists, in chronological order, the major fiscal policies the U.S. government enacted to energize the U.S. economy during the Great Recession. Government policies were initiated and then modified, which is one reason this list is abridged.

Table 21.6: U.S. Government: 2007–2009.

2007	
HOPE NOW initiative	October 10
2008	
Economic Stimulus Act	February 13

Table 21.6 (continued)

2008	
SEC temporarily bans naked short selling of Fannie Mae, Freddie Mac, and primary dealers at commercial and investment banks	July 15
Housing and Economic Recovery Act	July 30
U.S. Treasury announces a Supplementary Financing Program	September 17
SEC temporarily bans short sales of financial companies	September 17
Emergency Economic Stabilization Program (TARP)	October 3
Treasury, Fed, and FDIC acquire shares of Citicorp	November 23
Treasury lends to General Motors and Chrysler	December 19
Treasury purchases $5 billion of GMAC equity	December 29
2009	
Treasury, Fed, and FDIC give guarantees, liquidity access, and capital to Bank of America	January 16
Treasury, Fed, and FDIC give loans to Chrysler America	January 16
Financial Stability Plan: Public-Private Investment Fund (Fed, Treasury, and FDIC)	February 10
American Recovery and Reinvestment Act	February 17
Homeowner Affordability and Stability Plan	February 18
Stress testing of large bank holding companies announced by the Federal Reserve, FDIC, Comptroller of the Currency, and OTS	February 25
U.S. Treasury and Fed launch Term Asset-Backed Securities Loan Facility (TALF)	March 3
Auto Supplier Support Program	March 19
Helping Families Save Their Homes Act	May 20
Treasury, Fed, and FDIC create legacy Securities Public-Private Investment Program	July 8
Treasury Supplementary Financing Program	September 17
Treasury acquires shares of CIT Group Inc.	November 5

Source: Federal Reserve Bank of St. Louis, "The Financial Crisis: A Timeline of Events and Policy Actions," https://www.stlouisfed.org/financial-crisis/full-timeline (accessed August 30, 2019).

Abridged Chronology of Federal Reserve and Federal Deposit Insurance Corporation Actions: 2007–2009

Table 21.7 provides an abridged chronological list of the monetary policies enacted by the Federal Reserve and Federal Deposit Insurance Corporation to stimulate U.S. economic activity and stabilize the U.S. financial system. Fed policies were initiated and then modified, which is one reason this list is abridged.

Table 21.7: Federal Reserve and Federal Deposit Insurance Corporation Actions: 2007–2009.

2007	
Fed creates the Term Auction Facility	December 12
2008	
Fed creates the Term Securities Lending Facility (TSLF)	March 11
Fed creates the Primary Dealer Credit Facility (PDCF)	March 16
Maiden Lane LLC is formed for the merger of JPMorgan Chase & Bear Stearns	March 24
Fed rescues AIG	September 16
Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility	September 19
Fed begins paying interest on banks' excess and required reserves	October 6
Fed creates Asset-Backed Commercial Paper Funding Facility	October 7
FDIC increases insurance limits from $100,000 to $250,000 per depositor	October 7
FDIC creates a new Temporary Liquidity Guarantee Program	October 7
NY Fed is authorized to borrow up to $37.8 billion in investment-grade, fixed-income securities from AIG	October 8
Fed creates the Money Market Investor Funding Facility (MMIFF)	October 14
FDIC creates a new Temporary Liquidity Guarantee Program	October 14
Fed creates Commercial Paper Funding Facility	October 14
Fed creates Money Market Investor Funding Facility (MMIFF)	October 21
Maiden Lane II created to restructure AIG (to purchase AIG's residential MBS)	November 10
Maiden Lane III designed to restructure AIG (to purchase AIG's collateralized debt obligations)	November 10

Table 21.7 (continued)

2008	
Fed, FDIC, and Treasury acquire shares of Citicorp	November 23
Term Asset-Backed Securities Lending Facility (TALF)	November 25
2009	
Fed buys housing obligations of Fannie Mae, Freddie Mac, and Ginnie Mae	January 5
Fed, Disband Treasury give guarantees, liquidity access, & capital to Bank of America	January 16
Fed, FDIC, and Treasury give loans to Chrysler America	January 16
Treasury, Fed, and FDIC create Legacy Securities Public-Private Investment Program	July 8, 2009

Source: Federal Reserve Bank of St. Louis, The Financial Crisis: A Timeline of Events and Policy Actions, https://www.stlouisfed.org/financial-crisis/full-timeline (accessed August 30, 2019).

Key Points

- If we learned anything from the Great Recession, it was the folly of believing that calamities can occur in the real credit market without affecting the real goods and services market and foreign exchange market.
- The Great Recession was marked by declining real GDP, deflation, wealth erosion, and rising unemployment.
- Two major financial and economic problems were illiquidity and insolvency.
- The five major causes of the U.S. housing market collapse were changing government regulations and incentives to homeowners, U.S. monetary policies, wealth destruction, moral hazard, and illiquidity.
- Mortgage strategies
  - With the originate-to-hold strategy, banks initiate and then hold on to the mortgages they create.
  - With the originate-to-distribute strategy, banks initiate and then sell the mortgages they create.
- Securitization
  - The process of purchasing, bundling, creating, and selling mortgage-backed securities is called *securitization*.
  - MBS were used as vehicles for investing in the booming U.S. real estate markets.
    - MBS have the same risks and returns as mortgages.
  - CMOs are backed by mortgages but have different risk-return profiles.
  - Securitization creates the potential for moral hazard by shifting the consequences of mistakes from mortgage originators to investors.

- Subprime mortgages are loans made to customers with lower credit ratings than would typically be approved for such debts.
- Fixing the credit market and goods and services market
  - Fixing the U.S. financial problem meant solving both insolvency and illiquidity problems.
  - Fixing the U.S. economic problem meant repairing the U.S. financial system and increasing aggregate demand.
  - "Quantitative easing" is the term applied to expansionary monetary policies when nominal interest rates approach zero.
  - Large fiscal deficits and a rapidly growing government debt became major issues connected to expansionary fiscal policy.
- The U.S. recovery was U-shaped.
- The Wall Street Reform and Consumer Protection Act (i.e., the Dodd-Frank Act) addressed many of the perceived deficiencies in the U.S. financial system.
- In terms of equity, liquidity, and ability to pass stress tests, U.S. banks appear to be safer than they were before 2007, but the U.S. banking system is more concentrated.

Review Questions

1. The values of existing homes are not included in a nation's aggregate demand, yet their compression in 2008 caused a decline in aggregate demand during the Great Recession. Explain the cause and effect relationship.
2. Explain the *Paradox of Leverage*, how it contributed to the Great Recession, and how it made recovery more difficult.
3. Distinguish between a liquidity problem and a solvency problem. What are the major solutions to these problems?
4. What is moral hazard? Explain why it was one of the main causes of the Great Recession.
5. Explain the difference between the originate-to-hold and the originate-to-distribute strategies. What is the connection between these strategies, moral hazard, and the Great Recession?
6. Explain NINJA loans and their relationship to the Great Recession.
7. Define "securitization" and the "originate-to-distribute" strategy. How did they combine to help create the Great Recession?
8. Explain the role of Fannie Mae and Freddie Mac in the U.S. housing market.
9. What role, if any, did Fannie Mae and Freddie Mac play in the Great Recession?
10. Explain the *Paradox of Financial Innovation* and the role it played in the Great Recession.
11. Explain the *Paradox of Thrift* and the role it played in the Great Recession.
12. Explain how U.S. regulatory changes helped create conditions that led to the Great Recession.
13. Explain financial disintermediation.
14. Explain how a lack of financial transparency helped create the Great Recession.

15. What are repurchase agreements (repos)? Are they sources of funds or uses of funds? How did the collapse of the repo market contribute to the Great Recession?
16. What is the commercial paper market? Is it a source of funds or a use of funds? How did the collapse of the commercial paper market contribute to the Great Recession?
17. In the context of the Great Recession, explain "quantitative easing" and the economic problems it poses.
18. What was the relevance of the Dodd-Frank (Wall Street Reform and Consumer Protection) Act in the aftermath of the Great Recession?
19. Explain the role that credit rating agencies were supposed to play in the mortgage securitization process and how failures at that level contributed to the housing crash.

Discussion Questions

20. How effective were U.S. fiscal and monetary policies at curing the Great Recession?
21. Use the Three-Sector Model to explain the effects that Federal Reserve monetary policies had on the U.S. economy and financial system. Assume the United States had highly mobile international capital markets and a flexible exchange rate. What problems connected with the Fed's policies may burden the United States for years?
22. Use the Three-Sector Model to explain the effects fiscal policy had on the U.S. economy. Assume the United States had highly mobile international capital markets and a flexible exchange rate.
23. Why did the U.S. government have a greater motivation to supply equity to troubled U.S. banks than to purchase their troubled assets?
24. Looking back at the Great Recession, was it an illiquidity problem or an insolvency problem?
25. Did the U.S. government's and Federal Reserve's bailout of the U.S. economic and financial systems earn them a return? How should one define the term "return?"
26. What arguments can be made to support the view that the U.S. financial system is healthier today than it was before 2007? What counterarguments can be made?

Chapter 22
Long-Term Growth and Development

Until now, we have focused on building a framework for analyzing short-term changes in economic activity. The Three-Sector Model provided us with an integrated and systematic way to evaluate the economic consequences of financial, real, political, and social shocks to a nation. The results from these analyses could then be used to strengthen annual budgets, country studies, business plans, capital budgets, and strategic decisions.

This chapter and the next focus on the long run. Rather than examine changes in economic activity for one- to five-year periods, we will concentrate on changes that span a decade or more and start by discussing the role played by scenario analyses in a company's strategic planning process. Then our attention will turn to issues of economic growth and development and how governments and natural resource endowments affect them. In the process, we will learn about the power of compounding and why annual growth rates, even at seemingly low levels, can have significant effects on long-term living standards.

We move on to address comparative advantage, which is a major takeaway from any course in international economics. Understanding comparative advantage is insightful for business leaders engaged in long-term planning and essential for policymakers because it shows how free international trade can provide net benefits to *all* trading partners—regardless of a nation's absolute level of global competitiveness.

The chapter ends by discussing why the reasoning that goes into making sound macroeconomic decisions is often different from the reasoning that goes into making sound business decisions, which are microeconomic in scope. This section provides insights into why successful business leaders are not always the most effective central bankers or finance ministers and why successful central bankers and finance ministers may be ineffective business leaders.

The Basics

Scenario Planning

Having a framework for evaluating long-term economic changes is important because it complements the strategic planning needs of businesses and governments. Yearly or biannual scenario plans are created and actively discussed by many well-organized companies. These plans typically have 10- to 20-year time horizons

https://doi.org/10.1515/9781547401437-022

and concentrate on structural issues, such as the future composition of a company's product portfolio and centers of business interests.
Companies use scenario analyses to address issues such as:

- What will our industry look like in a decade or more, and how can we be a significant part of it?
- Given our current strengths and the direction of world trends, what acquisitions or alliances will provide us with the most significant synergies?
- What existing products or lines of business should we divest because they no longer make long-term strategic sense?

As we change our perspective to the long run, our focus will shift from factors that mainly affect demand to those that affect supply. These supply-side factors usually move at a glacial pace, but over time, their cumulative effects tend to overwhelm other forces standing in their way. Among these supply-side forces are broad-based:

- Demographic changes, such as aging populations, immigration, and emigration
- Technological advances in areas such as artificial intelligence, the development of new synthetic materials, telecommunications, informatics, automation, miniaturization, robotics, blockchain, and genetic engineering,
- Corporate governance practices and labor-management relations
- Government and central bank rules, regulations, priorities, and policies toward fundamental factors, such as property rights, global protectionism, taxes, and reaction to economic, political, and social risks

Economic Growth and Development

Just as businesses create, execute, and assess their performance using balanced scorecards, countries can do the same.[1] Two of the most frequently used measures to gauge a nation's level of economic development are real per capita gross domestic product (GDP), which is a flow concept, and wealth, which is a stock concept, but these statistics are only road signs that indicate whether nations are moving in the right direction.

1 See Robert S. Kaplan, "Conceptual Foundations of the Balanced Scorecard," *Harvard Business School Working Paper 10-0734* (2010), https://hbswk.hbs.edu/item/conceptual-foundations-of-the-balanced-scorecard (accessed August 19, 2019).

More critical to nations than the goods and services they produce each year or the wealth they accumulate over time are visible signs that every citizen has (1) widespread access to essential life-sustaining amenities, (2) freedom to pick from a wide range of social and economic choices, and (3) better self-esteem through higher standards of living.[2] Viewing economic growth in terms of sustenance, freedom, and self-esteem helps us focus on the mountains on the horizon rather than landmarks along the way.

Increasing Real GDP and Real Per Capita GDP

A nation can increase real per capita GDP in two primary ways. One of them is to augment or improve the resources used in the production process. The other is to increase the efficiency of the production process. Figure 22.1 shows three stages of production. Stage 1 is the *input stage*, Stage 2 is the *production process stage*, and Stage 3 is the *distribution stage*.

Stage 1: Growth Caused by More or Better Inputs

Whenever a nation employs more labor, land, capital, or entrepreneurship, its real GDP should rise, but to increase living standards, countries not only have to increase real GDP; they also must increase real per capita GDP. Because of *diminishing returns*, this is often hard to do.

Figure 22.2 shows the generalized relationship between inputs and outputs when a variable resource is added to one or more fixed resources. Suppose Figure 22.2 represents the output of shirts at a garment factory as labor is added to fixed amounts of land, capital, and entrepreneurship.

In the beginning, the number of shirts produced may rise at an increasing rate because machinery and workspace are abundant. Qualified workers are relatively easy to find, and any increase in output is relatively significant because it is measured against a low base. Therefore, increasing production at a growing rate is possible for a short period, but this production stage of *increasing returns* is not sustainable. If it were, a nation could clothe itself and the rest of the world by merely increasing the amount of labor it employs in this single factory.

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2 For more information on this way of viewing economic growth and development, see Amartya Sen, *Development as Freedom*, Oxford: Oxford University Press (1999). Also see Paul Collier, *The Bottom Billion: Why the Poorest Countries Are Failing and What Can Be Done*, Oxford: Oxford University Press (2007), Jeffrey D. Sacks, *The End of Poverty: Economic Possibilities for Our Time*, New York: Penguin Group (2005), and Daron Acemoglu and James A. Robinson, *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*, New York: Crown Publishers (2012).

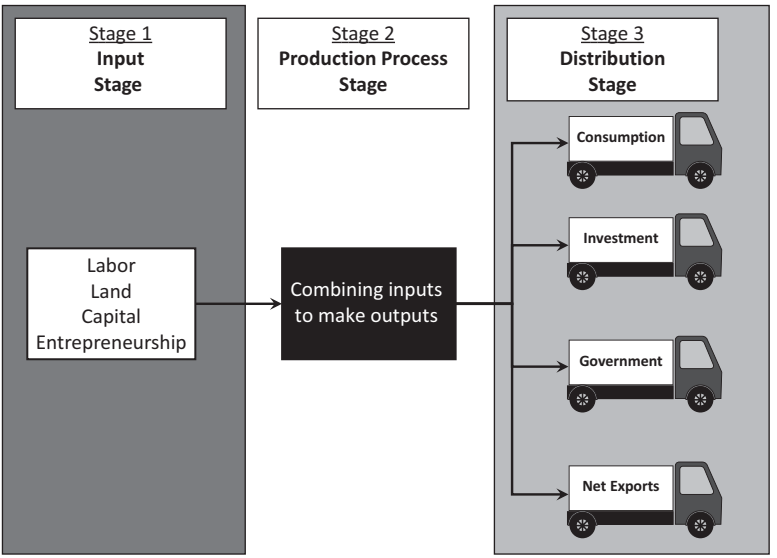


Figure 22.1: Three Stages of Production. (Imagery used: © yupiramos/123rf)

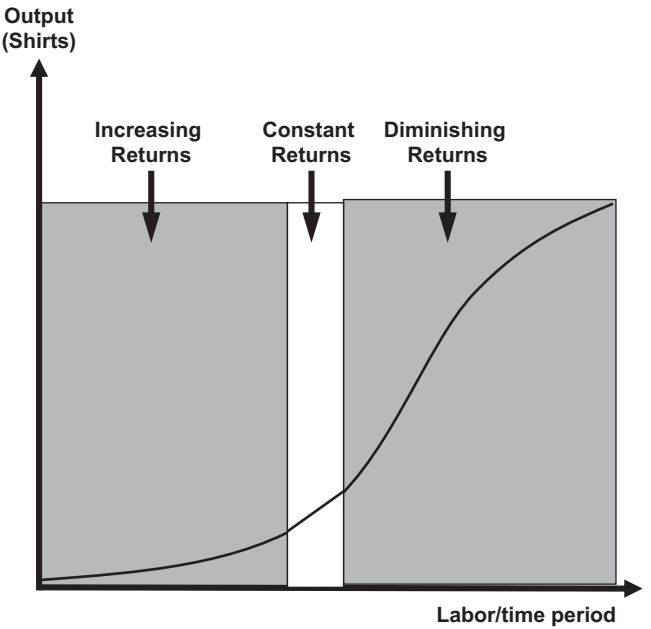


Figure 22.2: Generalized Relationship between Inputs and Output.

As more labor is hired, the production capacity of this factory's machinery is increasingly challenged. Average and marginal worker productivities decline, as more frequent bottlenecks occur, logistical complexities increase, and the normal wear and tear on machinery takes its toll. Productivity also declines when new workers with below-average ability are hired and have to be trained.

As a company moves out of the increasing returns stage, it encounters *constant returns*, where output grows proportionately with labor inputs. Eventually, if some of the inputs are held constant, it reaches the stage of *diminishing returns*. At this point, output continues to rise, but at an ever-decreasing rate. Diminishing returns is not a theory but rather an economic fact-of-life, which means every company and nation should expect to experience it.

Understanding the generalized relationship between inputs and outputs helps explain why differences in nations' growth rates may have nothing to do with one country doing something right (well) and the other doing something wrong (poorly). Instead, it could be due to the disparity in their stages of production and relative usage of resources.

For example, developing nations often grow more rapidly than developed countries when they have a plentiful supply of labor relative to capital, and they are deriving relatively high returns from their investments in plant, equipment, and education. Furthermore, growth is spurred if they are comparatively undercapitalized and enjoy access to technological advances that can be imported at relatively low costs.

By contrast, developed countries are already operating at relatively high levels of capacity, efficiency, and technological capability. Their capital-to-labor ratios are already elevated in comparison with those of developing nations. Moreover, vast majorities of their workforces are already educated, and they must invent new technologies to gain competitive advantages.

Stage 2: Growth Caused by Changes in the Production Process

There are only two ways to postpone diminishing returns. One of them is to find ways to increase all resources together; another is to improve the efficiency of the production process (Stage 2 in Figure 22.1). By increasing all resources together or improving productivity, the entire production function shifts upward (see Figure 22.3).

