Basel Accords, Bank Capital and Portfolio Risk Behavior

Samina Riaz, Venus Khim-Sen Liew and Rossazana Ab. Rahim

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THIS BOOK IS DEDICATED TO MY PARENTS
FOR THEIR ENDLESS LOVE, FAITH, UNBIASED SUPPORT
AND CONSTANT ENCOURAGEMENT

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PREFACE

With the endorsement of the Basel III contracts on the supervision of the banking industry, management of the capital buffers throughout the business cycle attained crucial importance for the reinforcement of financial stability in the banking system. This study is different from previous studies since it focuses specifically on the developing country and evolves a conclusion in answering the important questions on how undercapitalized banks and banks with low and high capital buffers adjust capital and portfolio risk due to regulatory pressure. As such, a plethora of literature shows that the bank capital buffer and the business cycle do not have a consensus on their relationship. Therefore, this study also addresses the question: how do banks adjust buffer capital and portfolio risk in business cycle fluctuations? This topic is still debatable and cannot be simply answered. However, assistance is extended towards financial analysts as well as managers, to comprehend the dynamic nature inherent to the underlying assumptions of capital and risk adjustments and the cyclical behavior of the capital buffer.

I cannot forget the support throughout my research study. First and foremost, I would like to thank Allah (SWT) for giving me His blessings in terms of health, strength, patience and perseverance to work on this book. I am deeply indebted to my co-authors, Dr. Venus Khim-Sen Liew and Dr. Rossazana Bt Ab Rahim for their professional guidance, valuable suggestions and constructive comments, which are very beneficial for the research process and subsequently led to the completion of this study. I would also like to thank my parents, family members and friends for their fullest support and encouragement, never failing to lift my spirits throughout the course of this research.

Dr. Samina Riaz

CHAPTER ONE

INTRODUCTION

The role of capital in the banking system is a crucial one because it helps in preserving a safe and sound financial environment. When banks maintain a sufficient amount of capital, it adds to their credibility by rendering them capable of meeting their obligations. In this connection, the banking industry introduced a mechanism to set minimum capital standards for all international banks in the 1990s under the Basel accord. The risk-based capital standards called the Basel capital accords, which were issued by the Basel Committee on Banking Supervision (BCBS) – founded through the support of the Bank for international settlements (BIS), initially made their way into the G10 countries at the end of 1992.

After that, upon receiving worldwide recognition, all international banking regulations started focusing on the Basel capital accords (Bichsel & Blum, 2004; Kleff & Weber, 2008). The BCBS sufficiently concentrates on banking sector regulations because of the important role that banks play in maintaining economic growth as well as economic failures. Moreover, banks in the member countries are also compelled to apply the capital standards set by the BCBS. Due to the aforementioned reasons, the Basel accords have eventually become a means to stabilize and restructure financial systems (Rime, 2001). With the passage of time, banks were gradually becoming progressively active for international competition with contemporary banks in other jurisdictions. Thus, regulatory bodies tried to provide equal opportunities and advantages to all the banks through the implementation of Basel minimum capital requirements (Heid, Porath & Stolz, 2004). As mentioned earlier, the Basel capital accord was first initiated in 1988 to regulate international banks and require them to maintain a minimum of 8% capital to risk-weighted assets ratio (BCBS, 1988). As a result, a second accord was launched by the BCBS in 2004 because the Basel I accord was considered insufficient. Under the Basel II accord, three fundamental concepts were projected because of the presence of greater risk related to the calculation of the regulatory capital ratio (BCBS, 2006). The repercussions of the global financial crises of 2007-2008 had obviously increased the apprehensions regarding a sufficient and

requisite holding of minimum capital requirements (MCR) set by the Basel II Accord in many countries. The situation led to an increase in the dependency of a capital buffer on business cycle fluctuations and as a result, many falsifications within the Basel II capital requirements were disclosed. Moreover, further viable needs for a better and stronger framework were also pointed out. In order to take the financial downturn into consideration, the Basel III framework was launched by the BCBS in 2010 in an attempt to make the banking system more robust (BCBS, 2010; Busun & Kasman, 2015; Maji & De, 2015). As the Basel III contract was endorsed to supervise the banking industry, the management of the capital buffer throughout the business cycle also becomes crucially important so that the financial stability of the banking system could be reinforced.

With the introduction of the new regime, the maintenance of excess capital above the regulatory minimum requirement for compensatory utilization during a crisis became essential for all the banks. As per the new rule, a counter-cyclical capital buffer was created within a range of 0-2.5% of common equity, so that the bubbles of lending could be weakened. The objective of the counter-cyclical capital buffer regime was to restrict the growth of loans during a credit boom. Moreover, the counter-cyclical capital buffer management always allowed banks to ensure the availability of an adequate capital buffer (Drehmann, Borio, Gambacorta, Jimenez & Trucharte, 2010; Francis & Osborne, 2012; Shim, 2013). The prevalence of MCR is primarily founded on the notion that banks could often end up being involved in a moral hazard behavior. Insufficiently-priced deposit insurance and information asymmetries shield the banks from disciplined control of depositors, with an advantage of decreasing capital and increasing asset risk by banks (Merton, 1977; Heid et al., 2004). The moral hazard theory subjugates the theoretical work focusing on the effect of capital requirements on the risk appetite of banks. In accordance with the theory of moral hazard, bank managers avoid taking risk-reduction measures in the presence of a mispriced deposit insurance arrangement. As a result, risky projects that have a higher return are opted for by bank managers and this malpractice, in turn, leads to the banks' solvency being compromised in the long run. Thus, the theoretical reason to regulate capital is for the purpose of neutralizing the risk-shifting incentives that occur because of deposit insurance.

The first strand of researchers, including Pyle (1971) and Hart and Jaffee (1974) used the portfolio approach, which comprehensively tends to explain that banks are rightly considered to be "utility maximizing units". Within such a model, mean-variance analysis is carried out to compare the

portfolio choice of banks, both with and without capital regulations. Koehn and Santomero (1980) demonstrated that when higher leverage ratios are introduced, banks tend to shift their portfolio to assets, which are riskier. Similarly, Kim and Santomero (1988) also suggested a solution for such a scenario. They proposed that regulators must make accurate measures of risk, while calculating the solvency ratio. Following the research work of Koehn and Santomero (1988), Rochet (1992) further explored and discovered that capital regulations rely on the status of banks, whether they are value-maximizing or utility-maximizing. In the case of value-maximizing banks capital regulations provide no guarantee for the bank, when it comes to taking risks. While, capital regulations play a significant role in the case of a utility-maximizing bank, if usage of various weights while calculating ratios is equivalent to the systematic risks associated with assets.

The second strand of the literature attempted to shed light on the option models. Furlong and Keeley (1989) and Keeley and Furlong (1990) had developed several frameworks related to the above-mentioned theory. These frameworks provide options leading to higher capital requirements which reduce the incentives for value-maximizing banks to raise their assets risk, which is quite contrary to the earlier conclusion. The utility-maximizing model was well criticized in earlier studies for not being viably appropriate. The main criticism of this framework stressed that it neither characterizes the investment opportunities of banks, set through the omissions of option value of deposit insurance nor characterizes the probability of the bank's failure. However, arguments given in favor of option models were, to some extent, undermined by Gennottee and Pyle (1991). In accordance with this study, the assumptions regarding banks' investment in zero net present value assets were accordingly relaxed. It was established that there are certain situations when an increased MCR results in raising asset portfolio risk (Hussain & Hassan, 2005; Majid & De, 2015). In cases when adjustment costs are found to be absent in capital ratios, it will never be possible for banks to hold more than the minimum capital needed by regulators. However, adjustments in capital ratio and portfolio risks may incur a lot of costs. Consequently, banks may not be in adequate situations to do so immediately, because of the costs of adjustments and/or non-liquid markets. According to the buffer theory, if banks approach the regulatory minimum capital ratio, then adequate incentives to boost capital reduce the risk so that costs of regulations incurred in breach of capital requirements are avoided (Rime, 2001). Consequently, the surplus capital, more precisely termed as a "capital buffer", is taken as a preferred option for banks. Then a possibility of

regulatory pressure on capital requirements will be obviously reduced, for the most part, when the capital ratio apparently tends to be excessively more volatile in nature (Myers & Majluf, 1984; Milne & Whalley, 2001). Simultaneously, banks continue to rebuild their capital, in order to achieve and reach their optimum levels and risk aversion of banks deviates towards the lower side when capital is increased, and provides opportunities for optimum risk levels to take a rising trend, as well. When both targeted and actual assets risks attain equally parallel levels, banks obtain a certain position to increase both risks, as well as capital, to such high points so that optimum capital levels are obtained. Hence, in its first stage, banks attempt to increase their capital and also try to lower the risks after increase in the regulatory minimum levels. Eventually, as soon as the adjustments are made and banks rebuild their capital up to a certain level at a later stage, both risks and capital are increased accordingly (Milne & Whalley, 2001). However, banks with poor capital attempt to take more risks for higher expected returns when approaching the regulatory minimum capital ratio (Rime, 2001). Thus, within theoretical reasoning for capital regulations investigation of the capital and portfolio risk adjustment of banks is taken as the first broad objective of the study.

The banks tend to maintain the requisite capital to secure themselves from future losses, which could probably incur at any time. When the entire financial system faces a stressful period of post credit boom, the credit flow in the economy provides a helping hand to some extent. However, when credit risks in lending become materialized, it could be attributed to capital shocks, and often assumed to be related with the business cycle. Hence, during the times of an economic downturn, when counterparts are more diverted towards down-gradation, a rise in the anticipated credit risk is clearly seen and during the times of economic boost, it shows an opposing trend. A relatively high correlation exists between credit risks and fluctuating aspects, which occur in the business cycle from time to time (Curry, Fissel & Hanweck, 2008). For instance, Allen, Delong and Saunders (2004) found out that whenever the quality of credit tends to degenerate and create very high possibilities of making the borrowers real defaulters during the recession period. Similarly, Curry et al. (2008) argued that during any recession period the possibility of default risks increases. But opposing the fact, when the economy starts to recover from the shocks, it inclines to start expanding, whereas default risks automatically show downward trends. In various instances in the relevant literature on the subject, the behavior of credit risks is apparently counter-cyclical, i.e., during a business cycle, credit risk moves in the opposing direction (Ayuso, Perez & Saurina, 2004; Stolz, 2007; Haubrich, 2015;

Castro, Estrada & Martinez-Pages, 2016). Consequently, objectives of banks' behavior regarding capital are more inclined to variations at different stages within the business cycle, and also depend on banks' own financial conditions (Ayuso, et al., 2004).