Economic growth that cannot be explained by increases in the quantity or quality of inputs (i.e., capital and labor) must be due to something happening within the production process stage. The contribution of this unknown source of output is called "total factor productivity" because it increases the efficiency of capital and labor in the production process. This unexplained production residual could be caused by discovery, invention, or innovation, but it could just

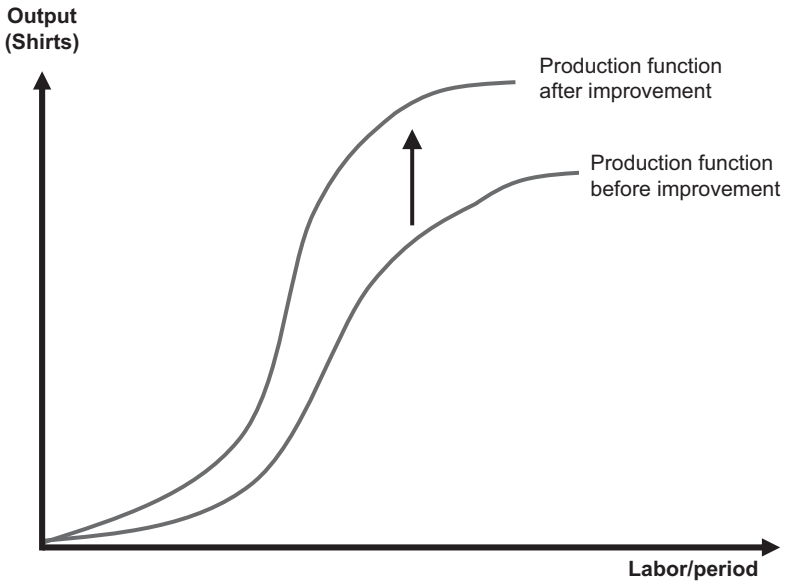


Figure 22.3: Postponing Diminishing Returns.

as easily be the result of a novel management style, cultural differences, or political ideology. Identifying the exact cause(s) of this output residual is problematic because the inner workings of the production process stage are not always visible and well understood.

An example helps explain why identifying the source of a nation's growth can become a politically sensitive issue. During the 1950s and 1960s, member nations of the Soviet Union grew at much faster rates than the United States or Western Europe. Many analysts attributed the difference to the Communist ideology. Some even suggested that higher growth rates and better living standards might be worth the cost of a few sacrificed freedoms in Western nations.

In the end, the notion was discredited that Communism was the cause of rapid *and* sustained economic growth. Today, Communism is seen by many to be more of an anchor to growth than an economic sail, but it did not take the dissolution of the Soviet Union or the crumbling of the Berlin Wall to prove this point. Analysts knew for years that virtually all of the Soviet Union's growth could be explained by the relationship between inputs (Stage 1 in Figure 22.1) and distribution (Stage 3 in Figure 22.1). They knew because there was no residual in the production process (Stage 2 in Figure 22.1) to explain.

Soviet output grew mainly because of substantial, and often compulsory, increases in the quantity and quality of inputs. The Soviet government forced thousands of people from their farms to work in cities. Men and women were compelled to enter the labor force and required to work overtime. Expenditures for education increased dramatically, which substantially increased the nation's literacy rates and productivity.[3]

With such radical changes in the quantity and quality of inputs, one would expect Soviet output to rise—and it did, but therein was a problem. A nation can double its literacy rate once, but if more than half of the population can already read and write, then it is impossible to double the percentage again. Similarly, a government can force people from farms to cities, but when more than half the people are already in cities, it cannot double the percentage again. In short, the Soviet Union eventually encountered diminishing returns. Its growth rate slowed and, finally, the ceiling caved in. Public unrest caused remarkable political and economic changes that led to the dissolution of the Soviet Union.

Soviet Communism is rarely cited today as a cure-all for economic malaise. Nevertheless, ideological questions about growth and development are still hotly debated. The only difference is that the focus has shifted as new countries have sprinted ahead of the pack. During the 1960s and 1970s, Japan was seen as the economic role model for growth and development. Then, in the 1980s and early 1990s, the Asian Tiger countries were held in high esteem. In the 2000s, it is China's and India's turn.

Stage 3: Distribution Stage

Rapid advances in supply-chain management, the strategic use of location theory,[4] as well as novel delivery methods have changed business practices, the competitive landscape, and expectations about what is "business as usual." Real-time supply chain management has increased visibility, transparency, and seller-to-buyer speeds. The logistics behind same-day delivery have combined with technological improvements in electric trucks, electric cars, and drones to

3 See Paul Krugman, "The Myth of Asia's Miracle," *Foreign Affairs,* Volume 73, Number 6, November/December 1994, pp. 62–78. George F. Gilboy, "The Myth Behind China's Miracle," *Foreign Affairs,* Volume 83, Number 4, July–August 2004, pp. 33–48. Joe Studwell, *How Asia Works: Success and Failure in the World's Most Dynamic Region* (New York: Grove Press, 2013).

4 Location theory focuses on the optimal location of economic activities and reasons why these activities locate where they do. It is an important part of disciplinary areas such as economic geography and spatial economics.

make distribution channels faster and less expensive. Global positioning systems (GPS), big data, and predictive analytics have been used effectively to develop business strategies, predict events, and avoid costly disruptions related to buyer behavior, traffic patterns, and weather conditions. Advances in 3D printing, which now cover the gamut, from small medical implants and dental crowns to large automobile and aircraft parts, hold the potential to produce almost anything virtually anywhere, via the sale of software programs.

Economic Growth and the Importance of Compounding

Due to compounding, positive rates of real growth, even small ones, are important to living standards when they are considered over long periods. Compounding is a powerful force because, each year, the base on which growth is calculated gets larger. Due to compounding, a nation growing at a 4% annual rate needs fewer than 18 years to double its annual GDP. Without compounding, it would take 25 years.

To see the power of compounding in a different light, suppose we considered the period from 1947 (just after World War II) to 2020 and compared the per capita incomes of two nations that started at the same level but grew at different rates. If per capita income in 1947 for both countries was $1,000, and Country A grew at an average annual rate of 1%, while Country B grew at an average annual rate of 3%, how large would the difference in their living standards be at the end of the 73 years?

Growth would make both countries better off. Slow-growing Country A's per capita GDP would be $2,068, which is almost 107% higher than in 1947, but Country B's results would be much more impressive. At the end of the period, Country B's per capita income would be $8,661, which is more than 765% higher than in 1947 and almost 4.2 times higher than the 2020 level of Country A.

The takeaway is that nations need forward-looking government officials and central bankers who are willing and able to keep the ball of economic progress rolling forward. They can do this by enacting policies that contribute to sustainable economic growth rates because each year new gains are compounded on the shoulders of all previous years' gains. If public officials keep this vision, they will end up providing better standards of living for their children and grandchildren, as well as for their current constituents.

Government's Role in Economic Development

What does history tell us about the role governments should play, if any, in the promotion of economic growth and development? Do government policies matter in the long run? Can they make a difference?

How Can Governments Promote Economic Growth?

The government's role in promoting long-term economic growth is still being sorted out. Figure 22.4 summarizes some of the policies that have been successful for many developed nations, like the United States, England, and Switzerland. The governments of these countries have established fair rules of behavior and provided the means to enforce them. They have also done good jobs creating stable and predictable political environments, encouraged competitive markets, and promoted national and international flows of financial capital, labor, goods, and services. They have also pursued sensible fiscal policies, appointed prudent central bankers, and imposed reasonable marginal tax rates.

Figure 22.4: How Governments Can Promote Economic Growth.

Over long periods, governments seem to function best when they provide needed goods and services that otherwise would not be provided effectively or efficiently by the private sector, such as defense against foreign invasion. Of course, a large part of delivering on this responsibility is knowing when they have crossed the line and started to provide goods and services that would or could be supplied

more efficiently and effectively by the private sector. Historically, governments have not been especially successful at choosing industry winners, and after nationalizing industries, their record has been relatively poor at developing new technologies and staying at the forefront of technological efficiency.

How Can Governments Impede Economic Growth?

Governments can impede economic growth in six primary ways (see Figure 22.5). First, to fund their expenditures, governments must either borrow or tax. If borrowing raises the real interest rate, it can crowd out private investment and consumption expenditures. Taxes lower business profits and disposable household incomes, which also reduces investment and consumption. This reduction in private spending can lower economic growth.

- **Government borrowing can crowd out private investment**
- **High taxes may reduce investment, consumption, and work incentives**
- **Government projects may have relatively low marginal returns**
- **Lack of accountability to a bottom line may allow wasteful spending**
- **Regulation may redistribute income and wealth rather than create them**
- **Protectionism may interfere with international trade, labor, and capital flows**

Figure 22.5: How Governments Can Impede Economic Growth.

Second, taxes *may* also diminish work incentives by lowering the opportunity cost of leisure. For example, someone who works eight hours a day, earns $20 an hour, and pays a 10% tax rate sacrifices $144 for each day off.[5] If taxes were raised to 40%, the same day off would cost the worker only $96.[6] Therefore, higher taxes make leisure cheaper.

Third, at some point, government spending begins to encounter diminishing returns, but this is no surprise. Why should governments be any different from private companies? The marginal returns on government projects, such as educational programs, roads, tunnels, and bridges, follow the same inevitable pattern of diminishing returns as private investments in buildings, factories,

5 Disposable income – Income Taxes = ($20/hr x 8 hr/day) – (10% x $20/hr x 8 hr/day) = $144/day.

6 Disposable income – Income Taxes = ($20/hr x 8 hr/day) – (40% x $20/hr x 8 hr/day) = $96/day.

machinery, and tools. As more projects are undertaken, the marginal return on government projects, at some point, is bound to sink below the marginal return on private projects.

Fourth, governments are accountable to voters and constituents but not to bottom lines or shareholders. If they were, the consequences of excessive and unwise spending practices might be threatening and act as deterrents. Government accountability is also diminished because there is often no way to measure the economic return on government projects.

Open markets are not always right, but they have the remarkable potential to increase a nation's wealth and well-being. Governments can impede economic growth by focusing too myopically on the redistribution of assets, rather than their creation. Legitimate goals, such as *fairness* and *creating level playing fields*, are not necessarily at odds with economic growth and development, but they are often perceived to be. For this reason, balance and care are needed, on all sides, when considering the impact of new government rules, regulations, guidelines, and procedures.

The Role of Natural Resources in Economic Growth

It is no accident that a nations' natural resource endowments are deemphasized as significant sources of economic growth. If all other things were equal, then countries with abundant resources would have advantages over nations with fewer resources, but "other things" are rarely equal, and there is ample empirical evidence that natural resource endowments are not prerequisites to high living standards or rapid economic growth. If they were, nations like Argentina, Brazil, and Venezuela, countries with some of the most abundant natural resources in the world, would have higher living standards than Japan and Switzerland, where natural resources are relatively scarce. To grow, nations need *access* to resources, which means they need open trade and investment channels. They do not need to own the resources.

Comparative Advantage

Why do countries trade the particular goods and services they do? For nations that can produce anything, why do they tend to specialize in only certain products? Do the gains that one country derives from international trade come at the expense of other nations? One of the most insightful economic concepts to help answer such questions is *comparative advantage*, which convincingly

shows us how trade should be based on relative productivity differences among countries, rather than absolute productivity differences.

For business managers, understanding the concept of comparative advantage is essential for two reasons. First, it is a useful framework for analyzing changes in long-term international trade and production patterns. Therefore, comparative advantage should be a part of every business manager's scenario-planning toolkit. Second, comparative advantage highlights an essential way in which countries differ from companies. In particular, the effect of one company's productivity advances is likely to be quite different from productivity advances for an entire nation.

Let's begin this section by taking a closer look at the concept of comparative advantage and, afterward, explain the significant ways in which countries are different from companies.

Setting the Stage

The U.S. Census Bureau uses the North American Industry Classification System (NAICS, pronounced "nakes") to categorize exports and imports.[7] There are thousands of codes for imports and exports, and for each particular industry there is a broad array of different reasons for why trade takes place. For instance, trade relationships could be based on factors such as cost, quality, productivity, cultural similarities (e.g., language preferences, ethnicity, religion, and social norms), political and social stability, geographic distance, regulatory framework, and other economic factors, such as per capital incomes, sophistication of the financial system, and patents. They could just as easily be set up on the basis of personal friendships and chance meetings in airports or social gatherings.[8] Comparative advantage focuses on one primary reason for trade and trade patterns—relative differences in international productivity.

Let's use two hypothetical countries, Inland and Outland, to understand how relative productivity differences influence international trade. Suppose Inland is a highly developed nation with the latest technologies and highest worldwide living standards. By contrast, Outland is among the least developed countries in the world, using primitive technologies and having meager living

7 U.S. Census Bureau, North American Industry Classification System, https://www.census.gov/eos/www/naics/ (accessed August 19, 2019).

8 See Pankaj Ghemawat, "Distance Still Matters. The Hard Reality of Global Expansion," *Harvard Business Review*, September 2001, 79(8): 137–40, 142–7, 162, and Alessandro Giudici and Marianna Rolbina, *Pankaj Ghemawat's Distance Still Matters. The Hard Reality of Global Expansion*, Macat International Limited, 2018.

standards. A constant lament among Inland businesses is that they cannot compete against Outland's low resource costs (e.g., wages). At the same time, companies in Outland complain that they cannot compete against Inland's advanced technologies.

Absolute Advantage

Suppose the average worker in Inland could produce 1,000 high-tech products (e.g., specialized transistors) per day or 200 units of clothing (e.g., shirts). In Outland, the average worker could produce 100 high-tech products per day or 100 units of clothing (see Table 22.1).

Table 22.1: Output per Worker per Day in Inland and Outland.

	High-Tech Products Per Day	Clothing Per Day
Inland	1,000	200
Outland	100	100

Given these conditions, which country should produce and export high-tech products, and which one should produce and export clothing? On the surface, it appears as if Outland cannot compete against Inland in either product because Inland has an absolute advantage (i.e., absolute *productivity* advantage) in both products. An absolute advantage exists when the average worker (or other resource, such as a unit of capital or land) in one country can produce more per period than the average resource in another country.

Is absolute advantage the basis for international trade? If it is, then Outland is in real trouble. Under these circumstances, what alternatives would Outland have? Because countries do not go out of business, should Outland close its borders and protect domestic industries by imposing tariffs and quotas on imports? Let's take a closer look at the causes of trade, but this time, we will use comparative advantage (not absolute advantage) as our guide.

Opportunity Costs and Comparative Advantage

For Inland, employing a worker in the high-tech industry means that he or she is not working in the clothing industry. Therefore, the opportunity cost of producing 1,000 high-tech products per day is the sacrifice of 200 units of clothing. On a standardized basis, this means that one high-tech product in Inland costs 0.20 clothing units (i.e., 200 clothing units/1,000 high-tech goods = 0.20 clothing

units/high-tech good). Alternatively, expressing costs in terms of high-tech products, it means that the cost of producing one clothing unit is the sacrifice of five high-tech products (i.e., 1,000 high-tech goods/200 clothing units = 5 high-tech goods/clothing unit) as shown in Table 22.2. In Outland, the cost of producing 100 units of high-tech products (HT) is the sacrifice of 100 units of clothing (CL). Therefore, on a standardized basis, one high-tech product costs one clothing unit, and one unit of clothing costs one high-tech product (see Table 22.2).

Table 22.2: Opportunity Costs for Inland and Outland.

	1 High-Tech Products Costs	1 Unit of Clothing Costs
Inland	0.20 units of clothing	5 high-tech products
Outland	1 unit of clothing	1 high-tech product

Based on opportunity costs, Inland is the low-cost producer of high-tech products because it gives up only 0.20 clothing units to produce one high-tech product, as compared with Outland, which sacrifices one clothing unit. At the same time, Outland is the low-cost producer of clothing because it sacrifices only one high-tech product to produce a unit of clothing. It costs Inland five high-tech products to get the same clothing unit. Because Inland's opportunity cost for producing high-tech products is lower than Outland's, Inland is said to have a comparative advantage in high-tech products. Similarly, Outland has a comparative advantage in clothing because its opportunity cost is lower than Inland's opportunity cost.

Inland's opportunity cost for one high-tech product (0.20CL-to-1HT), is lower than Outland's cost (1CL-to-1HT). Outland's opportunity cost for one unit of clothing (1HT-to-1CL) is lower than Inland's cost (5HT-to-1CL). For trade to benefit both nations, Inland should produce high-tech products and trade them for clothing with Outland. At the same time, Outland should produce clothing and trade it with Inland for high-tech products. Doing so will make both countries better off.

Mutually Advantageous Trade Between Inland and Outland

Mutually advantageous trade between Inland and Outland occurs at any trading ratio between the two extremes (i.e., anywhere between the two domestic opportunity costs). Suppose the trading ratio was two high-tech products for one unit of clothing (i.e., 2HT = 1CL), which also means that 0.50 units of clothing can be exchanged for each high-tech product (0.5C = 1HT). First, let's focus on

the 2HT-to-1CL trading ratio to see why both countries benefit. At the 2HT-to -1CL trading ratio, Inland benefits because it gets one unit of clothing by trading two high-tech products instead of it costing five high-tech units at home. Outland also benefits because it gets two high-tech products for each clothing unit it trades with Inland. At home, Outland would get only one high-tech product for each unit of clothing.

The same point can be made by focusing on the trading ratio of 0.50 clothing units per high-tech product. Inland benefits because it gets 0.50 clothing units for each high-tech product it trades, instead of getting only 0.20 clothing units at home. Outland also benefits from this trading ratio because it gets one high-tech product by trading only 0.50 units of clothing, instead of it costing one unit of clothing at home.

Mutually advantageous trade occurs at any trading ratio between the two extremes,[9] but it worth remembering that, within these limits, Inland benefits more (and Outland less) the closer the price (i.e., opportunity cost) is to Outland's domestic trading ratio. Similarly, Outland benefits more (and Inland less) the closer the price is to Inland's domestic trading ratio. In short, net benefits are a zero-sum game within the mutually advantageous trading limits (i.e., one country gains at the expense of the other). The actual trading ratio within these mutually advantageous limits depends on factors such as relative bargaining powers.

Trading Ratios Outside the Extremes

Trade between Inland and Outland will not take place at a trading ratio that is outside the range of domestic opportunity costs because, at this rate, both countries would want to produce and export the same product. For example, at a trading ratio of 10 high-tech products (e.g., specialized transistors) per clothing unit (e.g., one shirt), both countries would want to produce and export clothing. Inland would want to do so because it would get 10 high-tech products for each clothing unit traded instead of the 5 high-tech products it would get at home. Similarly, Outland would want to produce clothing because it would get 10 high-tech products for each unit of clothing traded instead of the one unit it would get by producing high-tech products domestically. If both countries wanted to produce and export clothing, what would happen? With two sellers and no buyers, at the 10-to-1 ratio, clothing would flood the market, thereby lowering the trading ratio to within the 5-to-1 and 1-to-1 range.

9 In terms of high-tech products, the two extremes are 0.20CL to 1HT and 1CL to IHT. In terms of cloth, the extremes are 1HT to 1CL and 5HT to 1 CL.

Similar reasoning can be used if the trading ratio was below the range of opportunity costs. For example, suppose the trading ratio is 0.5 high-tech products per unit of clothing. Under these circumstances, both countries would want to produce and export high-tech products (e.g., specialized transistors). Inland would want to produce high tech products because it could get one unit of clothing (e.g., one shirt) by trading only 0.5 high-tech products. Producing clothing at home would cost five high-tech products. At the same time, Outland would want to produce and export high-tech products because it could get one clothing unit for only 0.5 high-tech products traded instead of costing one high-tech product at home.

Mutually Advantageous Trade and Resource Costs

For mutually advantageous trade to take place, Inland and Outland must also have relative resource costs that are within certain bounds, and these bounds are determined by the two nations' relative production levels. Inland's high-tech productivity per worker is 10 times higher than Outland's (1,000 versus 100 high-tech products), and its clothing productivity is two times higher than Outland's (200 versus 100 clothing units). Therefore, resource costs in Inland must be no less than two times higher than in Outland and no more than 10 times higher than in Outland. Instead, it must be somewhere between for trade to take place.