For further clarification, if supposing the banks are forward-looking ones, then numerous chances of expansion in their loan portfolio emerge, when there is any economic upturn. In such situations, there is also an expectation from the banks to make attempts to be able to build up their capital. The excessive capital will obviously prove to be a protective measure against any credit risks. The main reason for building up excess capital during an economic boom is to acquire an increase in portfolio risks during such times (Crockett, 2001). The built-up capital provides assistance to banks to lessen their surplus credit growth when unstable and deviating economic situations arise. Banks use the capital buffers in times of huge credit losses during economic downturns. If banks have enough capital buffers to fight against economic downturn, then the lending activities may still continue as restrictions are not too hard. An increase in the capital buffer apparently makes the performance of banks easier and at the same time, also more cost-efficient. Such similar financial advantages are not made properly available when economic depressions still exist all around. Therefore, capital of banks is anticipated to show a pro-cyclical behavior if banks are forward-looking ones. On the contrary, during economic upturns, banks might be in a position to make expansions in their loan portfolios without lowering their capital. More precisely, some banks may also underestimate the probable risks that they might face during economic expansions. Hence, when the economy is being expanded, very thin chances emerge to show that risks will materialize instantaneously (Heid et al., 2004; Stolz, 2007).

We would not be shocked to see that when any economy starts facing a downturn, the banks become surrounded with very complicated situations to raise their capital due to very high costs and they have no option but to utilize their retained earnings to build up their capital, because returns are apparently at a very low level. These limitations may not make it possible for the banks to be able to continue with their lending activities and they are compelled to raise their capital by minimizing their risk-weighted assets. If such a situation arises, a counter-cyclical capital behavior is expected with the probability of having detrimental effects on the lending abilities of banks during downturns in business cycles. Consequently, the banks are not in a position to widen their credit but are forced to squeeze it to its lowest limits, and as a result, showing additional contributions

towards the economy when under more serious downturns, contrarily in a positive manner. These scenarios eventually cause some damage and may gradually sabotage the stability and sustainability within the banking sector, which in turn, attributes to create a vicious circle. Keeping in view the various aspects of this context, the second objective of our current study is investigating the impact of business cycle fluctuations on capital adjustments and portfolio risks to comprehensively reveal whether capital behavior of banks is pro-cyclical or counter-cyclical over the business cycles. The issues pertaining to this topic are still under debate and far from being simply answered. However, assistance is extended towards financial analysts as well as managers, to comprehend the dynamic nature inherent to the underlying assumptions of capital and risk adjustments and the cyclical behavior of capital.

For the alignment of the regulatory capital requirement to match with international standards, the framework of capital and risk-weighted assets was introduced in Pakistan with the aim to adequately strengthen the capital and solvency in the banks. The State Bank of Pakistan (SBP) initially allowed all banks to maintain a minimum capital requirement (MCR) of Rs 500 million and not less than 8% of the capital to risk-weighted assets (CRWA) ratio, also known as the capital adequacy ratio (CAR). Thus, the banks were advised to enforce the system of risk-weighted capital, to be made effective from December 31, 1997 (State Bank of Pakistan, 1990-2000). When the Basel II Accord was introduced internationally, Pakistan also announced a road map for its implementation accordingly on March 31, 2005. As per SBP instructions, all other banks were advised to maintain MCR (net of losses) at Rs 10 billion with the CAR at 10%, to be aligned with the risk profile of banks by the end of December 31, 2013. By the same date the SBP instructed the Basel III Accord to become effective and fully implementable by December 31, 2019 in a phased manner. As per instructions from the Basel III Accord, MCR must stand at Rs 10 billion. However, the CAR requirement is 10% in addition to a leverage ratio of 3% and a 2.5% capital conservation buffer. Since the CAR requirements will be increased gradually to 12.5% by December 31, 2019, banks are striving hard to meet the SBP regulations, whereas few banks are still under-capitalized (Zaidi, 2012). Moreover, the International Monetary Fund (IMF) report with regard to the 8th review pertaining to the economic performance of Pakistan indicates that risk to banks is from the structure of their loan/investment portfolio. However, still five small banks are operating below MCR of Rs 10 billion. Although the SBP has formulated a couple of strategies to bring these banks to the levels of regulatory compliance, the report is still not

satisfactory. However, one bank deals with the raising of its equity by the end of 2015, while others suggested privatizing the affected banks by June 2016. To report more precisely, these five banks represent about 1.4% of the entire assets in the banking sector (International Monetary Fund Report, 2015). These non-compliant banks obviously face various repercussions. Thus, some of the restrictions, like accepting deposits and lending to cancellation of license are repercussions, imposed on such non-compliance banks. Although the risk profile of the Pakistani banking sector showed rising trends from 2003 up to 2018 (see Figure 1.1).