Suppose Inland's resource costs for both products, were five times higher than in Outland, with Inland's resources earning \$100 per day and Outland's resources earning \$20 per day. Figure 22.6 shows that, at these relative resource costs, high-tech products would be cheaper in Inland (\$0.10/unit) than in Outland (\$0.20/unit), and clothing would be less expensive in Outland (\$0.20/unit) than in Inland (\$0.50/unit).

(Inland's resources earn \$100/day,and Outland's resources earn \$20/day)		
	Cost of High-Tech Products	**Cost of Clothing**
Inland	\$100 per 1,000 units → \$0.10/unit	\$100 per 200 units → \$0.50/unit
Outland	\$20 per 100 units → \$0.20/unit	\$20 per 100 units → \$0.20/unit

Figure 22.6: Dollar Cost of High-Tech Products and Clothing Inside Trading Limits.

If the resource costs of these nations were anywhere outside the limits of 2-to-1 and 10-to-1, they would nullify the comparative advantage and prevent trade from taking place. Figure 22.7 shows what would happen if resource costs in Inland equaled Outland's resource costs, causing the ratio of labor costs to be

1-to-1, which is outside the mutually advantageous trading limits. If resource costs in both countries were $100 per day, Inland could produce and sell both products cheaper than Outland. High-tech products would cost $0.10 per unit in Inland compared with $1 in Outland, and clothing would cost $0.50 per unit in Inland compared with $1 in Outland. No trade would take place.

The market would react in ways that remedy this one-sided trade advantage. As unemployment in Outland rose, its resource costs would fall, thereby making it more competitive with Inland. As the demand for Inland's products rose, so would the demand for resources, causing resource costs to rise and making Inland less competitive relative to Outland. Finally, the increased demand for Inland's currency would appreciate its value, thereby making Inland's products relatively more expensive than shown in Figure 22.7.

	(Inland's resources earn $100/day,and Outland's resources earn $100/day)	
	Cost of High-Tech Products	**Cost of Clothing**
Inland	$100 per 1,000 units → $0.10/unit	$100 per 200 units → $0.50/unit
Outland	$100 per 100 units → $1.00/unit	$100 per 100 units → $1.00/unit

Figure 22.7: Dollar Cost of High-Tech Products and Clothing Outside Trading Limits.

Comparative Advantage: Key Take-Aways

Our examples explain comparative advantage using only two countries producing two products at constant costs. The real world is much more complex, with numerous countries producing many products—some at increasing costs, others at constant costs, and still others at decreasing costs. Nevertheless, the conclusions regarding comparative advantage are essentially the same:

- First, international trade based on output and efficiency does not depend on nations' absolute levels of productivity. Instead, it depends on relative international opportunity costs. As a result, a nation should be able to compete internationally even if it has an absolute productivity disadvantage relative to every other country in the world and for every possible product sold. Furthermore, the likelihood of two countries having precisely the same opportunity costs for all products is minuscule (i.e., nearly impossible).
- Second, insisting that the resources (e.g., workers) in different countries earn the same level of compensation (e.g., wages) is counterproductive because it negates nations' comparative advantages and takes away the mutual benefits that come from trade.
- Finally, international trade provides net benefits to all nations, but within each country, some groups are hurt while others are helped. For example,

export industries benefit at the expense of the import-competing industries because demand for exports rises and demand for import-competing products falls. Similarly, the relatively abundant resources in each country benefit at the expense of the relatively scarce resources because the net demand for the relatively abundant resource rises and the net demand for the relatively scarce resource falls. Nevertheless, the *net* effect on each nation is still positive.

The Rest of the Story

A Country Is Not a Company

Transparency, fairness, stability, and predictability are a few of the common characteristics shared by successful companies and countries, but the principles that make companies efficient and profitable are not always the same as those that make healthy and prosperous countries. CEOs, division heads, and company directors do not (and should not) use the same guidelines and economic logic as public officials. Similarly, central bankers and finance ministers do not (and should not) think in the same ways as CFOs. Let's look at a few of the most important dissimilarities between companies and countries.[10]

Country Residents Versus Business Customers and Suppliers

Most companies sell only a tiny fraction (if any) of the products they make to their own employees, and they produce and supply themselves with only a small fraction of their own ingredient needs. By contrast, countries sell the vast majority of what they produce to domestic residents, and they source massive amounts internally. For example, U.S. imports have historically been about 15% of U.S. GDP, which means 85% of what the nation purchased was produced internally. Similarly, only about 12% of U.S. goods and services produced have been sold to foreigners.[11] Few, if any, prominent U.S. companies have purchases and sales that come anywhere close to these national levels. The

10 See Paul Krugman, "A Country Is Not a Company," *Harvard Business Review*, January/February 1996, product number 96108; Paul Krugman, *Pop Internationalism*, Cambridge, MA: MIT Press (1996).

11 In 2018, U.S. exports were about 12% of GDP, and U.S. imports were about 15% of GDP. Source: U.S. Bureau of Economic Analysis, Exports of Goods and Services [EXPGS], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/EXPGS (August 19, 2019).

external world is vital to the United States, but domestic demand and supply are far more crucial. For most companies, just the opposite is true. External sales and sourcing are more important than internal sales and sourcing.

Country Productivity Versus Company Productivity

Companies in the same industry, like Ford and General Motors, are competitors, which means the success of one often comes at the expense of the other. If Ford's productivity increases, it expects to be rewarded in the marketplace by earning higher profits, but these rewards usually materialize only if Ford's productivity is higher than General Motors'. For example, if Ford's productivity grew by 2%, but General Motors' productivity increased by 8%, then Ford would be at a competitive disadvantage. The company's profitability could suffer, layoffs could result, its stock price could fall, and acquisition vultures would soon begin to circle Ford's corporate headquarters in Dearborn, Michigan.

By contrast, increased productivity at the country level is beneficial, regardless of whether it is greater than, less than, or equal to other nations. Higher productivity means there is more for everyone to share. Unlike Ford and GM, which compete vigorously with each other and sell most of what they produce to third parties, countries are their own major suppliers and major customers. When countries on Earth produce more, then the people on Earth have more to consume. To date, Earth has not had to compete with any foreign planets.

If U.S. productivity grew by 2% and China's productivity grew by 8%, both nations and the world would benefit. China would gain because the rising real output would improve its living standards. The United States would also benefit from its own 2% growth because U.S. residents would consume most of the newly produced goods and services, but the United States would also benefit from China's growth. U.S. consumers would gain because the increased availability of Chinese products should reduce their prices. U.S. producers would gain because rising Chinese GDP would increase the nation's income, making China a better customer for U.S. products.

Country GDP and Employment Versus Company Sales and Employment

When companies increase top-line sales revenues, they usually employ more labor. This relationship is much weaker at the country level and even more fragile at the global level. One reason for the loose country-relationship between exports and employment is that nations employ monetary and fiscal policies to offset undesired changes in demand. For example, if global demand for U.S. goods and services plunges, causing net exports to fall and unemployment

to rise, expansionary monetary and fiscal policies can be used to increase it. Similarly, if foreign demand for U.S. products rises, causing unwanted inflation, contractionary monetary and fiscal policies can be enacted.

At the global level, the main effect of free trade is to redistribute production from where it is currently located to the most efficient locations. It does not necessarily increase worldwide employment because many of the jobs created in net export nations are lost in net import nations. For world employment to grow, trade would have to increase worldwide demand. One avenue through which trade might stimulate demand and increase employment is via its effect on world income. As free trade increases global production, it raises world income, and rising world income stimulates demand. Of course, if the world were at or close to full employment before trade liberalization, this increased demand would not (and could not) increase employment.

Country Versus Company Employment and Price Goals

Companies tightly monitor their employee headcounts to control costs, and they hire and fire based on profitability considerations. No company has the goal of employing anyone unemployed and actively seeking work. Moreover, just because a company increases employment does not mean that it can raise prices. Nor does it mean that just because a company releases workers that it has to lower prices. Market forces set prices and not company headcount changes.

Things are different at the national level. Many countries have full-employment targets and try to provide meaningful employment to anyone unemployed and actively seeking work, by adjusting their monetary and fiscal policies. At the national level, there is often a short-term inverse relationship between inflation and unemployment. We know this inverse relationship as the Phillips Curve trade-off (see Chapter 12, "Real Goods and Services Markets," and Chapter 23, "Long-Term Inflation, Exchange Rates, and Unemployment"). Nothing comparable to this exists at the company level.

Employment in Open Versus Closed Systems

Companies are open systems, and countries are closed systems. Open systems place no binding constraints on the ability of companies to grow. They can hire workers to expand old lines of business and develop new ones without worrying about the new lines encroaching on the old ones. Closed systems are different because they face binding constraints, such as fixed amounts of arable land and limited workforce populations. Once a country reaches full employment, it

is impossible to expand all existing lines of business, and new lines of business can be pursued only by reducing old lines.

Suppose a company produced a top-rated product, borrowed liberally to finance expansion by investing in new plant and equipment, and increased its capacity by 20%. What should happen to the company's top-line sales volume, employment, and profits? The answer (in all likelihood) is sales volume, employment, and profits would grow. If this is true, can the same be said of a country? What should happen to a nation's net exports, when it borrows liberally from foreign nations and invests the funds in new plant and equipment? We know from the *Balance of Payments Identity* that net exports must fall because the Current Account (CA) plus Capital Account (KA) must equal the Financial Account (FA) plus Reserves and Related Items (RRI).[12] If net capital inflows cause FA to be a minus item in the balance of payments, and there is no change in KA or RRI, then CA must be negative. A negative CA means that imports exceed exports. Therefore, countries that are net international borrowers are not the ones with current account surpluses. By contrast, companies that are net borrowers can simultaneously increase third-party sales by using the funds to expand capacity and efficiency.

Country Versus Company Currencies

During the past quarter-century, some nations, such as those joining the European Monetary Union, abandoned their domestic currencies in favor of a common currency. Other countries have adopted the currencies of other countries, such as Ecuador and Panama adopting the U.S. dollar; Scotland adopting the British pound; and Andorra, Kosovo, and Montenegro adopting the euro. Despite these exceptions, most countries still have their own currencies. A significant benefit from having a national money is when global demand for a nation's products drop, so does demand for the currency, causing it to depreciate. Such depreciations reduce the effective price of a nation's goods and services and increase foreign demand for them.

If companies had their own currencies, they, too, could allow them to depreciate or appreciate with the ebbs and flows in product demand. Most companies do not have their own currencies. The nearest equivalents are tokens, which are like cryptocurrencies, whose development has been spirited by advances in blockchain technology. Tokens have focused mainly on reducing

12 Chapter 17, "Balance of Payments," explains in detail the *Balance of Payments Identity*, which shows that CA + KA ≡ FA + RRI.

transaction costs, and they are a considerable distance from serving the monetary functions of national currencies.

Country Policies Versus Company Strategies

The level of diversification a company pursues is a strategic decision made by top management. A company's chief executive officer, management team, and board of directors can choose to engage in numerous activities, streamline multiple lines into one, or select an intermediate structure. In contrast, countries have thousands of business lines and far more sub-activities. Imagine how difficult it would be to make strategic and operating decisions for a company with thousands of divisions, each having thousands of business units. For this reason, strategic planning at the national level has an entirely different meaning from strategic planning at the company level.

Hands-On Versus Hands-Off Strategies

Businesses seem to function best when important operating and strategic decisions are carefully managed, directed, and monitored by top management, such as the CEO, executive committee, and board of directors. It is for this reason that annual budgets, business plans, and capital budgeting analyses are used for making short-term decisions, and scenario plans are used for making long-term decisions.

By contrast, economies seem to function best when their markets are free to operate without burdensome central government supervision, control, and intervention. During the twentieth century and now into the twenty-first century, many countries have tried to use industrial policies[13] for purposes such as promoting research and development, improving economic conditions, enhancing company performance, and helping industries adapt to changing economic conditions.

The final verdict is still out, but in general, industrial policy disappointments have (so far) outnumbered successes. For example, import substitution experiments in Latin America during the 1950s and 1960s were mainly futile. U.S. and European subsidies to industries, such as agriculture, semiconductors, shipbuilding, steel, and textiles, were generally a waste of taxpayers' money. The Soviet Union's industrial planning fiascos during the period from 1947 to

13 Industrial policies are government actions that influence industry supply or demand. The term industrial policy derives from early cases where governments tried to promote their industrial sectors. Since then, governments have branched into many other areas, such as agriculture, but the term *industrial policy* remains.

the late 1980s were legendary for their ineffectiveness. Japan's industrial planning policies since the 1960s (e.g., mainly in the aircraft, aerospace, aluminum, biotechnology, computer, HDTV, nonferrous metal, and steel industries) were mostly fruitless.[14]

In the twenty-first century, China has become an interesting story because its government has tried to tilt the playing field to domestic companies' advantage—especially for state-owned companies—aspiring to become the dominant world power in many high-tech industries. Among them are electric cars and other new energy vehicles, next-generation information technology, telecommunications, advanced robotics and artificial intelligence, as well as agricultural technology, aerospace engineering, new synthetic materials, advanced electrical equipment, emerging bio-medicine, high-end rail infrastructure, and high-tech maritime engineering. Its "One Belt One Road" initiative, which was initiated in 2013, has turned rapidly into a massive lending program to developing nations in central and Eastern Europe, as well as in Africa. It will take years to execute and then to evaluate the effectiveness of China's central planning policies.

Government planning is not always wrong, and business planning is not always right, but central to any evaluation are the stakes. When businesses make decisions (right or wrong), their changes are usually marginal rather than discrete, and the results provide vital feedback to others. In other words, business decisions are typically small compared with government decisions, and regardless of whether they succeed or fail, these decisions provide critical information to the rest of the market about what to pursue and what to avoid. By contrast, when government decisions are significant and discrete, their successes and failures can be massive and provide little or no quality, incremental feedback to private market participants.

Conclusion

In the long run, growth and development depend on supply-side factors, such as the quantity and quality of inputs and the efficiency of production processes. The most common measures of economic development are real per capita GDP and wealth, but these output-related indicators are only a means to an end.

14 Japan's Ministry of International Trade and Industry (MITI) targeted more than 60 industries to support, but very few of these efforts succeeded. The verdict is still out on how successful China will be.

Perhaps, nations should have more visionary goals, such as providing their citizens with widespread access to essential life-sustaining amenities, freedom to pick from a wide range of social and economic choices, and better self-esteem through higher standards of living. In the end, if goods and services are not produced, they cannot be consumed. Therefore, long-run economic policy needs to keep its focus on the creation of income and wealth.

Increasing real GDP is one way to improve a nation's living standards, but eventually, economic growth encounters diminishing returns. To fight diminishing returns, nations must find ways to expand and improve their resource bases, as well as make their production processes more efficient.

Governments with the best records for promoting sustainable long-term growth have been those that have restricted their activities to defining and enforcing property rights, setting basic rules of human behavior, and encouraging competitive markets. They also play significant roles by creating stable and predictable economic and political environments.

Without resources of sufficient quantity and quality, growth could not occur. Nevertheless, for a nation to grow, access to natural resources is more important than ownership. Some of the world's most developed nations have natural resource endowments that rank among the scarcest in the world, and among the world's poorest countries are ones with relatively abundant natural resources.

Comparative advantage exists when a nation can produce a good or service at a lower opportunity cost than another country. As long as markets are free to adjust, a nation should have a comparative advantage in at least one product, which it should be able to export. Similarly, despite how productive a country is, free markets guarantee that it should have a comparative *dis*advantage in at least one product, which it should import.

To ensure mutually advantageous trade, a nation's resource costs must be within bounds set by relative international productivity levels. Therefore, *international pressure to equalize resource compensation levels among nations could seriously erode or offset the reason for and advantages of free trade*.

Unlike the game of poker, international trade is not a zero-sum game, where one player's gains equal other players' losses. Instead, it is a positive-sum game played by teams, with all sides leaving the table as *net* winners. Consequently, it is essential to remember that, within each team, specific individuals will be victims of trade. It is the team, not each member, that leaves as a net winner.

A country is not a company, which means the basis for making sound business decisions is often different from that used for nations as a whole. Some of the most important differences between countries and companies are:

- Each country will always have a comparative advantage in at least one product. A company may not.
- Countries consume internally most of what they produce and source the vast majority of their needed inputs internally. Companies do not.
- Countries benefit regardless of how fast they grow, which is one of the primary reasons in favor of free international trade. Companies benefit mainly when their productivity grows faster than their competitors'.
- There is a strong positive correlation between increases in companies' external (third-party) sales and headcount (i.e., number of employees). By contrast, the correlation between nations' export sales and overall employment is relatively weak.
- Countries often face short-term Phillips Curve trade-offs between inflation and unemployment. Companies do not.
- Countries have full-employment targets and use monetary and fiscal policies to reach these goals. Nothing comparable exists at the company level.
- Most countries have their own currencies. Most companies do not.
- Countries have thousands of business lines, and companies have relatively few. Therefore, strategic planning at the country level is different from strategic planning at the company level.
- Well-managed companies usually exercise a considerable degree of top-down management, supervision, direction, and control. Countries seem to perform best when individuals and markets are relatively free from central government intervention.

Key Points

- Long-term growth and development
  - Long-run growth depends more on supply-side factors than demand-side factors.
  - A balanced set of long-term goals for many nations could include freedom, sustenance, and self-esteem. Growth of real GDP is simply a means to these ends.
  - Eventually nations encounter diminishing returns as output increases at rates that are slower than inputs.
  - To postpone the effects of diminishing returns, nations can try to increase all resources simultaneously or improve the production and distribution processes.
  - Growth in output that cannot be explained by changes in resource quantity or quality must be due to the production process.

  - Compound changes in GDP can make an enormous difference in living standards—especially over long periods.
  - Access to natural resources (not necessarily ownership) is a prerequisite for economic growth.
- Governments' roles
  - Governments can play essential roles by supplying needed goods and services that otherwise would not be provided, in sufficient quantity or quality, by the private sector.
  - Government spending can crowd out private spending and diminish work incentives.
  - Government spending eventually encounters diminishing returns.
  - Governments are not accountable to bottom lines in the way businesses are.
  - Government redistribution efforts may come at the expense of economic growth.
  - Misguided government regulations can impede economic growth.
  - Government restrictions on trade and capital flows often create economic results that are inferior to market-created outcomes.
- Absolute and comparative advantage
  - Absolute advantage is not a good explanation for why trade between nations occurs. Comparative advantage offers a better answer.
  - Opportunity cost is the amount of one product sacrificed to produce another.
  - A country has a comparative advantage if its opportunity cost is lower than that of a foreign country.
  - Mutually advantageous trade takes place at any trading ratio between two nations' domestic opportunity costs.
  - If the trading ratio were outside the extremes set by nations' domestic opportunity costs, both countries would want to produce and export the same product.
  - Mutually advantageous trade requires relative international resource costs that do not offset relative international productivity differences.
  - If a nation's relative resource costs were so high that they nullified international trade, free-market adjustments in resource costs and exchange rates should remedy the imbalance.
- A country is not a company. Good business decisions can be ineffective in a macroeconomic setting.