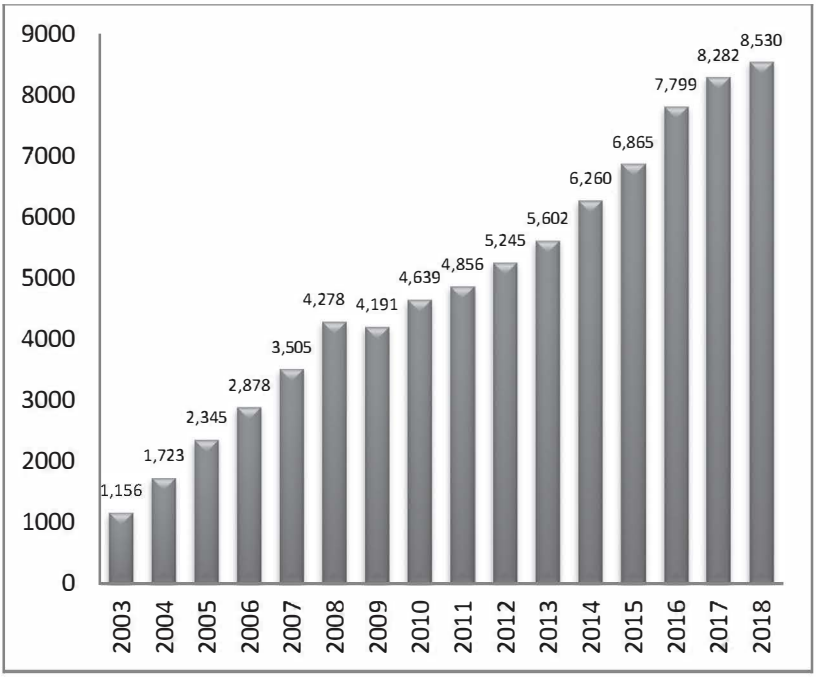

Figure 1: Risk-weighted Assets (in Billion Rupees)
Source: State Bank of Pakistan

The global financial crisis in 2007-2008 placed Pakistan with some of the most adversely affected countries, because prices of global commodities had dominated in disturbing the fundamentals of macroeconomics. Since the rising imbalances in macroeconomics along with prevalent global commodities' hiking prices, high inflationary pressures had undoubtedly witnessed an unprecedented increase in food products, as well as core

prices surprisingly sky-rocketing and astonishingly creating new records in this regard. Overall inflation was 8.7% in 2007 but gradually went up to 23.3% in December 2008 (State Bank of Pakistan, 2008-09). The Pakistan government as well as its Central bank clearly identified the defects and diverted towards taking some measures in an attempt to resolve these challenges.

Moreover, keeping in view the increased pressures which had been imposed by demands due to general inflation and price-hikes, the monetary policy had to be further tightened by the Central bank for similar compliance with other countries, which were facing similar pressures. Although Pakistan faced domestic financial crises, as well as, international economic challenges, Pakistan's financial sector resisted nearly all global financial pressure and no direct influence was evinced, but instead, strong resilience was demonstrated by the sector (State Bank of Pakistan, 2014).

As the risk-weighted assets were gradually elevating towards a rising trend, the banking sector faced the biggest challenge pertaining to a heavy burden of non-performing loans. As a result, the quality of the asset portfolio deteriorated and continued to prove a threatening factor for the capital base of the banking system (Zaidi, 2012). NPLs were estimated to be at Rs 199 billion in 2004 but suddenly showed surprising growth of nearly 200% in 2014 to stand at Rs 604 billion (State Bank of Pakistan, 2014). The global financial crisis in 2007-2008 led to decelerate economic activities suddenly and assumedly becoming the most fundamental reason for the impairment of the quality of a bank's loan portfolio in the asset portfolio. In a situation when risk-weighted assets are on the rise in the asset portfolio, banks tend to perform internal consolidation progressively in such a way that its quality improved instead of the distributing of credit. Moreover, the presence of a high level of NPLs, compelled the banks to increase their provision for loss in loans that decreases the banks' revenue and lessens the funds required for making new lending. The corporate sector also faced many hardships when the loans were cut back, because of greater problems in terms of expansion of working capital. Moreover, due to this, the chances of the corporate sector resuming normal operations or a growing trend are hampered (Stiglitz, 2001). When the decline causes some variation in the quality of the asset portfolio; the banks are compelled to increase the volume of their financing as the regulatory capital requirement increases. This rising practice of financing by banks apparently shows a unique experience in the presence of changes seen in the financing portfolio towards less risky weighted assets by diversifying their financing portfolios into government securities. This practice

discourages the growth of financing in the private sector that ultimately causes a slowdown effect in growth trends in economic activities (Ayub, 2013). Thus, our study will obviously place a real impact on banks to implement viable decisions on optimal capital and risk levels.

Significance of the Study

The general purpose of this study is to investigate the capital and portfolio risk behavior of Pakistani banks and to examine the impact of regulatory pressure and business cycle fluctuations on capital and portfolio risk during the period of 2004-2017. This research study intends to make several contributions to the literature. The findings will also provide important and interesting information to policy makers, and financial analysts dealing with various types of banks in Pakistan. It would also be helpful to comprehend the responses of banks towards capital regulation so that regulations could be designed in such a way so as to satisfy the objectives of the regulators in a much better approach.

The first and foremost contribution of this research is an attempt to guide policy makers and assist financial planners to make visionary plans for implementation in accordance with the most favorable and viable decisions on optimal capital and risk levels, since this research will evolve a conclusion in answering the important question as to how banks adjust capital and portfolio risk. The results obviously unfold the reasons as to why under-capitalized banks are unable to raise their capital. The undue regulatory pressure is the most vital constraint. On the other hand, it is clearly observed that non-performing loans of high stratum are increasing asset portfolio risk. The quality of assets is not only consequential of risks behavior, but also an influencing factor on the risk taken by the bank.

The second contribution of this research will be concluded with a reasonable answer as to how banks adjust capital and portfolio risk in the business cycle fluctuations. The policy makers will seize an opportunity to devise strategic plans accordingly if the bank is shortsighted or a forward-looking bank. In accordance with the capital buffer theory, there is positive dependence of optimum capital on asset portfolio risk. In case the assets risk is higher, banks must have a higher capital so that it can have full insurance if the regulatory minimum is violated. The credit risk primarily drives assets risk because traditionally loans are part of banks' most crucial assets category. This system is spread to such an extent that during a business cycle, if the credit risk is facing fluctuations, then fluctuation is also witnessed in optimum capital levels. For those forward-

looking banks, capital behaves in an anticipated manner. For instance, throughout the upturns of a business cycle when banks are in the process of expanding their lending, there is a tendency for potential risks to increase. Consequently, banks also have to raise their capital, keeping in view their sustainability in very stable positions, so as to tactfully face any growing risks. In a similar manner, when risks materialize during the downturns of a business cycle, banks could draw on the increased capital. In this way, it is expected that capital might undergo pro-cyclical fluctuations during the business cycle when banks are of the forward-looking type. This study also discovered that capital in banks fluctuates pro-cyclically, indicating that their capital grows when the economic conditions improve. This is to say more precisely that while accounting for rising credit risks during upward trends of the business cycle, banks have to increase their capital, when they experience upturns in the business cycle (Milne & Whalley, 2001). The results again indicate that banks in Pakistan tend to increase their capital in order to meet the minimum capital requirement in the upturn to materialize the credit risk in the downturn. The results further reveal that business cycle fluctuations have a pro-cyclical impact on portfolio risk adjustments. The significant pro-cyclical behavior of risk-weighted assets may be due to the increase in portfolio risk in upturns.

Moreover, the study contributes to the existing literature by answering the question: how do banks adjust buffer capital and portfolio risk in business cycle fluctuations? The study concluded that the bank capital buffer fluctuates counter-cyclically and it may be due to the shortsightedness of banks or low loan demand during downturns. On the contrary, business cycle fluctuations have a pro-cyclical impact on portfolio risk adjustments and indicate that during an upturn rising loan demand increases bank risk.

The third integral part contributes comprehensively to finalize the findings of our results which are absolutely in line with the predictions stated in the capital buffer theory for banks with a low capital buffer and show that low capital buffer banks tend to adjust their capital requirement and risks pro-cyclically within the business cycle. Moreover, there is a two-way coordination between adjustments in capital and adjustments in risk. It refers to an adjustment in capital being negatively affected by the adjustments in portfolio risk and vice versa. The results further contribute that higher profitability may induce low capital buffer banks for risky investments and effect asset quality. The analyses of our findings also divert our attention towards another significant contribution, that high capital buffer banks adjust their capital counter-cyclically in the business

cycle whereas their portfolio risk is adjusted pro-cyclically. It indicates that during upturns capital is not accumulated. There is a two-way inverse relationship between adjustments in capital and adjustments in risk. However, it is quite apparent that in order to pursue higher profitability, banks with high capital buffer are also induced towards higher risky investments.

The fourth contribution of this study, to the best of our knowledge, discovers that banks have received comparatively less attention for assessment of effective capital regulations in risk-taking, specifically in developing countries, which have further crucial variations among banks. This calls for further research to clarify why the capital buffer of banks behaves in a cyclical manner. In this context, this study will fill the lacuna on the subject and add noticeably to the literature for the benefits of the stakeholders.

Organization of the Study

The study is organized into ten chapters. Chapter 1 provides an overview of the research and contains information on the research background being the motivational sources for carrying out the research. This chapter describes the overall picture of the area of research, provides its background with vital focus on the impact of regulatory pressure and business cycle fluctuation on the banks' capital and portfolio risk in Pakistan. It also identifies various issues and gaps which lead to problem statements, research questions and research objectives. Then, the significance of the study is highlighted in this chapter along with structural details for a comprehensive understanding of the motivation and direction for the research study. Chapter 2 explores the evolvements of the Basel capital accords and their implementation from the Basel I to Basel III Accords. Chapter 3 discusses the capital and portfolio risk assessment of Pakistani banks in terms of asset quality, solvency, liquidity and profitability during the period 2004-2017. All data have been provided by the State Bank of Pakistan. This chapter will provide the capital and portfolio risk behavior in the context of the real financial market of Pakistan. Chapter 4 reviews theories of capital and portfolio risk such as the theory of bank capital, Agency theory, Financial Intermediation theory, Moral Hazard theory and Capital Buffer theory. Chapter 5 covers the prior empirical evidences that are relevant to the scope of this study; such as studies on the impact of regulatory pressure on bank capital and portfolio risk, the effect of business cycle fluctuations on capital and portfolio risk,