Review Questions

1. What causes some nations to grow faster than others? Are there identifiable engines or commonalities? Are there identifiable anchors (i.e., hindrances) to growth?
2. What are diminishing returns? How can nations postpone them?
3. Suppose that each worker in Belgium can produce either 20 units of food per hour or 80 units of machinery per hour. At the same time, workers in France can produce either 15 units of food per hour or 30 units of machinery per hour.
   a. Explain which country has absolute advantage in the production of food. Explain which country has an absolute advantage in the production of machinery.
   b. Calculate the opportunity costs for food and machinery in France and Belgium.

c. Which country, if any, has a comparative advantage in the production of food? Explain why.
d. Which country, if any, has a comparative advantage in the production of machines? Explain why.
e. Choose a mutually advantageous trading ratio, if any exists, and explain why it improves the well-being of both trading partners. If none exists, explain why.
f. Explain the consequences if France's and Belgium's trading ratio is 5 machines per unit of food.
g. Suppose workers in France and Belgium earned €20 per hour. Calculate the cost per unit of food and cost per unit of machinery in both countries. Will trade take place at these compensation levels?
h. Suppose that Belgium increased its worker productivity for both food and machinery by 300% (i.e., three times). How (if at all) would this increased productivity change your answers to Questions a), b), c), and d)?

4. Can a country have comparative advantage in all goods? Is it possible for a country not to have comparative advantage in any good? Explain.
5. In what major ways are companies economically unlike countries?
6. Why do changes in relative productivity levels have a different meaning for companies than they do for countries?
7. How does the relationship between price movements and employment at the country level differ from the relationship between price movements and employment at the firm level?
8. Why might free trade have only a minimal impact on the total number of jobs worldwide? When might its effects on worldwide jobs be greatest?
9. Nations often face a short-run Phillips Curve trade-off between unemployment and inflation. What is its counterpart, if any, at the firm level?

Discussion Question

10. Companies often create long-term planning documents that focus on improving their core competencies. If the government wanted to create a similar document for the nation, what problems would it have composing the first draft?

Chapter 23
Long-Term Inflation, Exchange Rates, and Unemployment

This chapter starts by looking into the Phillips Curve controversy, which focuses on whether nations face tradeoffs between inflation and unemployment. Our discussion will center on the *natural-rate hypothesis*, which considers how short-term and long-term unemployment rates should be affected by differences between a nation's actual and expected inflation rates.

Monetarism,[1] which is based on the *Quantity Theory of Money* (QTM), will serve as the springboard for our discussion of long-term price movements and the primary cause of long-term inflation. Monetarism will also play a valuable role in explaining the possible long-term effects of fiscal policies. Theories are controversial, and monetarism is no different. So, before discussing monetarism, we will introduce the *Equation of Exchange* (EOE), which is the foundation on which the Quantity Theory of Money and monetarism are built. The Equation of Exchange is an economic relationship on which we all can agree because it expresses an economic tautology.

This chapter ends by focusing on long-term exchange rate movements. It begins by looking at the *Law of One Price* (LOOP), which explains how prices and nominal exchange rates should adjust to equate the prices of *identical products* in two different nations. The chapter then considers the *Absolute Purchasing Power Parity Theory* (APPP), which explains how nominal exchange rates should adjust to equate the prices of *identical product baskets* in two different nations.

The Law of One Price and Absolute Purchasing Power Parity consider exchange rates at a particular moment. Therefore, *Relative Purchasing Power Parity Theory* (RPPP) is introduced to explain how nominal exchange rates should vary over time. Finally, our discussion of long-term exchange rates ends by linking Relative Purchasing Power Parity and the Quantity Theory of Money, thereby providing even more insight into why exchange rates change over long periods.

1 Monetarism is also called monetarist theory.

https://doi.org/10.1515/9781547401437-023

The Basics

Phillips Curve and the Natural-Rate Hypothesis

The Phillips Curve controversy centers on whether or not nations face tradeoffs between inflation and unemployment. If they do, then governments and central banks face a bitter choice. Either they can reduce their unemployment rates by tolerating more inflation, or they can reduce their inflation rates at the cost of higher unemployment. The controversy also considers whether this tradeoff (if immutable) occurs only in the short run, only in the long run, or both.

The Short-Run Phillips Curve

In 1957, British economist A.W. Phillips analyzed the historical relationship between British wage inflation and unemployment rates. His data showed that there was an inverse relationship between these two economic variables, which meant that, in the past, as British unemployment rates fell, the percentage change in wage rates increased (and vice versa). Today, most nations are more interested in prices (and inflation) than they are in wages (and wage rate changes). As a result, the Phillips Curve has changed from its original focus on percentage changes in wages and unemployment rates to inflation and unemployment rates.

Figure 23.1 shows a downward sloping line, depicting an inverse relationship between unemployment and inflation. For example, if the unemployment

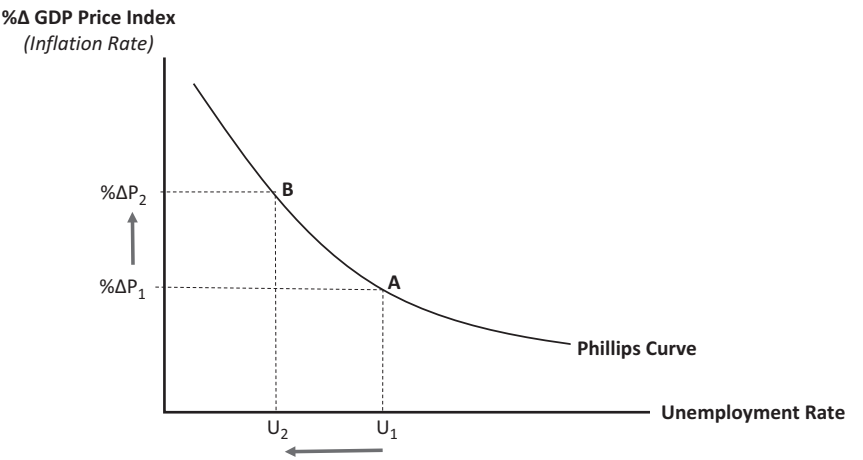


Figure 23.1: Short-Run Phillips Curve Relationship.

rate fell from U_1 to U_2, the inflation rate would rise from $\%\Delta P_1$ to $\%\Delta P_2$ (and vice versa).

The idea that inflation and unemployment are inversely related became very popular in many nations (including the United States) during the 1960s. Some governments and central bankers felt they had found an economic Rosetta Stone, which could be used to translate macroeconomic policies into educated tradeoffs between inflation and unemployment goals. Figure 23.2 shows the inflation rates and unemployment rates in the United States from 1959 to 1967. If asked to draw just one line through these points that best represents them, most of us would choose a downward-sloping line like the one shown in the figure.

Figure 23.2: U.S. Phillips Curve Relationship from 1959 to 1967.

Unfortunately, belief in this relationship faded as nations realized that this short-term tradeoff did not stand the test of time and became rather nebulous in the long run. Figure 23.3 shows U.S. inflation rates and unemployment rates from 1959 to 2018, which is a much more extended period than the nine years covered in Figure 23.2. It provides visual evidence for why the inverse relationship between unemployment and inflation is more ambiguous in the long run. If asked to draw just one line that best represents these inflation–unemployment rate combinations, would it be downward sloping like before, upward sloping, vertical, or horizontal? The answer is not clear.

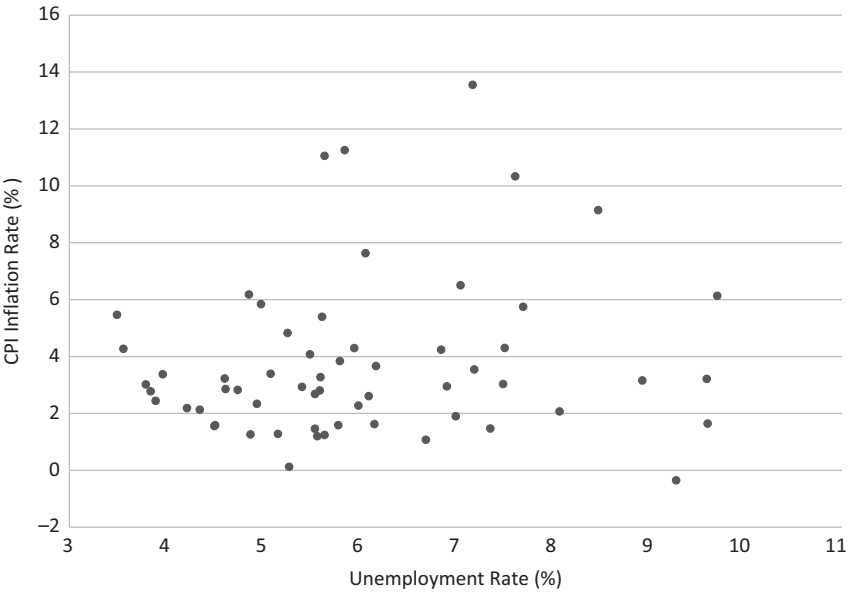


Figure 23.3: Annual U.S. Inflation and Unemployment: 1959–2018.
Source: Federal Reserve Bank of St. Louis Data – Fred, https://fred.stlouisfed.org/ (accessed August 28, 2019)

There is nothing theoretical about the Phillips Curve relationship.[2] Instead, it is a statistical relationship in search of a rational explanation, and demand-pull inflation provides a possible one.[3] Today, many believe that a *short-term* tradeoff between inflation and unemployment still exists when shifts in aggregate demand stimulate these changes. Moreover, this inverse relationship is most likely to occur if inflation is unexpected, causing abrupt changes in business profitability. For example, if prices increase faster than resource costs, then profits rise and businesses have an incentive to hire more workers. As a result, the inflation rate increases, and unemployment rate falls.

If the downward-sloping Phillips Curve is due to unanticipated inflation that redistributes income from workers to businesses, then one can see why its effect may only be temporary. Given time, inflation and inflationary expectations should

2 The Phillips Curve is simply a regression line drawn through historical points that best represent the combination of all inflation rates and unemployment rates.
3 Demand-pull inflation was explained in Chapter 11, "Real Goods and Services Markets."

converge. If they do, then business profitability and unemployment should settle back to their old rates.

Natural Rate of Unemployment and Natural-Rate Hypothesis

A rational explanation for the shotgun-like pattern of inflation–unemployment points in Figure 23.3 is the *natural-rate hypothesis*. It asserts that nations confront a dominant long-run Phillips Curve and a family of short-run Phillips Curves. The dominant long-run Phillips Curve is vertical at the nation's *natural rate of unemployment*. The family of short-run Phillips Curves is downward sloping and shifts to the right or left with changes in the expected inflation rate. As expected inflation rises, the short-term Phillips Curve shifts rightward, and when expected inflation falls, it shifts leftward.

What is sacrificed when a nation strives for full employment? Often, the cost of lower unemployment is higher inflation. Therefore, the natural rate of unemployment is defined as the unemployment rate that allows a nation to sustain its current level of inflation. In other words, at this rate of unemployment, inflation has no inherent tendency to rise or fall. For this reason, the natural rate of unemployment is often called the *nonaccelerating inflation rate of unemployment* (NAIRU). Perhaps, more accurately, it should be called the *nonincreasing inflation rate of unemployment* (NIIRU) because the rate of change is more important than the rate of acceleration. These names buttress the strong link that exists among the unemployment rate, stable inflation, and a nation's full-employment goals.

The natural rate of unemployment varies from country to country and is based on socioeconomic and institutional differences. Many factors, such as the labor market structure, worker mobility, levels of unemployment benefits, social welfare programs, ability of workers to respond to market incentives, male and female participation rates, minimum wage levels, labor union strength, and real wage flexibility, enter into determining a nation's natural rate of unemployment. These factors vary widely from nation to nation and change over time. Therefore, the natural rate of unemployment is not stationary.

Picture natural rate of unemployment as the destination toward which a nation gradually moves if the real wage rate is free to fluctuate and the nation's actual inflation rate equals its expected inflation rate. If these two conditions are met, the forces of supply and demand move the economy gradually back to equilibrium. In Figure 23.4, if the real wage rate is above the equilibrium level, at $(W/P)_A$, unemployment (i.e., the distance between s_A and d_A) causes the real wage to fall, giving businesses more incentive to hire workers and individuals less incentive to remain in or enter the workforce. Therefore, the unemployment

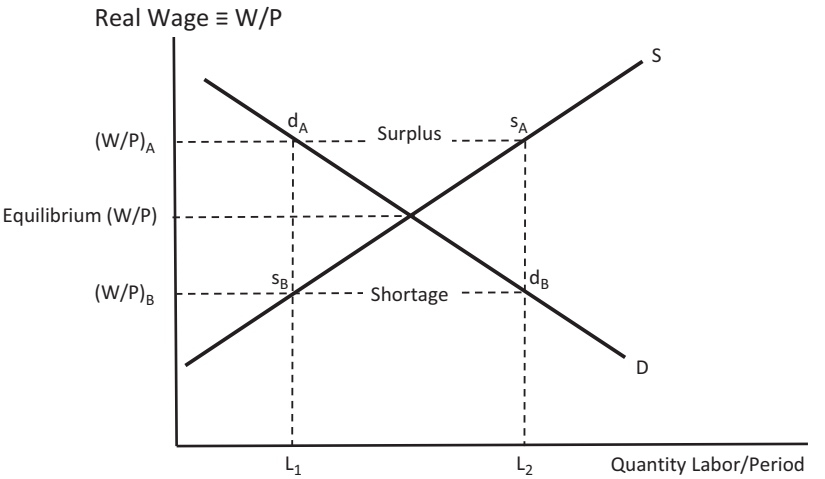


Figure 23.4: Labor Market.

rate falls. By contrast, if the real wage is below equilibrium, such as $(W/P)_B$, there is a labor shortage (i.e., the distance between d_B and s_B), which causes the real wage to rise. As it does, business incentives to hire fall, and individuals are encouraged to remain in and enter the labor force.

It is essential to recognize that the natural rate of unemployment is not the level of unemployment that is consistent with the maximum amount of output a nation is capable of producing. In other words, it does not represent the vertical portion of the AS curve, where the productive potential of a country has been completely utilized. Instead, the natural rate of unemployment represents a threshold level of unemployment, below which persistent and rising inflation rates occur and above which persistent reductions in inflation (or deflation) occur. As a result, it is possible for a nation to operate, for short periods, below or above the natural unemployment rate.

Short-Run Movements around the Long-Term Phillips Curve

Let's use the natural-rate hypothesis to explain the scatter of inflation and unemployment points in Figure 23.3. We will start our analysis at Point A in Figure 23.5. Notice that Point A is on the short-term Phillips Curve labeled $PC_{2\%}$. At this point, the actual inflation rate, which is shown on the vertical axis, and expected inflation rate, which is attached to the short-run Phillips Curve, are both equal to 2%. Assume that the nation's unemployment rate equals 5.5%, which is the natural

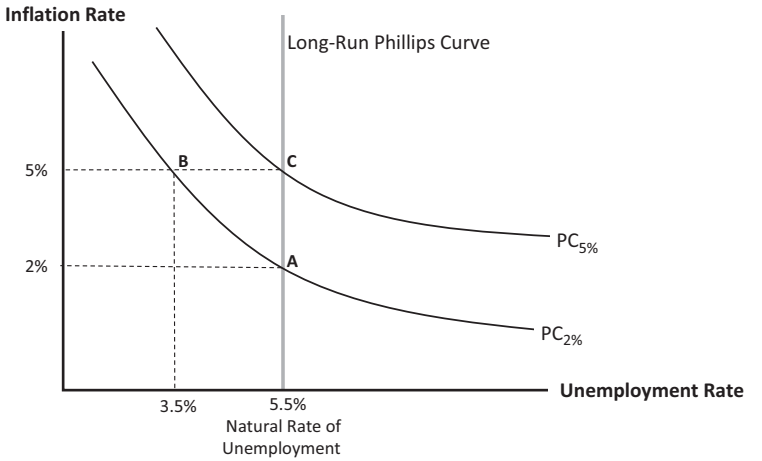


Figure 23.5: Natural-Rate Hypothesis.

rate of unemployment. If actual inflation equals expected inflation, the country is considered to be at an equilibrium point because individuals and companies can confidently incorporate expected inflation rates into their contracts and not have surprises (positive or negative) during the contract period.

Suppose the central bank pursues expansionary monetary policies that cause inflation to rise from the expected 2% rate to an unexpected 5% rate. *Real* wages would fall by 3%. As real wages fell, businesses would have more incentive to hire, which would reduce the unemployment rate. Besides, individuals would have less incentive to remain part of or to enter the workforce. For example, some individuals might leave work and go back to school (e.g., enter graduate programs or finish high school), and current students might stay in school. Homemakers may decide their time is better spent at home. Therefore, the higher-than-expected inflation would reduce the unemployment rate and move the nation northwestward along $PC_{2\%}$ from Point A to Point B. At Point B, the actual inflation rate (5%) would be higher than the expected inflation rate (2%), and the unemployment rate would be lower (3.5%) than the natural rate (5.5%).

The level of unemployment at Point B can be maintained only if the actual and expected inflation rates continue to be 5% and 2%, respectively. This is highly unlikely to occur because labor will adjust its inflation expectations and try to regain its lost real wage, for example, by negotiating new contracts with the higher inflation rate in mind. As these contracts are renegotiated, the real wage rate should rise back toward its initial level, reducing business incentives to hire, and

increasing labor's motivations to seek employment. Consequently, the unemployment rate gradually creeps horizontally, from 3.5% back toward 5.5% (B to C).

If inflationary expectations remain at 5%, the economy will return to equilibrium at Point C, where expected inflation and actual inflation are equal at 5%. At Point C, the nation's unemployment rate, again, would equal 5.5%, and the inflation rate (both actual and expected) would be 5%.

Figure 23.6 shows that if there is a family of short-term Phillips Curves, then almost all of the U.S. inflation–unemployment points between 1960 and 2018 can be explained. The long-term Phillips Curve divides the mass of points at the natural rate of unemployment.

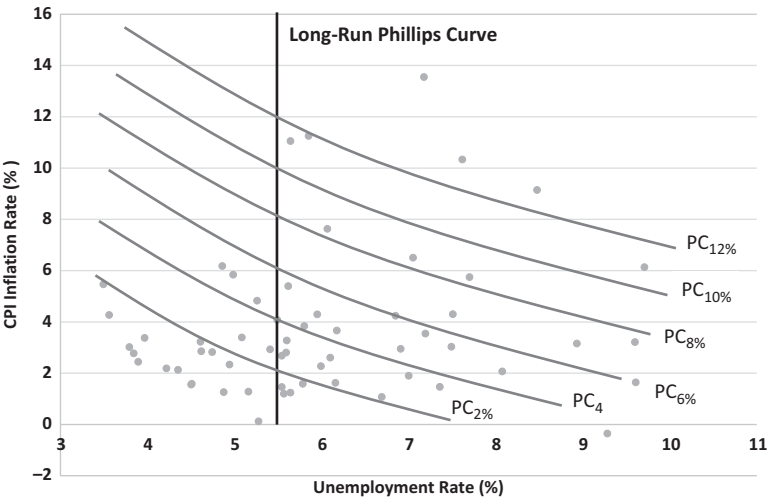


Figure 23.6: Long-Term and Short-Term Phillips Curve: 1960–2018.
Source: Federal Reserve Bank of St. Louis Data – Fred, https://fred.stlouisfed.org/ (accessed August 28, 2019)

Policy Recommendations

What policy prescriptions emerge from our discussion of the long-run Phillips Curve? If the long-run Phillips Curve is vertical, as the natural-rate hypothesis asserts, then governments and central banks should focus on keeping inflation as low, stable, *and* predictable as possible.

This policy recommendation is both simple and frustrating. It is simple because governments and central banks have only one goal, namely, to focus on controlling inflation. It is frustrating because this recommendation seems to

imply that governments and central banks have no direct control over the nation's ultimate long-term unemployment rates.