the impact of bank liquidity, profitability, size, merger and investment on bank capital and portfolio risk as well as the impact of asset quality on risk decisions. Chapter 6 explains the research design and methodology used in the study. The chapter begins with an explanation on the research framework, definitions and measurements of variables, sources of data and the process adopted for data collection. The hypotheses development of each variable is also described. The chapter also presents regression models of the study, which have been conducted in order to answer the research questions. The answers will, of course, lead to achieve the objectives of the study. In Chapter 7, are the empirical results of the capital and portfolio risk analysis. Chapter 8 explains the empirical results of analysis of low and high capital buffer banks. Chapter 9 discusses the empirical results of the impact of the business cycle on bank capital buffer and portfolio risk analysis. The consistency and differences of the results in comparison with underpinning theories and prior empirical evidences are also elaborated for clear understanding. Chapter 10 concludes with the interesting results of the study, along with a conclusive summary. This chapter also highlights the contributions and implications of the study, and explains the limitations which must be noted. Further, suggestions in the subject areas for some possible information for future research are also presented herein.

CHAPTER TWO

EVOLUTION OF THE BASEL CAPITAL ACCORDS

The Bank for International Settlements (BIS) serves the central bank in pursuing monetary and financial stabilities, encourages international cooperation in those areas and apparently acts as a bank for central banks. The BIS was established in May 1930, and is assumed to be one of the world's oldest international financial organizations. The regular meetings of the BIS are held every two months in Basel, with active participation of Governors and senior officials of members of central banks. These meetings provide all opportunities for participants to discuss the world economy and financial markets, besides an exchange of views on topical issues of central bank interest. The main outcomes of these meetings are participants' comprehension of betterment and development, challenges and visionary policies, which intend to affect various countries or markets around the world.

The Basel Committee on Banking Supervision (BCBS) is an international committee of banking supervisory authorities, which was established by the G10 countries' central bankers at the end of 1974 under the great auspices of (BIS), following the sudden collapse of Bankhaus Herstattin, Germany and Franklin National Bank, USA in 1974 (BIS, 2008; Engelen, 2005). The BCBS consists of senior representatives of bank supervisory authorities and central banks from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the United States. The main objective of the BCBS is to enhance clear understanding among all the key members of the G10 (Group of Ten). All these countries grouped together for consultation and co-operation on economic, monetary and financial matters (BIS, 2004).

The Basel Accord (Risk-based Capital Standards)

The role of capital is quite difficult to be overstated in preserving a secure and sound banking system. When banks maintain a sufficient amount of capital, they are able to ensure being capable of meeting their obligations

towards their creditors. Likewise, a sufficient amount of capital will create confidence and inspiration among depositors and other creditors to encourage them that such banks will repay their amount, even if some assets of banks lead them towards default (Larson, 2011). Eventually, the Basel Accord has thus emerged as a supporting factor to ensure a secure stability in financial systems and structures by using a set of rules, which is acceptable in all global financial hubs and allows for some scientific treatment for risk aversion. As part of the Basel Accord requirement, all banks had to face a number of minimum capital requirements. These firm rules are advantageous for the economy since they altogether cushion the banks' performance against losses that result from credit, operational and market risk exposures and also ensure the availability of capital within the economy throughout every business cycle (BIS 2004, Hassan Al-Tamimi, 2008). The limits allocated for banks with regard to capital also protect them against systemic risks (Amidu, 2007). The introduction of the Basel Accord in 1988, pertaining to minimum capital requirements, was adopted by the G10 group. The Accord has now spread around to many states and has been implemented in around 100 countries world-wide (Van Roy, 2008). Since 1988, the BCBS has issued three capital accords, known as Basel I, Basel II, and Basel III. Basel I was implemented by member countries in 1992, whereas Basel II is still being implemented in certain countries and as far as Basel III is concerned, it came into effect gradually from January 1, 2014 in most member countries.

Basel I

The BCBS initiated the Basel I Accord in 1988, with two very important and viable objectives from its time of inception. The first objective was to strengthen secure and sound stabilization in the international banking system and secondly, to create level playing fields among banks of international reputation by diminishing the existing means and ways of competitive inequality (BCBS, 1988). To achieve these requisite goals, a set of two tiers was selected in order to define capital in banks. The capital in Tier 1 is relevant to common stocks and other preferred stocks in perpetual terms, and retained earnings. The international banks were required to hold Tier 1 risk-weighted capital, at least to the level of up to 4%. Accordingly, capital in Tier 1 and Tier 2 are jointly defined as "fixed maturity preferred stock, subordinated debt and loan losses reserves with ratio of capital to risk-weighted assets (RWA) by 8%". Hence, the assets of banks are placed into different categories or more precisely termed as "buckets", within the range of 0%, 20%, 50%, and 100%, pertaining to

risks as established by the Basel I Accord. These are then multiplied by the corresponding risk weight of each category (BCBS, 1988). Table 2.1 explains different categories of assets along with the relevant assigned risk weights.