This latter conclusion is not necessarily correct because the natural rate of unemployment can change. As Figure 23.7 shows, if the natural rate of unemployment falls, then the entire long-run Phillips Curve shifts to the left; if it rises, the long-run Phillips Curve shifts right.

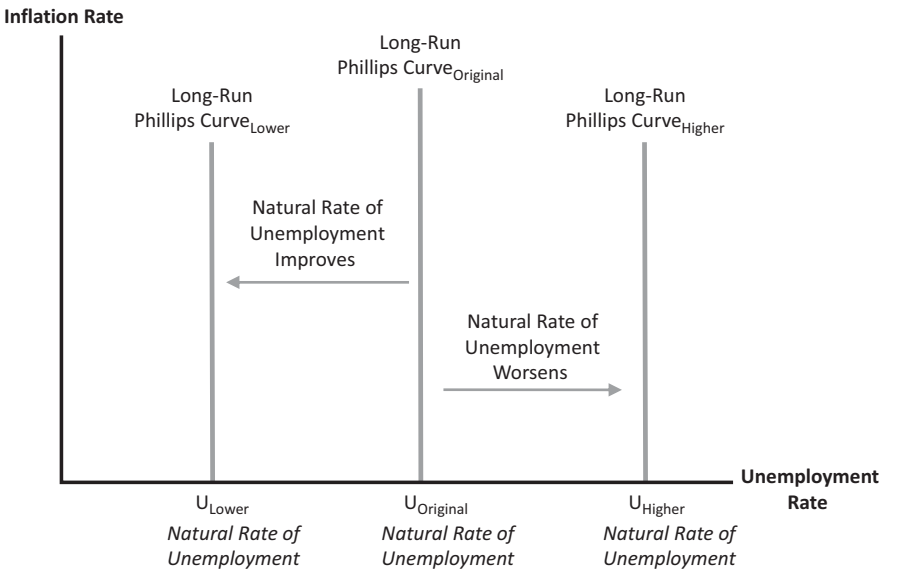


Figure 23.7: Changes in the Natural Rate of Unemployment.

Shifts of the long-run Phillips Curve occur when there are changes in supply-side factors that affect labor market conditions, resource mobility, productivity, or per unit costs. Among the most important factors that shift the long-run Phillips Curve leftward (in a favorable direction) are:

- Reductions of input prices due to the greater availability of resources (e.g., increased worker participation rates, greater numbers of talented immigrants, and reductions in oil costs)
- Improvements in productivity brought on by invention and innovation
- Modifications of unnecessary and costly government regulations
- Exchange rate appreciation (especially for countries that are relatively dependent on foreign-sourced inputs)

In short, many of the same supply-side factors that we discussed in Chapter 22, "Long-Term Growth and Development" as being the essential ingredients for real economic growth and national well-being are also the factors that improve a nation's natural unemployment rate.

If the *Natural-Rate Hypothesis* is correct, then discretionary monetary and fiscal policies may have destabilizing effects on domestic and international economies. As Figure 23.8 shows, there are time lags between (1) fundamental changes in economic activity, (2) when they are recognized, (3) when monetary or fiscal policies are enacted, and (4) when these policies take effect. From beginning to end, the lag could be months or multiple years. As a result, nations might be better off with central banks and governments that had little or no discretionary powers.

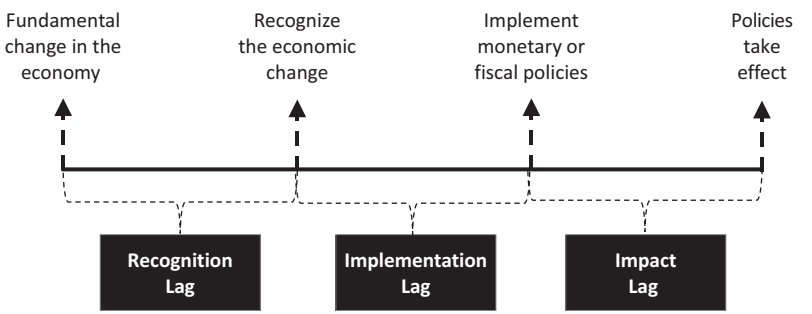


Figure 23.8: Lags in Monetary and Fiscal Policies.

Rather than change the money supply according to current or expected economic conditions, central banks would be required to follow a *monetary rule*, such as increasing the money supply each year at the average long-term growth rate of real GDP (e.g., 3% per year).[4] Similarly, instead of encouraging or allowing governments to change spending or taxation to balance current or expected economic activity, discretionary fiscal policies would be discouraged or severely restricted.

With our discussion of long-term unemployment and inflation in mind, let's turn our attention to the forces that cause long-term movements in exchange rates.

4 This monetary rule is also known as the "k-percent rule." See Milton Friedman, "The Optimum Quantity of Money," in *The Optimum Quantity of Money and Other Essays*, Chicago: Aldine Publishing Company (1969), pp. 1–50. Milton Friedman, "Monetary Policy: Theory and Practice," *Journal of Money, Credit, and Banking*, Volume 14, Number 3, August 1982, pp. 98–118.

Equation of Exchange

The Equation of Exchange is a particularly useful and appealing way to frame long-term economic issues. This intuitive tautology isolates four important macroeconomic variables: GDP Price Index (P), Real GDP (RGDP), Money Supply (M), and Velocity of Money (V). Because the M2 money supply has been the focus of this book, we will use M2 as the money supply definition in our discussion of the Equation of Exchange. As a result, we will abbreviate the velocity of money as V2, to indicate that it is the average number of times financial assets in the M2 money supply need to be spent per period to purchase newly produced final goods and services.

How are P, RGDP, M2, and V2 related? To answer this question, let's rely on two standard ways to calculate nominal GDP (NGDP). Remember that nominal GDP is defined as *the market value of all final goods and services produced in a nation during a given period*. Therefore, one way to calculate nominal GDP is by multiplying the price and quantity of every end product made during a given period and then summing the results. This gives the same result as multiplying a nation's GDP Price Index by its real GDP (see Figure 23.9).

Nominal GDP $\equiv (P_1 \times Q_1) + (P_2 \times Q_2) + (P_3 \times Q_3) + \ldots + (P_n \times Q_n)$

Therefore, Nominal GDP ≡ Sum of all $(P_i \times Q_i) \equiv \sum_1^n (P_i \times Q_i)$

which we can abbreviate as:

$$\boxed{NGDP = P \times RGDP}$$

where,

NGDP ≡ Nominal GDP

P_i ≡ Price of a final good or service (i) produced per period

Q_i ≡ Quantity of a final good or service (i) produced per period

P ≡ GDP Price Index, and

RGDP ≡ Real GDP

Figure 23.9: Nominal GDP Relationship #1: NGDP ≡ P × RGDP.

Nominal GDP can also be calculated by multiplying a nation's money supply (M2) times the velocity of money (V2). To understand why this is true, let's use the United States as an example. In 2019, the M2 money supply in the United States averaged about $15,000 billion, and the nation's nominal GDP was about $22,000 billion. How is it possible for a country to have such a large nominal GDP with such a small money supply? The answer is that each dollar was spent approximately 1.5 times, on average, during 2019 to purchase the newly

produced, final goods and services. Therefore, it must be the case that nominal GDP is equal to the product of the M2 money supply and the velocity of money (V2) (see Figure 23.10).

$$\boxed{NGDP = M2 \times V2}$$

Where,

M2 ≡ M2 money supply

V2 ≡ Velocity of M2 money supply needed to purchase RGDP

Figure 23.10: Nominal GDP Relationship #2: NGDP ≡ M2 × V2.

It is helpful to remember that V2 is not determined by surveying companies and consumers. Instead, it is a derived figure that is calculated by dividing the nominal GDP by the M2 money supply (see Figure 23.11). After a nation has estimated both its nominal GDP and M2 money supply, V2 can be calculated. By studying how the velocity of money has changed in the past, economists can determine how stable it has been and the factors primarily responsible for its movements.

$$V2 \equiv \frac{NGDP}{M2}$$

Figure 23.11: V2 Is a Derived Value.

Merging *Nominal GDP Relationship #1* in Figure 23.9 and *Nominal GDP Relationship #2* in Figure 23.10 gives us the Equation of Exchange. From Relationship #1, we know that a nation's nominal GDP equals P × RGDP, and from Relationship #2, we know that nominal GDP equals M2 × V2. Therefore, (P × RGDP) must equal (M2 × V2). This identity is known as the Equation of Exchange (see Figure 23.12).

Converting the Equation of Exchange to Percentage Terms

A nation's GDP Price Index, real GDP, money supply, and money velocity are all critical macroeconomic variables, but most policy discussions are couched in terms of the rates of change and expected rates of change. Rather than discuss price indices, most of us are concerned with inflation or deflation rates. Rather than discuss real GDP, we are more interested in whether a nation's real economic growth is positive, negative, high, low, rising, or falling. Similarly,

Because

NGDP ≡ P ×RGDP

and

NGDP ≡ M2 ×V2

then it must be that

P × RGDP ≡ NGDP ≡ M2 × V2

Therefore,

P × RGDP ≡ M2 × V2

Figure 23.12: Equation of Exchange.

instead of focusing on the absolute level of a nation's money supply or velocity, we tend to focus on rates of change.

To make the Equation of Exchange more useful and relevant, let's convert it into percentage change terms. There are two ways to accomplish this task: the rigorous mathematical way and the commonsense way. Let's take the commonsense route.

How would you answer the following question? If a nation's GDP Price Index (P) increased by 10% and real GDP (RGDP) increased by 10%, by how much would nominal GDP (which is P × RGDP) rise? To answer this question, let's use a simple example. Suppose that the original average price index was 1.00, and real GDP (e.g., stated in 2012 dollars) was $1,000. By multiplying them together, we see that nominal GDP would equal $1,000.

If prices rose by 10% to 1.10, and real GDP rose by 10% to $1,100, then nominal GDP would rise to $1,210, which is a 21% increase.[5] This 21% increase in nominal GDP is *approximately equal* to the sum of the percentage change in the price index *plus* the percentage change in real GDP (i.e., 10% + 10% =20% ≅ 21%).

Therefore, we will use the following generalization: *For small movements, when two variables are multiplied together, the percentage by which their product changes is approximately equal to the sum of the two variables' growth rates*.[6] Therefore, %ΔNGDP ≅ %ΔP + %ΔRGDP, and %ΔNGDP ≅ %ΔM2 + %ΔV2 (see Figure 23.13).

By combining terms in Figure 23.13, we see that the percentage change in GDP Price Index (%ΔP) plus the percentage change in real GDP (%ΔRGDP) must be approximately equal to the percentage change in money supply (%ΔM2) plus the percentage change in velocity of money (%ΔV2) (see Figure 23.14).

5 1.10 × $1,100/year = $1,210/year

6 This approximation is less accurate as the percentage changes become larger.

$$\%\Delta NGDP \cong \%\Delta P + \%\Delta RGDP$$

$$\%\Delta NGDP \cong \%\Delta M2 + \%\Delta V2$$

Note: "%Δ" means percentage change.

Figure 23.13: Nominal GDP Components in Percentage Terms: An Approximation.

Because

$$\%\Delta P + \%\Delta RGDP \tilde{=} \%\Delta NGDP \tilde{=} \%\Delta M2 + \%\Delta V2$$

then it must be that

$$\boxed{\%\Delta P + \%\Delta RGDP \cong \%\Delta M2 + \%\Delta V2}$$

where,

%Δ P ≡ Percentage inflation rate
%Δ RGDP ≡ Real economic growth rate
%Δ M2 ≡ Percentage change in the M2 money supply
%Δ V2 ≡ Percentage change in the velocity of M2

Figure 23.14: Equation of Exchange in Percentage Terms.

Once the Equation of Exchange has been transformed into percentage terms, its variables take on new meaning. A nation's GDP Price Index (P), real GDP (RGDP), money supply (M2), and money velocity (V2) are replaced by the nation's inflation rate (%ΔP), growth rate of real GDP (%ΔRGDP), M2 money supply growth rate (%ΔM2), and percentage change in the velocity of the M2 money supply (%ΔV2). With the Equation of Exchange in mind, let's turn our attention to monetarism and Quantity Theory of Money.

Monetarism and the Quantity Theory of Money

Because the Equation of Exchange is a tautology and makes no assumptions about how macroeconomic variables behave, it cannot be used to predict or to explain why economies function as they do. This is where the Quantity Theory of Money and monetarism[7] make significant contributions to macroeconomic analysis because they breathe life into the Equation of Exchange by making

7 Monetarism is built on the Quantity Theory of Money. In this discussion, they are referred to interchangeably.

behavioral assumptions about what causes the GDP Price Index (P), real GDP (RGDP), money supply (M2), and velocity of money (V2) to change.[8]

We know from the Equation of Exchange that %ΔM2 + %ΔV2 ≅ %ΔP + %ΔRGDP, which means %ΔP ≅ %ΔM2 + %ΔV2 − %ΔRGDP. Therefore, inflation must be caused by a combination of rising money supply, rising money velocity, or falling real GDP (see Figure 23.15), but which of these variables is the main long-term source of inflation, and what causes it to change?

If

%ΔM2 + %ΔV2 ≅ %ΔP + %ΔRGDP

then

%ΔP ≅ %ΔM2 + %ΔV2 − %RGDP

Therefore,

Inflation (%ΔP) is caused by:

– %Δ M2 rising

– %Δ V2 rising

– % RGDP falling

Figure 23.15: Equation of Exchange: Causes of Inflation.

Let's take a closer look at what causes each of the variables in the Equation of Exchange to change. In the case of the M2 money supply and real GDP, you may be glad to learn that we already know the answers. As for the causes of long-term velocity changes, the answer will be new—but not surprising.

What Causes Long-Term Changes in M2?

Answering the question "What causes long-term changes in M2?" is relatively easy because we have already addressed this issue in Chapter 8, "Money Creation" and Chapter 9, "Central Banks," where the money creation process and central bank controls were discussed. Remember that M2 is equal to the M2 money multiplier times the monetary base (i.e., $M2 \equiv mm_2 \times B$). Central banks have a significant degree of influence over the money multiplier because they determine the required reserve ratio(s) on financial intermediaries' deposit liabilities and the interest earned on bank reserves deposited at the central bank. Nevertheless, they lack complete control over the M2 money

8 Milton Friedman published the classic article that set the stage for a modern investigation of Quantity Theory of Money in 1956. See Milton Friedman, "The Quantity Theory of Money: A Restatement," in *Studies in the Quantity Theory of Money* (Chicago: University of Chicago Press, 1956).

multiplier because central banks do not determine the preferred asset ratios of households[9] and the preferred asset ratios of financial intermediaries[10] (see Figure 23.16).

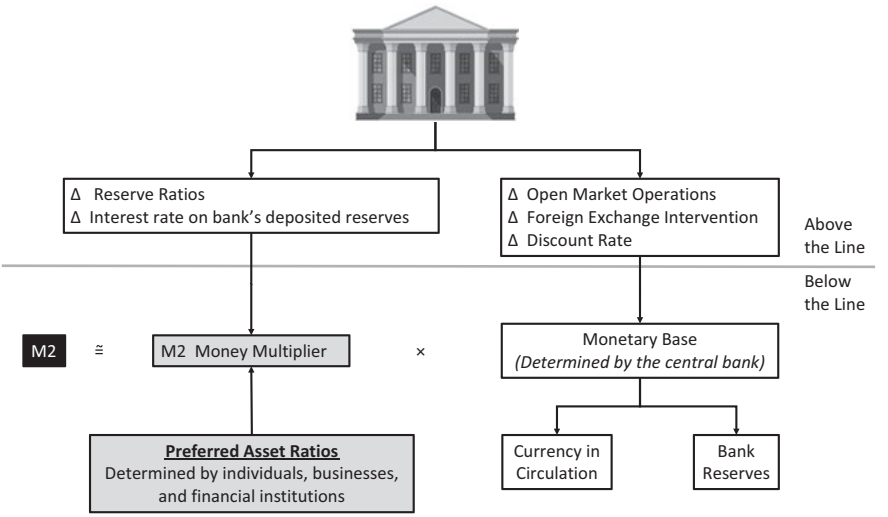


Figure 23.16: Causes of Long-Term Changes in M2. (Imagery used: © MicroOne/Shutterstock)

By contrast, central banks have complete control over the monetary base. Therefore, if a nation's monetary base changes, it is due to voluntary central bank action(s), such as open market operations, foreign exchange market intervention, and discount rate changes.

What Causes Long-Term Changes in Real GDP?

Monetarists agree with the conclusions we drew in Chapter 22, "Long-Term Growth and Development." In particular, they believe that a nation's long-term economic growth is based mainly on its ability to increase the quantity and quality of resources, improve production processes, develop better distribution systems, and enact sensible public policies. Simply put, to consume more, nations need to produce more, but to increase production, they need well-educated

9 The preferred asset ratios of households are CC/D, which is (Currency in circulation/Checking accounts), and N/D, which is (Near money/Checking accounts).

10 The preferred asset ratio of financial intermediaries is ER/D, which is (Excess reserves/Checking accounts).

workforces, efficient machinery, reasonable governments and central banks, as well as freedom to pursue economic opportunities.

What Causes Long-Term Changes in M2 Velocity?

The velocity of money has strong and direct links to broad institutional factors that do not tend to change quickly. For example, the degree of market liquidity, fluctuations in payment risks, and the technical sophistication of a nation's payment system are just a few of these "institutional" factors.

Velocity also depends on market-based variables that can change quickly and by substantial amounts. Whether these market-based variables have a significant effect on V2 will be discussed shortly. To facilitate our understanding of the impact these market-based variables have on V2, it is useful, first, to establish a link between money velocity and the demand *to hold* money.

Money Velocity and Money Demand Are Inversely Related

Suppose that, in 2020, the M2 velocity (V2) equaled 2.0, which means, on average, individuals spent M2 two times per year to purchase newly produced final goods and services. If they spent M2, on average, two times per year, these individuals must have held the financial assets in M2 for a half year, which is six months.

Likewise, if M2 was spent four times a year, then it must have been held for only a quarter year, which is three months. Therefore, the quicker people spend M2, the shorter the period they hold it. Thus, V2 and the demand *to hold* M2 assets are inversely related.

Monetarists view the assets in M2 as just a few of the many ways in which individuals can hold their wealth. Therefore, determining why people demand (i.e., hold) money is similar to figuring out why they demand any investment asset in their portfolios, like real estate, precious metals, cryptocurrencies, and stock. Two significant factors determining demand are the return on substitute assets and expectations.

Substitutes for the financial assets in M2 are other investments, such as interest-earning securities (e.g., bills, notes, and bonds), equities, and real assets (e.g., collectibles, precious metals, antiques, business inventories, and real estate). As the returns on these substitute assets rise relative to the return on M2, the demand *to hold* money falls, which means the velocity of money increases.

Expectations also affect the demand to hold money. For example, an increase in expected inflation reduces the desire to hold money. Money demand falls because the assets in M2 lose purchasing power as inflation rises. To protect their wealth, people try to replace their M2 assets with real and financial investments that will increase in value with inflation. As the demand to hold

money falls, M2's velocity rises. Similarly, when the expected returns on alternative investment assets, such as equities or real assets, rise relative to the expected returns on M2 assets, money demand falls, which means the velocity of money increases.

Table 23.1 summarizes the main variables that affect M2's velocity and shows both the qualitative effect they have on V2 and the demand to hold M2.

Table 23.1: Forces That Affect the Portfolio Demand to Hold M2.