Table 2.1: Basel I Risk-weighted Assets

Category	Assets and Characteristics	Risk Factor Weight
Category I	Cash, government securities, reserves, etc., which are taken to be risk-free	0%
Category II	Interbank deposits, general obligations of state and local governments, fully backed mortgage bonds, and securities of government agencies and considered a bit riskier than assets of category I	20%
Category III	Revenue bonds of state and local governments including residential mortgages and considered to be even riskier	50%
Category IV	Commercial paper, various fixed assets and business and household loans. This is considered to be the riskiest asset	100%

Source: BCBS (1988)

Basel I is acclaimed for being the first to create a worldwide benchmark for regulations in banking systems, but its design was far from being perfect because of the presence of many flaws and deficiencies. Firstly, Basel I focuses only on credit risk, although market risks are later added to it through an Amendment in 1996, whereas other important types of risks (operational, reputation, strategic and liquidity) still remained uncovered. The second aspect and one of greater significance is the idea and concept of assigning risks and corresponding regulatory capital, following the identity of borrowers and immediately revealed its failures. Any type of loan is assumed to be 100% risk-weighted assets under Basel I. Hence, banks include total risk-weighted assets in the full value of the loans. However, those who are recipients of commercial loans from banks do not acquire similar types of risks. The loan given to a well-established company, for example, may be less risky than a loan given otherwise (Larson, 2011). Ong (2004) criticized the Basel Accord for a mono-sized fit towards all of its approaches, for not being sensitive to any distinctive credit risk and other similar possibilities of risks (Hai et al., 2007).

When Basel I provoked severe criticism and attempted to surpass all limits, the members of the BCBS then decided to revise the Basel I Accord of 1988. Within this perspective, the first consultative paper (CP) was issued in June 1999, and was followed by two others before the final proposal was published five years later, in June 2004. The final and ultimate regulatory framework, which was entitled: "International convergence of capital measurement and capital standards: a revised framework," emerged and evolved in the form of Basel II, and eventually was published in June 2006. Three other quantitative impact studies (QIS) were then subsequently undertaken to clearly ensure that global levels of regulatory capital in the banking and financial systems remained sufficient (BCBS, 2006).

Basel II

Basel II was published in June 2006 and introduced two main innovations compared to Basel I. The first innovation is founded not on the concept of looking at the identity of borrowers, but on seeing that its introductory rating is taken into consideration; therefore, Basel II is concerned with the inherent risk of borrowers, instead of their identity. Hence, Basel II basically aims to promote the adoption of more stringent practices in risk management based on three mutually reinforcing pillars: Minimal Capital Requirements, Supervisory Review and Market Disciplines.

The first pillar, "Minimum Capital Requirements", extended the most important and key feature of the Basel I measurement of risk and alignment with regulatory capital (Bailey, 2005) but gradually extended the definition of risks to further include credit risks, market risks and operational risks. To further elaborate on the "Credit Risk" aspect, it can be measured in two different ways: i) the Standardized Approach (SA), and ii) the Internal Ratings Based (IRB) approach. The first being the Standardized Approach (SA) where external agencies tend to rate the borrowers, and the banks use those inputs to compute the regulatory capital. Through the IRB approach banks are enabled to use internal estimates of borrower credit worthiness in order to measure any future losses. Under the IRB approach two different possibilities of distinct and varying complexity are possible. Under the Foundation IRB (FIRB) approach banks attempt to compute various estimates of probability of default (PD) of the respective borrowers and gradually, in the next step, their supervisors in the respective regions complement these estimates with other appropriate inputs. Alternatively, using an Advanced IRB

(AIRB) approach, banks may use the probability of default (PD), loss given default (LGD), exposure at default (EAD), and maturity (M) to compute the credit risk (BCBS, 2006). In addition, to refine the measurements of credit risk, Basel II also established that banks should allocate proportional capital for operational risks. This would enhance the scope of Basel II, since it requires all banks to measure the likely extent occurred in losses from inadequate internal processes, systems, and employee errors, which are relative to external factors. To make an attempt to measure the operational risks, three different approaches were also introduced: i) the basic indicator approach, ii) the standardized approach, and iii) the internal measurement approach.

It is important to note that Basel II also specifies capital charges for market risk exposures according to the banks' risk of loss, which emerge from on- and off-balance sheet positions due to volatility in market prices. These types of risks include interest rate risk, foreign exchange risk and commodities risk. Basel II also specifies guidelines to evaluate the positions in trading books. These guidelines consist of various provisions of perfect and adequate systems and systematic controls, valuation methodologies of marking to market and marking to model, independent price verifications and valuation adjustment and reserves. As such, valuation methodologies tend to show the involvement of actual measurement of market risks, using either the Standardized Measurement Method or the Internal Models Approach. As indicated earlier, the Supervisory Review forms the basis of the second pillar of Basel II, which requires banks to establish a proper framework for risk management to assess, identify, determine and manage all major risks inherent in an institution and needs the timely allocation of adequate capital to secure against those risks. Major risks, i.e. liquidity risks, interest rate risks, concentration risks, etc., which are not included and covered under Pillar I (BCBS, 2006).