Market-Based Variables	Change	Demand for M2	Velocity of M2
– Expected inflation	Rises	Falls	Rises
Return on			
– Fixed-income securities	Rises	Falls	Rises
– Equities	Rises	Falls	Rises
– Real assets	Rises	Falls	Rises
Expected Return on			
– Equities	Rises	Falls	Rises
– Real assets	Rises	Falls	Rises

Cause of Long-Term Inflation in the Monetarist Model

Monetarism focuses on the causes of long-term inflation by combining the Equation of Exchange (i.e., $\%\Delta P \cong \%\Delta M2 + \%\Delta V2 - \%\Delta RGDP$) with two major assumptions. If you accept them, its conclusions are logical and consistent. In particular, monetarism assumes that:

1. A nation's long-term growth rate depends on supply-side factors that affect productivity, rather than the creation of money by central banks and the financial system
2. V2 is stable and predictable around its long-run trend

Based on these two pillars and empirical evidence to support them, monetarists conclude that long-term inflation is a monetary phenomenon. For example, if the long-term growth rate of real GDP in the United States had been 3.5% per year (i.e., $\%\Delta RGDP = 3.5\%$) and over that period V2 had increased by 0.5% (i.e., $\%\Delta V2 = 0.5\%$), then the United States would have zero long-term inflation

if the Federal Reserve increased the money supply annually by 3.0% (see Table 23.2). By contrast, if M2 grew annually by 5.0%, V2 rose by 0.5%, and real GDP grew by 3.5%, then long-term inflation would be 2% (see Table 23.2).

Table 23.2: Discretionary Change in M2 to Achieve 0% or 2% Long-Term Inflation.

Inflation/Year	≅	Discretionary Change/Year	+	Long-Term Change/Year	–	Long-Term Change/Year
%ΔP		%ΔM2		%ΔV2		%ΔRGDP
0%	=	3.0%	+	0.5%	–	3.5%
2%	=	5.0%	+	0.5%	–	3.5%

Knowing this, we can go one step further: If long-term real GDP growth is expected to continue at 3.5%, and M2 velocity growth is expected to be 0.5%, then a central bank can achieve a 0% inflation goal by setting its long-term M2 money supply target equal to 3.0%. If its goal was a 2% inflation rate, then the M2 target should be set at 5.0%. A 2% inflation goal might be chosen instead of a 0% goal if the central bank believed that the nation's GDP Price Index overstated the actual inflation rate. This would occur if the price index did not reflect factors such as annual quality changes, the introduction of new products, and the substitution of relatively cheap products for relatively expensive ones.[11]

The main conclusion from monetarist theory is that, if the long-run growth of real GDP is determined by fundamental economic, social, and political factors that are not connected to monetary policy, and if V2 is stable and predictable, then a nation's long-term inflation rate will change passively with fluctuations in the money supply. Therefore, if a country has excessive long-term inflation, the source of the inflation must be from the excessive growth of a nation's money supply, which was induced or enabled by its central bank (see Figure 23.17).

Income Velocity, Money Demand, and "Hot Potatoes"

In many ways, the characteristics of money demand and money velocity are captured by a hikers' game called "hot potato." Hungry after a long day of hiking and possessing little or no cooking skills, hikers often put potatoes wrapped in aluminum foil on the hot coals of a fire. When the potatoes are fully cooked (i.e., burning hot!) and ready to eat, a decision has to be made about who eats

11 See Chapter 4, "Inflation and Real GDP," for a full discussion of these effects.

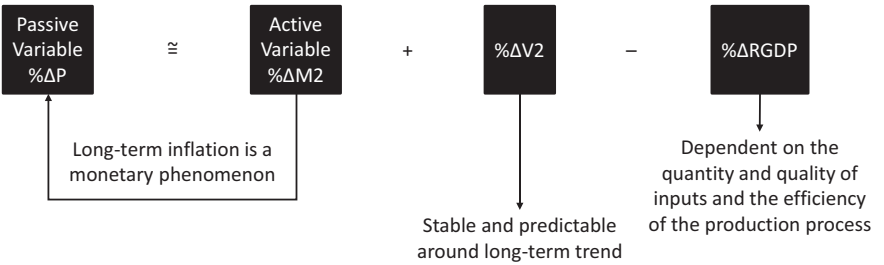


Figure 23.17: Monetarism: Inflation Is a Monetary Phenomenon.

first. That's where the game of "hot potato" comes in. A potato is removed carefully with tongs or sticks from the coals and passed quickly from person to person. The first person able to hold the potato gets to eat it, and it is a breach of honor to let a potato fall to the ground. It always stays within the group.

The M2 money supply is like the number of hot potatoes passed from hiker to hiker, and the velocity of money is the speed at which they are exchanged. With M2, instead of a few hot potatoes being passed, billions of dollars, euros, pesos, or yen are used. Like in the game of hot potato, one person can get rid of his or her money, but the group as a whole can not. When one person gets out of money by purchasing something or investing, someone else gets in by accepting it. Finally, just as heat from the fire determines how fast potatoes are exchanged, the market-based variables listed in Table 23.1 determine how fast money is spent (and, therefore, how long it is held).

Long-Run Effects of Fiscal Policy: A Monetarist View

In Monetarist theory, what are the long-term effects of expansionary fiscal policy? To answer this question, it is helpful to remember the two major pillars on which monetarism is built:

1. A nation's long-term growth depends on its ability to increase the quantity and quality of resources, improve production processes, and enact sensible public policies
2. V2 is stable and predictable around its long-run trend

Monetarists argue that increased government spending does not guarantee that a nation's business sector will be more profitable, domestic financial assets will earn higher real returns, or natural resources will be more productive. If expansionary fiscal policy could accomplish all these feats, it would be

the universal remedy for global poverty and slow economic growth. We know this is not the case.

We also know that fiscal policies that do not involve the central bank do not affect a nation's monetary base. Therefore, only if they affect the nation's money multiplier do fiscal policies change the money supply. Let's assume that any unwanted changes in a nation's money supply caused by fiscal policies can be offset by central banks—especially in the long run.[12] Accordingly, expansionary fiscal policy should have no long-term effect on a nation's growth of real GDP (%ΔRGDP), velocity (%ΔV2), or money supply (%ΔM2), which means it should not affect the long-term inflation rate.

If this is true, then what effect, if any, does expansionary fiscal policy have on economic activity? The monetarist answer is that fiscal policy mainly redistributes real GDP. To spend, governments need funding. For that, they either tax or borrow. If they tax, household consumption and business investments fall. Therefore, governments can purchase goods and services only to the extent that taxpayers are forced to reduce their demands. By contrast, if governments borrow, they cause real interest rates to rise. As real yields rise, private borrowing and spending fall, thereby allowing governments to purchase goods and services.

To monetarists, decisions about whether to tax or borrow are a bit like choosing which part of a pie the government should cut and consume. By taxing, it chooses a piece that would have gone to taxpayers. By borrowing, the government selects a piece that would have gone to interest-sensitive borrowers, like the construction industry. One thing is sure: the government owns the knife and is responsible for cutting.

To summarize our conclusions about the effects of monetary and fiscal policies, monetarists assert that long-term inflation can be (and should be) blamed directly on central banks because, if central banks do not support inflation, it dies out eventually. By contrast, the long-term effects of fiscal policy depend on whether they successfully increase the quantity or quality of inputs, incentivize research and development, promote capital accumulation, or upgrade and expand infrastructure so long as marginal government benefits exceed marginal private returns. Otherwise, these policies are mainly redistributive, thereby dividing the economic pie by taxing or borrowing.

12 If the increase in government spending causes the nation's real interest rate to rise, the M2 money multiplier rises (due to changes in the preferred assets ratios), which increases M2. This effect is likely to be small and easily reversible. Therefore, it is ignored in this analysis.

Long-Term Changes in Exchange Rates

For companies that buy, sell, invest, or borrow internationally, potential gains can be wiped out by unexpected changes in exchange rates. This is especially true in the long run when hedging alternatives are scarce and hedging markets are shallow. Because foreign exchange rate movements can cause significant gains and losses, managing currency exposures should be an essential part of every company's long-term planning process.

Even firms that might consider themselves immune from exchange rate fluctuations are vulnerable. Consider a U.S. company (let's call it Boston Company) that has only domestic customers and sources all its inputs from U.S. producers. If the dollar appreciates relative to the United States' major trading partners, how would Boston Company be affected? First, foreign-made products would now be cheaper for U.S. consumers to buy. U.S. demand might turn toward foreign-made products, thereby eroding Boston Company's customer base. Second, to the extent that Boston Company's domestic competitors sourced their ingredients internationally, the dollar appreciation would lower these companies' costs of production, thereby increasing their profits relative to Boston Company and allowing them to lower prices. Finally, the dollar appreciation might provide Boston Company's competitors with an incentive to relocate production facilities to take advantage of shifting incentives. As a result, fluctuating exchange rates could cause the competitive structure of the U.S. marketplace to adapt.

What causes long-term movements in nominal exchange rates? This is the question to keep in mind as we turn our attention to a concept called *Purchasing Power Parity* (PPP), which focuses on the relationship between the prices of internationally traded products and nominal exchange rates. Purchasing power parity requires an understanding of three core economic concepts—namely, the Law of One Price, Absolute Purchasing Power Parity, and Relative Purchasing Power Parity.

Law of One Price (LOOP)

According to the Law of One Price, the price of a product in one country should equal the exchange-rate–adjusted price of the same product in another country. If this were not the case, there would be opportunities to make riskless profits by purchasing a product in the lower-priced country and selling it in the higher-priced country.

More formally, the Law of One Price states that P_1^B, the price of Product 1 in Country B, should equal P_1^A, the price of the same product in Country A, times

the spot exchange rate, $S_{B/A}$. Notice that the spot exchange rate is the value of Country A's currency in terms of Country B's currency (see Figure 23.18).

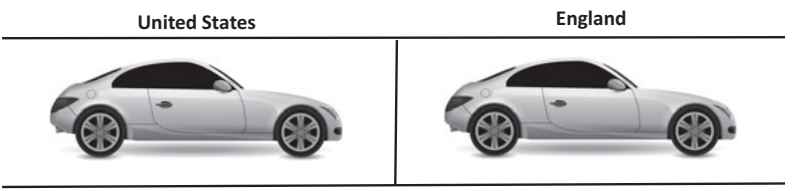
$$P_{(\text{Product 1 in Country B})} = \text{Price}_{(\text{Product 1 in Country A})} \times \text{Spot Exchange Rate}_{(B/A)}$$

$$P_1^B = P_1^A \times S_{B/A}$$

where $S_{B/A} \equiv$ Amount of Country B's currency per unit of Country A's currency

Figure 23.18: Law of One Price.

Consider a car sold in both the United States and England. The Law of One Price states that the dollar price of that car in the United States should equal the pound price in England times the exchange rate. If the price in the United States was $40,000, and the price in England was £20,000, then the spot exchange rate that equates $40,000 and £20,000 would be $2/£. If the exchange rate was different from $2/£, arbitrage could occur (see Figure 23.19).



$$P_{\$/\text{Car}} = P_{£/\text{Car}} \times S_{\$/£}$$

$$\$40{,}000/\text{car} = £20{,}000/\text{car} \times S_{\$/£}$$

$$S_{\$/£} = {}^{\$40{,}000}/_{£20{,}000}$$

$$S_{\$/£} = {}^{\$2}/_{£}$$

$$S_{\$/£} = \frac{\text{Price of the Car in the United States}}{\text{Price of the Car in England}}$$

Figure 23.19: Law of One Price: An Example. (Imagery used: © vasilyrosca/123rf)

Consider an exchange rate different from purchasing power parity, such as $1/£, which is equivalent to £1/$. At this rate, U.S. and English demand would turn away from the United States and toward England, where the car's price is lower. English residents would pay only £20,000 at home rather than £40,000 in the

United States, and U.S. residents would pay $20,000 for the English car instead of $40,000 at home.

The $1/£ exchange rate also opens up possibilities for arbitrage, which means making riskless profits by simultaneously buying and selling cars. Here's how. U.S. residents, English residents, and residents worldwide could: (1) borrow $20,000, (2) convert them into £20,000, (3) purchase the car in England for £20,000, (4) sell it in the United States for $40,000, and (5) earn a return of $20,000 (i.e., $40,000 in U.S. sales revenues minus the $20,000 purchase price of the car in England).[13]

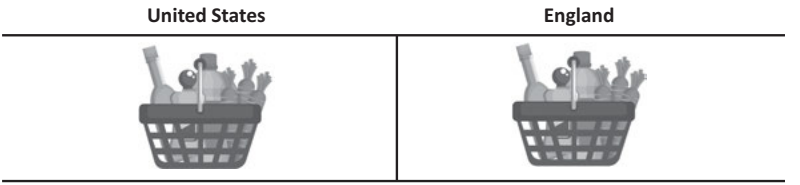
One problem with the Law of One Price is the equilibrium exchange rate for Product 1 (e.g., automobiles) may be different from the equilibrium exchange rate for Product 2 (e.g., bracelets). In such cases, how can one determine which of the various exchange rates is right for the nation, as whole? We will address this question in the next section, where Absolute Purchasing Power Parity (APPP) is discussed.

Absolute Purchasing Power Parity (APPP)

The Law of One Price considers exchange rates on a product-by-product basis, but we know that exchange rates are affected by all traded goods and services. Absolute Purchasing Power Parity calculates the equilibrium (no-arbitrage) exchange rate based on the price difference between *identical baskets* of tradable goods and services in two nations. The equilibrium exchange rate is the one that equates the price of these two baskets. If the exchange-rate–adjusted prices for the two baskets were different, there would be an opportunity to earn riskless profits by simultaneously purchasing the basket in the lower-priced country and selling it in the higher-priced country.

Consider identical baskets of American and English goods and services. If the U.S. basket's cost is $6,000 and the English basket's cost is £3,000, then the Absolute Purchasing Power Parity exchange rate would be $2/£ because, at that rate, the two baskets cost the same. The Absolute Purchasing Power Parity exchange rate would be equal to the price of the U.S. basket divided by the price of the English basket (see Figure 23.20). Therefore, the Absolute Purchasing Power Parity rate is a weighted average of all the individual Law of One Price exchange rates.

13 This example ignores interest and transaction costs, such as transportation.



$$P_{\$/\text{basket}} = P_{£/\text{basket}} \times S_{\$/£}$$

$$\$6{,}000/\text{basket} = £3{,}000/\text{basket} \times S_{\$/£}$$

$$S_{\$/£} = \$6{,}000/£3{,}000$$

$$S_{\$/£} = \$2/£$$

$$S_{\$/£} = \frac{\text{Price of the Basket in the United States}}{\text{Price of the Basket in England}}$$

Figure 23.20: Absolute Purchasing Power Parity. (Imagery used: © yupiramos/123rf)

Relative Purchasing Power Parity (RPPP)

Absolute Purchasing Power Parity is the exchange rate that eliminates arbitrage incentives for identical baskets of goods and services *at a particular moment*. Relative Purchasing Power Parity is the *percentage change* in an exchange rate that is needed to offset international inflation differentials over time. It is important to remember that Relative Purchasing Power Parity does not consider or reveal the absolute exchange rate that is needed to equate the prices of identical market baskets in two nations. This point will be made more apparent shortly.

Suppose the current spot exchange rate is \$2/£, and during the upcoming year, the inflation rate is expected to be 15% in the United States and 10% in England (see Figure 23.21).

Therefore, a U.S. basket of goods and services with a normalized price of \$2.00 this year is expected to cost 15% more next year. The same basket in England with a normalized price of £1 this year is expected to cost 10% more next year. Given this information, what exchange rate next year would offset the inflation differential?

With a 15% inflation rate, U.S. products worth \$2.00 today would cost \$2.30 next year (\$2.00 × 1.15 = \$2.30), and with a 10% inflation rate, English products worth £1 today would cost £1.10 next year (£1.00 × 1.1 = £1.10). To offset the inflation differential, the exchange rate next year needs to equate the U.S. basket costing \$2.30 and the English basket costing £1.10. To calculate this rate, we divide the expected U.S. price next year by the counterpart English

price level to get \$2.09/£, which is a 4.5% appreciation of the pound (see Figure 23.21).[14]

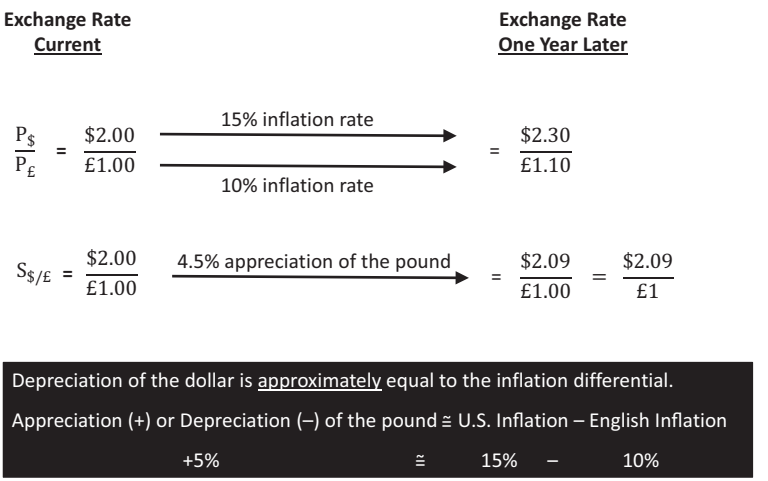


Figure 23.21: Relative Purchasing Power Parity.

Notice that England's inflation rate is 5% lower than the U.S. inflation rate, and this inflation differential causes the pound to appreciate by 4.5%, which is approximately 5%. In general, Relative Purchasing Power Parity tells us that, when inflation rate changes are small, the percentage change in the value of two countries' currencies should be approximately equal to the difference in their inflation rates (see Figure 23.22).

%ΔCountry A's Currency Value ≅ Country B's Inflation Rate – Country A's Inflation Rate

$$S_{B/A} \cong \%\Delta P^B - \%\Delta P^A$$

Figure 23.22: Major Take-Away from Relative PPP.

There are two critical takeaways from our Relative Purchasing Power Parity discussion. First, long-run changes in a nation's currency value depend on its

14 \$2.30/£1.10 = \$2.09/£, which is a 4.5% appreciation of the pound from \$2/£. At the same time, this is equivalent to a 4.3% depreciation of the U.S. dollar because the dollar would change in value from £0.50/\$ to £0.478/\$.

inflation rate r*elative to* foreign countries. Second, the higher a nation's relative inflation rate, the lower its currency value should fall.

Linking Purchasing Power Parity Theory and Quantity Theory of Money

One way to improve our understanding of long-term exchange rate movements is to link Relative Purchasing Power Parity to the Quantity Theory of Money.

- Relative Purchasing Power Parity shows that, in the long run, the percentage change in a nation's nominal exchange rate is approximately equal to the difference between a foreign nation's inflation rate (Country B) and its "home" inflation rate (Country A) – see Figure 23.23.
- The Quantity Theory of Money states that, in the long run, the percentage change in a nation's money supply plus the percentage change in the velocity of money is approximately equal to the percentage change in the price level plus the percentage change in real GDP (see Figure 23.23).

RPPP: $\%\Delta S_{B/A} \approx \%\Delta P^B - \%\Delta P^A$

QTM: $\%\Delta M2 + \%\Delta V_2 \approx \%\Delta P + \%\Delta RGDP$

Figure 23.23: Quantity Theory of Money in Percentage Terms.

By rearranging the Quantity Theory of Money terms and solving for the inflation rates in Country A and Country B, we find that:

- $\%\Delta P_A \approx (\%\Delta M2^A + \%\Delta V2^A - \%\Delta RGDP^A)$
- $\%\Delta P_B \approx (\%\Delta M2^B + \%\Delta V2^B - \%\Delta RGDP^B)$

Relative Purchasing Power Parity tells us that:

- $\%\Delta S_{B/A} \approx \%\Delta P^B - \%\Delta P^A$

Therefore, substituting $(\%\Delta M2^B + \%\Delta V2^B - \%\Delta RGDP^B)$ for $\%\Delta P^B$ and substituting $(\%\Delta M2^A + \%\Delta V2^A - \%\Delta RGDP^A)$ for $\%\Delta P^A$, we find (see Figure 23.24):

- $\%\Delta S_{B/A} \approx \%\Delta P^B - \%\Delta P^A \approx (\%\Delta M2^B + \%\Delta V2^B - \%\Delta RGDP^B) - (\%\Delta M2^A + \%\Delta V2^A - \%\Delta RGDP^A)$

which means

- $\%\Delta S_{B/A} \approx \%\Delta P^B - \%\Delta P^A \approx (\%\Delta M2^B - \%\Delta M2^A) + (\%\Delta V2^B - \%\Delta V2^A) - (\%\Delta RGDP^B - \%\Delta RGDP^A)$

QTM: $\%\Delta P \cong \%\Delta M2 + \%\Delta V2 - \%\Delta RGDP$

Relative PPP: $\%\Delta S_{B/A} \cong \%\Delta P^{B} - \%\Delta P^{A}$

Linking Relative PPP and QTM

$$\%\Delta S_{B/A} \cong \%\Delta P^{B} - \%\Delta P^{A}$$

$$\%\Delta S_{B/A} \cong (\%\Delta M2^{B} + \%\Delta V2^{B} - \%\Delta RGDP^{B}) - (\%\Delta M2^{A} + \%\Delta V2^{A} - \%\Delta RGDP^{A})$$

$$\%\Delta S_{B/A} \cong (\%\Delta M2^{B} - \%\Delta M2^{A}) + (\%\Delta V2^{B} - \%\Delta V2^{A}) - (\%\Delta RGDP^{B} - \%\Delta RGDP^{A})$$

Figure 23.24: Linking Purchasing Power Parity to the Quantity Theory of Money.

Therefore, the percentage change in Country A's currency value relative to Country B's currency value should equal the:

- Percentage difference between Country B's and Country A's money supply growth rate
- Plus the percentage difference between their velocity growth rates
- Minus the percentage difference between Country B's and Country A's real GDP growth rates

An example may help cement this relationship. Suppose that, during 2020, the M2 money supplies of the United States (Country A) and Mexico (Country B) grew by +2% and +4%, respectively; their M2 velocities changed by -0.5% and +1.5% and, respectively, and their real GDPs grew by 3% and 1%, respectively. Therefore, the predicted peso per dollar exchange rate would equal:

$$\begin{aligned}\%\Delta S_{\text{peso/dollar}} \cong\ & (\%\Delta M2^{MEX} - \%\Delta M2^{USA}) + (\%\Delta V_2{}^{MEX} - \%\Delta V_2{}^{USA}) \\ & - (\%\Delta RGDP^{MEX} - \%\Delta RGDP^{USA}). \\ =\ & (4\% - 2\%) + [1.5\% - (-0.5\%)] - (1\% - 3\%) = +6\%\end{aligned}$$

Consequently, if the dollar was worth MXN 20 at the beginning of 2020, the RPPP-QTM's year-end forecast would be (approximately) MXN 21.20/$.[15] The takeaway from this example is that the value of the U.S. dollar, $S_{MEX/USD}$, appreciates when Mexico's money supply or money velocity grows relatively faster than in the United States and when Mexico's real GDP grows relatively slower than U.S. real GDP. Remember, any time the dollar appreciates in terms of the peso, the peso must depreciate in terms of the U.S. dollar.

15 Ps21.2 = Ps20 * (1 + 0.06).

The Rest of the Story

How Well Does PPP Predict Exchange Rates?

"If you want to make a small fortune by speculating in the currency markets, use purchasing power parity to forecast exchange rates, but to make this *small* fortune, you have to start with a large one." Like many old sayings, this one provides a valuable lesson, namely "Beware of get-rich-quick schemes."

Criteria for Evaluating PPP's Effectiveness

There are three standard ways to measure the accuracy of purchasing-power-parity–exchange-rate predictions. One is to compare how close the predictions are to the actual spot exchange rates. Another is to identify a period and determine how often actual exchange rates moved in the direction of the predicted rates. Finally, accuracy can be assessed by how often actual exchange rates were within a narrow band of the purchasing power parity-predicted values (e.g., two standard deviations).

How Close Were PPP Rates to Actual Exchange Rates?

In the short term, there are significant and persistent deviations between the exchange rates predicted by purchasing power parity and the rates that eventually occur. Nevertheless, the predictive abilities of purchasing power parity improve dramatically in the long run. Therefore, purchasing power parity can be a useful tool for anyone preparing 10- to 20-year scenario plans.

The short-term predictive abilities of purchasing power parity also improve dramatically when at least one of the two nations under consideration has a relatively high inflation rate. In these situations, changes in relative prices overwhelm the other forces that affect nominal exchange rates. Therefore, when inflation is high, purchasing power parity can provide useful inputs for short-term budgets and business plans.

Did Actual Exchange Rates Move in the Direction of PPP Rates?

In the short run, exchange rates do not converge quickly to the rates predicted by purchasing power parity. They tend to do so over more extended periods. Purchasing power parity rates are like huge economic magnets that attract exchange rates with a subtle but steady force. Over time, this force of attraction exerts its influence. Therefore, the farther away an exchange rate is from its parity rate, the more likely it is that the next currency movement will be in the direction

of the purchasing power parity-predicted rate. Similarly, the more times an exchange rate moves away from purchasing power parity, the more likely it is that the next change will be closer to parity. For these reasons, purchasing power parity is much better at predicting the direction in which exchange rates move than predicting actual exchange rate levels.

How Often Were Exchange Rates Within a Narrow Band of PPP?

Maybe we are requiring too much from purchasing power parity. No estimate is expected to be exact. Statisticians realize this and often put about two standard deviations of variation around their estimates for 95% accuracy. If we place a two-standard-deviation band around the purchasing power parity forecasts, their predictive powers improve significantly. More concisely stated, parity rates with some room for random fluctuations tend to predict a relatively large number of actual exchange rate observations. As you might expect, the wider the band, the more accurate the purchasing power parity forecasts appear.

Predictive Powers of RPPP Versus APPP

In general, the predictive abilities of Relative Purchasing Power Parity tend to be better than Absolute Purchasing Power Parity. One primary reason for the difference is that Absolute Purchasing Power Parity calculates the exchange rate that *exactly* matches the prices of identical product baskets in two countries. Relative Purchasing Power Parity shows only the exchange rate change that is necessary to offset two nations' relative inflation differences. To calculate meaningful results using Relative Purchasing Power Parity, exchange rates do not have to start or end with Absolute Purchasing Power Parity. By contrast, meaningful Absolute Purchasing Power Parity results require exchange rates to equate the prices of international market baskets at both the beginning and the end of the period.

Why Are PPP-Forecasted Rates Often Inaccurate?

"How can something so logical be so wrong? If exchange rates are out of line with purchasing power parity levels, then why don't arbitragers earn riskless profits and, in doing so, bring them back into alignment?" These are the questions that many people ask when they learn about the lackluster predictive powers of purchasing power parity.

Different Market Baskets, Different Proportions, and Nontraded Goods and Services

One reason arbitrage may not occur is purchasing power parity rates are estimated using representative market baskets of goods and services for two nations. Even if the contents of the market baskets are the same, their values will differ if residents of each country have different consumption preferences and patterns. For example, the average U.S. resident drinks more dairy products, uses more fragrances, and eats more meat than the average Japanese resident drinks, wears, or eats.

Furthermore, even if the market baskets were the same and the proportions were equal, only a portion of the goods and services in each nation's market basket is traded internationally. Therefore, the Consumer Price Index, Producer Price Index, and GDP Price Index may be too broad for an accurate purchasing power parity forecast. What purchasing power parity may need is a pure basket of internationally traded products that remains the same during long periods.

Government Restrictions and Transport Costs

Another reason purchasing power parity rates are often inaccurate is government restrictions, such as tariffs and quotas, prevent or constrain arbitragers. Transportation costs also cut potential profits on many arbitrage transactions and open price gaps that cannot be arbitraged away.[16]

International Investment Flows and Central Bank Intervention

A final reason purchasing power parity rates are inaccurate is that exchange rates are set by more than just trade flows. We know from our discussion about exchange rate determination that international investment flows and central bank intervention can have significant effects on exchange rates (see Chapter 16, "Foreign Exchange Markets"). Why should trade flows, alone, account for every exchange rate movement? This is especially true when there are significant international investment flows or when central banks manage their exchange rates.

16 Transportation costs may not drive a significant wedge between the exchange-rate–adjusted prices of Inland and Outland. Consider a third country—call it Otherland—that is equally distant from Inland and Outland. Otherland would have to pay transportation costs, regardless of whether it bought from Inland or Outland. Therefore, Otherland would buy from the country that had the lower price, and it would be indifferent only when the prices (before transportation costs) in Inland and Outland were equal. Such purchases help to equate Inland's and Outland's prices.

In these situations, it may be difficult or impossible for exchange rates to mirror relative global price changes.

All the reasons mentioned above for why purchasing power parity might provide inaccurate estimates of equilibrium exchange rates are summarized in Table 23.3.

Table 23.3: Why PPP-Predicted Rates May Be Inaccurate.

1. **Market basket and price index problems**
a. Different market baskets in two countries
b. Different consumption patterns in two countries
c. What price index should be used? CPI? PPI? GDP Price Index?
d. Nontraded goods and services
2. **Government restrictions and transportation costs**
a. Tariffs and quotas raise prices and reduce trade
b. Transportation costs reduce arbitrage profits
3. **Exchange rates are not set by trade flows alone**
a. International financial investment flows must be considered
b. Central bank intervention must be considered

Summary of PPP

Let's summarize some of the essential lessons from our discussion about purchasing power parity. First, Absolute Purchasing Power Parity is used to calculate the nominal exchange rate that equates the prices of identical baskets of goods and services in two nations at a particular moment. Relative Purchasing Power Parity is used to measure percentage changes in exchange rates for these baskets. Second, the longer the period and the higher the inflation rate, the more accurate purchasing power parity is at predicting future exchange rates. Similarly, the longer the period analyzed, the more likely it is that exchange rates will converge toward the predicted purchasing power parity levels. Finally, purchasing power parity is much better at predicting the direction of exchange rate changes than it is at predicting their precise levels.

Income Velocity Versus Transactions Velocity

Picture yourself in the following situation. You are discussing with a friend why some nations have excessive long-term inflation rates and others don't, and you're doing your best to work the Equation of Exchange into the conversation.

After a heated exchange, your friend suddenly asks, "How large is this velocity of money that you keep mentioning? Do you have any idea?"

Proud to know the answer, you authoritatively state that the U.S. velocity for M2 is a bit under 2.0. At that point, your friend turns to you and says, "Do you mean to tell me that the dollar I spend today for a cup of coffee will only (on average) be spent one more time this entire year? If 'velocity' is a serious part of your argument, then you'd better get straight what it is because the way you're explaining velocity cannot be correct."

How should you respond, because she's right? A dollar spent today will be spent many more times than once during the next year, but if that is true, why does the Equation of Exchange tell us that it will be spent less than twice per year?

An excellent place to begin your answer is by pointing out the difference between a nation's *income velocity* and its *transactions velocity*. Income velocity is the number of times money (M2) is exchanged each year to purchase *newly produced* final goods and services. Because the Equation of Exchange focuses on the variables in nominal GDP, income velocity is its focal point.

By contrast, the transactions velocity is the average number of times money is exchanged each year for *any* good, service, donation, or financial asset. Some of these transactions are for newly produced final goods and services, but many more are for transactions that are not included in GDP. For example, purchases and sales of foreign exchange, financial securities, such as stocks, bonds, and notes, and used goods are included in the transactions velocity but not the income velocity. Therefore, the transactions velocity is always larger (usually much larger) than income velocity. Our focus is on income velocity.

Conclusion

The natural-rate hypothesis asserts that, if there is a short-run tradeoff between unemployment and inflation, then this inverse relationship is most reliable when price changes are unexpected. Over time, if the price changes become easier to predict, the Phillips Curve tradeoff is substantially weakened or eliminated. The reason for the tradeoff's disappearance is because individuals and businesses revise their contracts and portfolios to reflect new inflationary conditions and expectations. As they do, temporary changes in unemployment, caused by fluctuations in the real wage, are eliminated, and the economy moves back to the natural rate of unemployment.

If the long-run Phillips Curve is vertical, as the natural-rate hypothesis indicates, then governments and central banks should focus on reducing the rate and volatility of inflation. To accomplish this goal, they must control their

money supply growth rates, which is usually the responsibility of central banks. To improve the natural rate of unemployment, governments need to focus on supply-side factors, such as quantity and quality of the labor force, labor mobility, invention, innovation, entrepreneurship, and levels of competitiveness.

The Equation of Exchange shows the tautological economic relationship between a nation's money supply (M2), velocity of money (V2), price level (P), and real GDP (RGDP). In particular, (M2 × V2) must equal (P × RGDP). Monetarism, which is based on the Quantity Theory of Money, breathes life into the Equation of Exchange by making behavioral assumptions about what causes these variables to change. Monetarists believe that long-run growth is determined by a nation's ability to increase productivity. They also assert that velocity (V2) is stable and predictable along a long-term trend.

Therefore, monetarists conclude that excessive increases in the money supply cause long-run inflation. As for expansionary fiscal policy, unless lower taxes or higher government expenditures can improve the quantity, quality, or efficiency of a nation's resources, fiscal policy merely redistributes real GDP. It does little or nothing to increase a nation's economic growth rate or to stimulate long-term inflation.

The Law of One Price asserts that the price of *a product* in one country should equal the exchange-rate–adjusted price of the same product in a foreign country. Otherwise, riskless arbitrage profits could be earned. The Absolute Purchasing Power Parity Theory is similar to the Law of One Price, except that Absolute Purchasing Power Parity equates exchange-rate–adjusted prices for the *same basket* of goods and services in two nations. Relative Purchasing Power Parity is different from the Law of One Price and Absolute Purchasing Power Parity because it calculates a *percentage change* in the exchange rate, rather than the absolute exchange rate level. More specifically, Relative Purchasing Power Parity measures the percentage by which an exchange rate must vary to offset the difference between two nations' inflation rates.

In the short term, purchasing power parity forecasts are generally inaccurate, due to relative differences in nations' market baskets, consumption patterns, and government regulations. Also responsible are transportation costs and non-trade-related transactions, such as international investment flows and central bank intervention in the foreign exchange markets. These forecasts improve as the period grows longer and as inflation rates in the considered nations increase. The accuracy of purchasing power parity predictions also improves if the results are evaluated based on how often actual rates converge toward the predicted purchasing power parity levels and whether the actual rates fall within reasonable confidence intervals of the predicted purchasing power parity rates. Of the two purchasing power parity approaches, Relative Purchasing Power Parity tends to be

more accurate at predicting exchange rate changes than Absolute Purchasing Power Parity is at predicting exchange rate levels.

Merging Absolute Purchasing Power Parity Theory and the Quantity Theory of Money shows us that six major variables (i.e., $M2^B$, $V2^B$, $RGDP^B$, $M2^A$, $V2^A$, and $RGDP^A$) affect nominal exchange rates.[17] Changes in the long-run value of Country A's currency are determined by relative percentage differences in: the growth of Country B's and Country A's money supplies ($\%\Delta M2^B - \%\Delta M2^A$), velocity of money ($\%\Delta V_2{}^B - \%\Delta V_2{}^A$), and real GDP ($\%\Delta RGDP^B - \%\Delta RGDP^A$). Country A's currency depreciates if its money supply or velocity grows more rapidly than Country B and if its real GDP grows more slowly.

Key Points

- Natural-Rate Hypothesis
  - The Natural-Rate Hypothesis asserts that nations have a vertical, long-run Phillips Curve at the natural rate of unemployment and a family of downward-sloping, short-term Phillips Curves that shift with changes in expected inflation.
  - The natural rate of unemployment is also called the nonaccelerating inflation rate of unemployment (NAIRU) or nonincreasing inflation rate of unemployment (NIIRU).
  - The natural rate of unemployment is like a nation's economic center of gravity. The country returns to this level in the long run.
- Phillips Curve
  - Short-term Phillips Curves are downward sloping because unexpected changes in inflation affect hiring and job-seeking incentives.
  - The long-run Phillips Curve shifts with changes in supply-side factors that affect labor market conditions, productivity, and per unit costs.
- Equation of Exchange
  - The Equation of Exchange relates a nation's GDP Price Index (P) and Real GDP (RGDP) to its Money supply (M2) and Velocity of money (V2).
  - The Equation of Exchange is $M2 \times V2 \equiv P \times RGDP$
- Quantity Theory of Money
  - Quantity Theory of Money breathes life into the variables included in the Equation of Exchange.
  - If a central bank's goal is 0% inflation, then the long-run growth of money should be just enough to offset the net percentage growth in money velocity ($\%\Delta V2$) minus the percentage growth in output ($\%\Delta RGDP$).
- M2 Velocity (V2)
  - V2 is affected by broad-based institutional factors that change slowly and by market-based variables.

17 The superscript "A" stands for "Country A," and the superscript "B" stands for "Country B."

  - V2 and the demand to hold money are inversely related.
- Demand to hold money
  - The demand to hold money is inversely related to changes in the relative return on substitute investments, expected inflation rate, and expected relative returns on substitute investments.
- Monetarism
  - Monetarists assert that long-term inflation is caused by excessive money creation, which means long-term inflation is a monetary phenomenon.
  - Monetarists believe that fiscal policies mainly redistribute income rather than cause long-term inflation or long-term economic growth.
- Purchasing Power Parity
  - According to the Law of One Price, arbitrage should equate the exchange-rate–adjusted prices of identical (and tradable) goods and services among nations.
  - According to the Absolute Purchasing Power Parity Theory, arbitrage should equate the exchange-rate–adjusted prices of identical baskets of goods and services among nations.
  - The Relative Purchasing Power Parity Theory calculates changes in exchange rates based on relative inflation rates.
  - According to the Relative Purchasing Power Parity Theory, a nation's nominal exchange rate should appreciate when its inflation rate is lower than foreign inflation rates and depreciate when it is higher.
- Predictive abilities of Purchasing Power Parity
  - High inflation rates and extended periods improve the predictive powers of Purchasing Power Parity.
  - The predictive powers of Purchasing Power Parity improve if it is judged based on a confidence interval around the estimated values.
  - Relative Purchasing Power Parity is better at predicting changes in exchange rates than Absolute Purchasing Power Parity is at predicting exchange rate levels.
  - Purchasing Power Parity rates can be inaccurate if: (1) international product baskets are not identical, (2) global consumption patterns differ, (3) there are nontraded products in the market basket, (4) there are trade restrictions or transport costs, and (5) there are significant international investment flows or central bank intervention(s).
  - With time, most exchange rates converge toward Purchasing Power Parity levels.

Review Questions

1. Use the natural-rate hypothesis to explain the economic adjustments that would occur if a nation's inflation rate fell from its expected level of 6% to an unexpected 2% rate.
2. Explain the natural-rate hypothesis and how it arrives at the conclusion that the long-run Phillips Curve is vertical.
3. Is the velocity of money (V2) just another name for the M2 money multiplier? Explain.

4. Answer the following questions using the Equation of Exchange and Relative Purchasing Power Parity.
   a. If real GDP grows at a 3% annual rate, the money supply expands at 2% per year, and the velocity of money is constant, what is the long-run rate of inflation?
   b. Using your answer in Question 4a, if foreign inflation is 4%, what is the annual rate of currency appreciation/depreciation?
5. How is the Equation of Exchange different from monetarism?
6. Explain the major assumptions and conclusions of monetarism.
7. Suppose the Swiss National Bank (SNB) targets an inflation rate of 2% during the next year. Switzerland's real GDP is expected to grow from CHF 700 billion to CHF 707 billion, and the nation's M2 velocity is expected to grow from 4.00 to 4.24. Using the Equation of Exchange, calculate the percentage change in the money supply needed for the SNB to accomplish its goal. Given your answer, list the tools the SNB could use to change the money supply and how they would have to change.
8. Suppose you are in a meeting with the chief financial officer, treasurer, and treasury staff at corporate headquarters. The discussion suddenly focuses on expanding operations in Latin America, in general, and in Brazil, in particular. A colleague at the table mentions that Brazil is probably not a good prospect for investment because she fears that the nation may return to the 7,000% inflation rate it once experienced. When asked for the cause of the hyperinflation, your colleague says that most of her fears are centered on the potential for the Brazilian government to pursue highly expansionary fiscal policies. All eyes turn toward you for a comment on the validity of your colleague's statement. The question boils down to this: Can expansionary fiscal policy without an accommodating increase in money supply cause extended periods of hyperinflation? Using Quantity Theory of Money and monetarism as the basis for your reply, explain whether a 7,000% inflation rate is possible under these conditions. If it is possible, what would need to occur to make it happen? Otherwise, explain why it is impossible or improbable.
9. Determine whether the following statements are true, false, or uncertain ac-cording to monetarist theory. If any of them is false or uncertain, change it so that the statement is correct.
   a. A decrease in the real rate of return on bonds increases the velocity of money.
   b. An increase in the real return on equity increases the velocity of money.
   c. An expected decline in the rate of inflation increases the velocity of money.
10. Suppose that Mexico makes structural reforms that increase the nation's labor force productivity. According to monetarism and the Quantity Theory of Money, explain the effect these reforms should have, in the long run, on Mexico's inflation rate.
11. Suppose Turkey's inflation rate is 55%, and its real GDP growth rate is 7.3%. The country's exchange rate falls by 54% against the U.S. dollar, its velocity of money is unchanged, and government spending rises by 45%. Use the Quantity Theory of Money and monetarist theory to explain whether Turkey's inflation was due to fiscal policy, monetary policy, or the exchange rate.
12. What is the Law of One Price, and how is it different from Absolute Purchasing Power Parity?
13. If the United States has Absolute Purchasing Power Parity with the pound, what does the real exchange rate equal? Explain.
14. How is Absolute Purchasing Power Parity different from Relative Purchasing Power Parity?

15. Given the information below, use Relative Purchasing Power Parity to determine what the Swiss franc per dollar exchange rate should be in 2020. Which currency should have appreciated, and which currency should have depreciated.

Information	2000	2020
Exchange rate	CHF 1.60/$	CHF/$ = ?
U.S. Price Index	100	151
Swiss Price Index	100	109

16. What are the main problems with Absolute Purchasing Power Parity as a tool for forecasting exchange rates?
17. Suppose the original peso-per-pound exchange rate was 20 Mexican pesos per British pound (i.e., MXN20/GBP). The M2 money supply grows by 3% in the United Kingdom and 10% in Mexico. At the same time, England's real GDP grows by 2%, and Mexico's grows by 5%. Finally, assume that the velocity of money in England remains the same but falls by 1% in Mexico. Use Real Purchasing Power parity and the Quantity Theory of Money to determine the peso value of the pound in next year.
18. Suppose that from 2015 to 2020 (i.e., five years), Japan's yearly average inflation rate was –2%, and the U.S. yearly inflation rate averaged +2.5%. If the spot exchange rate was ¥120/$ in 2015, use Relative Purchasing Power Parity to determine the equilibrium exchange rate at the end of 2020.

Discussion Questions

19. Answer the following questions about Chile's monetary policy.
    a. What happens to the Chile's real interest rate if its central bank increases the monetary base? Which market did you analyze to find your answer?
    b. As a result of your answer to part (a), what should happen to Chile's unemployment rate? Which market did you analyze to find your answer?
    c. According to the Phillips Curve, what tradeoff is Chile's central bank making?
    d. According to monetarists, what should happen to Chile's long-term inflation rate if its central bank constantly increases M2?
    e. What should happen to inflationary expectations if long-run money supply growth rate increases faster than Chile's real GDP? How does this impact the Phillips Curve?
    f. As inflationary expectations increase, what should happen to the velocity of money? How should this impact Chile's inflation rate?
    g. How should Chile's monetary expansion affect its long-term real exchange rate?
    h. Chile has a credible central bank. If you were applying this analysis to a country with a less credible central bank, such as Venezuela's central bank in 2019, how would it impact your previous answers?
20. Suppose Belgium's natural rate of unemployment increased from 5% to 6%, and the current rate of unemployment was 4.5%. What economic adjustments would the increased natural rate cause?

Appendix A
List of Abbreviations

AD	Aggregate Demand
APPP	Absolute Purchasing Power Parity
AS	Aggregate Supply
B	Monetary Base
BOE	Bank of England
BOJ	Bank of Japan
BOP	Balance of Payments
C	Personal Consumption Expenditures
CA	Current Account in the Balance of Payments
CAIR	Compound Annual Inflation Rate
CAMELS	Capital Adequacy, Asset Quality, Management Earnings, Liquidity, Sensitivity
CAX	Foreign Exchange Effects from Current Account Transactions
CC	Currency in Circulation
CC/D	Preferred Asset Ratio for Currency in Circulation
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CIV	Cash in the Vaults of Banks
CPI	Consumer Price Index
D	Checking Deposits or Demand Deposits
D1, D2, . . .	Demand (#1), Demand (#2), . . .
DN	Danmarks Nationalbank (Denmark's Central Bank)
EA	Euro Area
ECB	European Central Bank
EMU	European Monetary Union
EOE	Equation of Exchange
ER	Excess Reserves
ER/D	Preferred Asset Ratio for Excess Reserves
EX	Export Revenues
EXP	Expectations
FA	Financial Account in the Balance of Payments
FAX	Foreign Exchange Effects from Financial Account Transactions
Fed	Federal Reserve
FX/t	Quantity of Foreign Exchange per Period
G	Government Spending on Final Goods and Services
GDP	Nominal Gross Domestic Product
GT	Government Transfers
I	Gross Private Domestic Investment
i	Nominal Interest Rate
IM	Import Revenues
IND	Indebtedness
KA	Capital Account in the Balance of Payments
KI	Capital Inflows (Financial) from Abroad

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KO	Capital outflows (financial) to foreign nations
L/t	Quantity of Labor per Period
LEI	Leading Economic Indicator Index
LOOP	Law of One Price
M	Money Supply
M/P	Real Money Supply
M1	M1 Money Supply
M1/P	Real M1 Money Supply
M2	M2 Money Supply
M2/P	Real M2 Money Supply
M3	M3 Money Supply
mm_1	M1 Money Multiplier
mm_2	M2 Money Multiplier
N	Near Money
N/D	Preferred Asset Ratio for Near Money
NEO	Net Errors and Omissions in the Balance of Payments
NER	Nominal Exchange Rate
NFI	Net Foreign Income
nsa	Not Seasonally Adjusted
NGDP	Nominal GDP
NX	Net Exports
P	Domestic GDP Price Index or Domestic Price Level or Domestic Price Index
P*	Foreign Price Index or Foreign Price Level
P_1^A, P_1^B, . . .	Price of Product 1 in Country A, Price of Product 1 in Country B
PBOC	People's Bank of China
PPI	Producer Price Index
PPP	Purchasing Power Parity
%ΔP	Domestic Inflation
%ΔP*	Foreign Inflation
%ΔPE	Expected Domestic Inflation
%ΔPE*	Expected Foreign Inflation
Q/t	Quantity per Period or Real GDP
QTM	Quantity Theory of Money
r	Real Interest Rate
RAX	Foreign Exchange Effects from Reserves and Related Items Transactions
RC/t	Real Credit per Period
RER	Real Exchange Rate
RGDP	Real GDP
RPPP	Relative Purchasing Power Parity
RR	Required Reserves
RR/D	Reserve Requirement per Unit (e.g., Dollar or Euro) of Checking Deposits
RR/N	Reserve Requirement per Unit (e.g., Dollar or Euro) of Near Money
RRFIR	Real Risk-Free Interest Rate
RRI	Reserves and Related Items in the Balance of Payments
S	Saving
S1, S2, . . .	Supply (#1), Supply (#2), . . .
sa	Seasonally Adjusted

SDR	Special Drawing Right
SNB	Swiss National Bank
SWF	Sovereign Wealth Fund
T	Tax Revenues – Government Transfer Payments (TXR – GT)
T&L Account	Tax and Loan Account
T&Q	Tariffs and Quotas
TECH	Technology
TR	Total Reserves
TX%	Tax Rate
TXR	Tax Revenues
V	Money Velocity
V1	M1 Money Velocity
V2	M2 Money Velocity
W	Nominal Wages
WLTH	Wealth

Currencies Symbols

¥	Yen
€	Euro
BTC	Bitcoin
CHF	Swiss Franc
COP	Colombian Peso
ETH	Ether
LTC	Litecoin
MXN	Mexican Peso
MYR	Malaysian Ringgit
$S_{B/A}$	Spot Exchange Rate. The Cost of Currency A in Terms of Currency B
USD	U.S. Dollar

Other Symbols

Δ	Change in
≡	Is defined as being equal to
*	Foreign

Appendix B
Important Terms and Concepts

Most Important International Macroeconomic Relationships, Concepts, and Terms

Term	Relationship/Definition	Chapter
Absolute purchasing power parity	$S_{B/A} = P_{B/Basket} / P_{A/Basket}$	23
Accounting Tautology #1	Assets ≡ Liabilities + Stockholders' Equity	7
Accounting Tautology #2	ΔAssets ≡ ΔLiabilities + ΔStockholders' Equity	7
Aggregate demand (AD)	AD ≡ C + I + G + NX	12
Bank reserves (TR)	See "Total bank reserves"	6, 7, 8
Balance of payments (BOP)		17
BOP: BOP identity	CA + KA = FA + RRI	17
BOP: Merchandise balance ≡	Net exports of goods (Goods exports – Goods imports)	17
BOP: Bal. on goods and services ≡	Net exports of goods and services (EX – IM)	17
BOP: Bal. on current account (CA) ≡	Balance on goods and services + primary and secondary income	17
BOP: Financial account (FA) ≡	Net direct + portfolio + fin. derivatives + other investments	17
BOP: Res. & related items (RRI) ≡	Changes in central bank assets used for FX intervention	17
Bilateral nominal exchange rate ≡	Cost of one currency in terms of another currency	16
Borrowers helped & lenders hurt	Actual Inflation > Expected inflation	5
Capital market mobility: High	FAX > CAX	18, 19, 20

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(continued)

Most Important International Macroeconomic Relationships, Concepts, and Terms			
Term		**Relationship/Definition**	**Chapter**
Capital market mobility: Low		FAX < CAX	18, 19,20
Comparative advantage		Trade is based on relative costs and not absolute costs	22
Current account		See "BOP: Balance on current account (CA)"	17
Direct impact	≡	Change in supply or demand due to the initial exogenous shock. Direct impacts are stronger than indirect impacts	18, 19, 20
Employment-to-population ratio	≡	(Employed/Civilian Noninstitutional population 16 years & older) x 100%	3
Equation of exchange (EOE)		M x V ≡ P x Q	23
EOE: Percentage change		%ΔP ≡ %ΔM2 + %ΔV2 – %ΔQ	23
Equilibrium		Desired quantity supplied/period = Desired quantity demanded/period	2, 12
Excess reserves (ER)	≡	Total reserves (TR) - required reserves (RR)	6, 8
Fiscal lags	≡	Recognition + implementation + impact lags	13
Guideline #1		Above-the-line–Below-the-line: The monetary base does not change unless the central bank crosses the imaginary horizontal line and changes its balance sheet size	9
Guideline #2		Checking accounts never leave the country	15
Guideline #3		Show me the money!	18, 19, 20
Indirect impact	≡	Endogenous changes in one market cause S or D shifts in another market. Indirect impacts are weaker than direct impacts	18
Monetary lags	≡	Recognition + implementation + impact lags	9

(continued)

Most Important International Macroeconomic Relationships, Concepts, and Terms

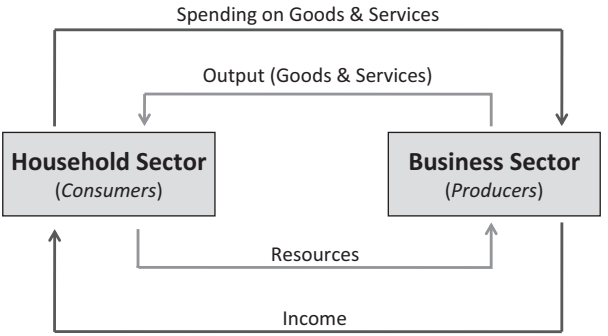
Term		Relationship/Definition	Chapter
Impossible trilogy	≡	It is impossible for a nation to have monetary independence, open international trade and investment markets, and a fixed exchange rate	20
Labor force	≡	Employed + unemployed & actively seeking work	3
Law of one price		$P_1^B = P_1^A \times S_{B/A}$	23
Lenders helped & borrowers hurt		Actual Inflation < expected inflation	5
Linking PPP & QTM		$\%\Delta S_{B/A} \cong (\%\Delta M2^B - \%\Delta M2^A) + (\%\Delta V2^B - \%\Delta V2^A) - (\%\Delta RGDP^B - \%\Delta RGDP^A)$	23
M2	≡	– Currency in circulation + checking deposits + near money – CC + D + N – M2 money multiplier x monetary base ≡ mm_2 x B	6, 8, 9
Monetary base (B)	≡	Currency in circulation + total bank reserves ≡ CC + TR	6
Net export identity		NE ≡ (S – I) + (T – G)	17
NE ≅ CA		CA ≅ (S – I) + (T – G)	17
Nominal GDP (NGDP)	≡	– C + I + G + NX – Wages + rent + return to capital + profits	2
		– C + S + T	17
		– M2 x V2	23
		– P x Q ≡ P x RGDP	4
		– P x RGDP	23
Nominal interest rate	≅	Real interest rate + expected inflation	5
%Δ Nominal GDP (%ΔNGDP)		$\%\Delta NGDP\% \cong \Delta M2 + \%\Delta V_2$	23
%Δ Nominal wage (%ΔW)	≅	%Δ Real wage + expected inflation	5

(continued)

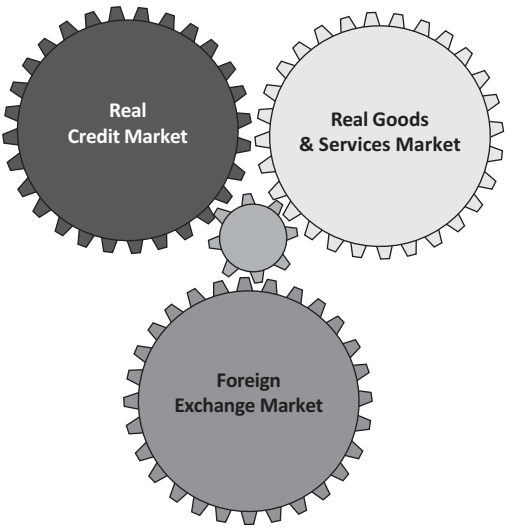
Most Important International Macroeconomic Relationships, Concepts, and Terms

Term		Relationship/Definition	Chapter
Preferred asset ratios	≡	CC/D, N/D, & ER/D	8, 9
Price index (P)	≡	Avg. price level in a given year/Avg. price level in base year	4
Primary effect	≡	Shift of a supply or demand curve caused by an exogenous shock Primary effects are stronger than secondary effects	18, 19, 20
Real exchange rate (RER)	≡	$(NER_{(B/A)} \times Price^{A}) / Price^{B}$	16
%Δ real exchange rate	≡	%Δ real exchange rate ≅ $\%\Delta NER_{B/A} + \%\Delta P^{A} - \%\Delta P^{B}$	16
Real GDP (RGDP)	≡	Nominal GDP/GDP Price Index	4
Real M2 money supply	≡	M2/P	10
Reserves (i.e., bank reserves)		See "Total bank reserves"	8,9
Reserves & related items	≡	Official reserve assets a central bank can use to intervene in the FX market	17,18, 20
Reserve ratio on checking accounts	≡	Required reserves per dollar of checking accounts (RR/D)	8
Reserve ratio on near money	≡	Required reserves per dollar of near money (RR/N)	8
Required reserves (RR)	≡	– Reserve ratio x deposit liabilities – RR/D × (Checking deposits) + RR/N × (Near money)	8
Secondary effect	≡	– Movement along a supply or demand curve – Secondary effects are weaker than primary effects	18, 19, 20
Total bank reserves (TR)	≡	Cash in the vault + Deposits at the central bank	6, 7, 8
Unemployment rate	≡	(Unemployed, available & actively seeking work/Labor force) x 100%	3

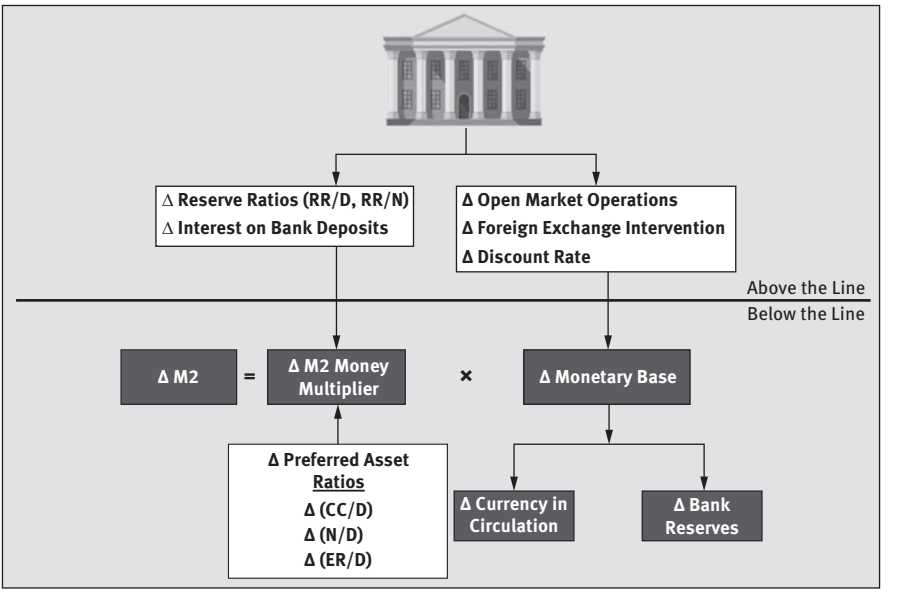
Three Fundamental International Macroeconomics Diagrams



Circular Flow Diagram (Chapter 2).



Three Major Macroeconomic Markets (Chapter 1).



Major Factors That Influence the M2 Money Supply (Chapter 9).

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