The Basel Accord is always in a position to dictate that all banks, working under its jurisdiction have proper systems and structured processes for their capital adequacy assessment, and in performing such activities, the Accord suggests that banks develop their own assessment procedures and the calculation of capital targets is continuously updated and hence, remains in line with capital adequacy requirements (BCBS, 2001). This would ensure that banks have sufficient resources to undertake their internal risk assessments (BCBS, 2006). Simultaneously, the supervisors were also given adequate powers to decide whether banks are to hold higher capital levels over and above the 8% target prescribed in Pillar I.

Furthermore, supervisors were also empowered to intervene in risk management procedures and in revising and upgrading the procedures and processes, as and when they considered it necessary (BCBS, 2001).

The market disciplines in the third pillar have set out bank requirements on public disclosures, viz., obligations to publish information on business profiles, risk exposures and risk management (Drumond, 2009). The main objective of this pillar is to raise disclosure of capital adequacy in banks through various public reports (BCBS, 2006). It also clarifies issues already raised therein (BCBS, 2001), which tend to state that market participants may only attempt to gauge capital adequacy risk profiles, if the reporting banks are in compliance with the increased levels in market disciplines (BCBS, 2001). In this manner, market participants attain suitable positions to reward banks by monitoring their viable activities and competent abilities to administer exposure to risks, which conservatively proves administration of their risks, simultaneously penalizing those banks, which fail to do so (Makwiramiti, 2008).

Structure of the Basel II Accord (Three Basic Pillars)

The Basel II framework comprises three parts referred to as the three pillars of the Accord (see Figure 2.1).

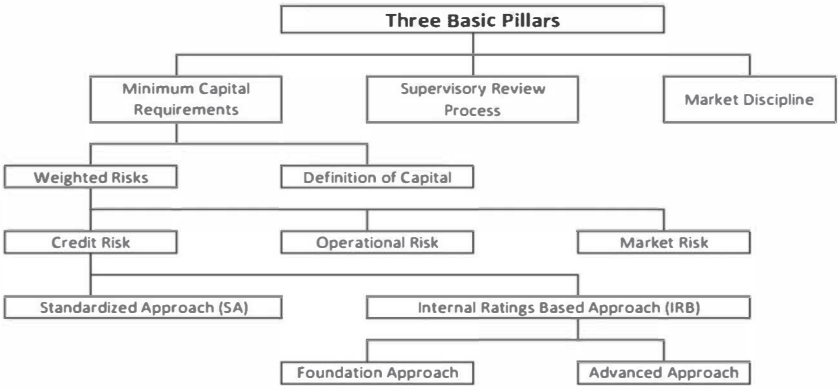

Figure 2: Structure of the Basel II Accord: Three Basic Pillars
Source: (BCBS, 2006)

Surprisingly, a number of major flaws and key weaknesses were specifically highlighted in Basel II during the global financial crisis. However, as far

as Pillar 1 is concerned in this regard, many valuable goals in using more sophisticated and highly risk sensitive internal models of banks, are applied to compute that the regulatory capital requirements are not without costs. It entails new risks, the most obvious and actually evolved being the so-called model risks especially due to imperfect information and incentives incompatibility. Moreover, an important issue pertaining to the pro-cyclicality of regulatory capital and systemic risk dimensions, i.e., macro prudential overlay, was lacking in the most popular Basel II Accord. This is due to the Basel II Accord being solely designed at the banking levels.

In the broader sense, the term "Pro-cyclicality" is being referred to as an increase (decrease) in capital requirements, during any downturn (upturn), and viably considered as a challenging issue, because it is most likely to intensify the economic downturn. In fact, to be more precise, if capital requirements of banks increase in a period of recession when it is not possible to build up reserves from declining profits or in raising fresh capital, the banks are compelled to reduce their lending activities and this credit squeeze would add to the downturn. This would exacerbate the recession, thus setting in motion an undesirable vicious circle that might ultimately have an adverse macroeconomic effect on the economy. Basel II also overlooks issues of leverage, macro-prudential stability (the impact banks have on the financial system as a whole) and systemic risk. In response, some of these obvious failings have begun to be addressed in a third accord.

Basel III

In response to numerous failings in the Basel II Accord as mentioned earlier, and which came to the limelight during the global crisis, a further modification was promulgated by the BCBS and termed as the Basel III Accord in September, 2010. The Basel III Accord is not a replacement of the Basel II Accord, but rather it is an augmentation and treated as an expansion of the Basel II Accord. The primary goal of the Basel III Accord was to improve the banks' abilities in absorbing losses of assets, without affecting other aspects in the economy. In terms of capital regulations, the Basel III Accord mainly focuses on both, the quantity and quality of capital held by banks. Among the most vital components emerging in the Basel III Accord, was its consideration for a "new definition" of regulatory capital, making it more restrictive as well as, laying greater emphasis on quality.

Moreover, the Basel III Accord has retained the levels of tier 1 and tier 2 distinctively, but at the same time, limited their composition factors to higher-quality capital that is better able to absorb losses. Under the Basel III Accord, capital in Tier 1 must mostly be of "core capital", which consists of equity capital and retained earnings. Additionally, most of the items, for example, some types of subordinated debt, that were earlier taken in capital calculations of banks under Basel II, will now be excluded from the new Basel III Accord.

Therefore, capital instruments that will no longer qualify as "capital", under the Basel III Accord, will be completely phased out from the capital calculations of banks, commencing from the year 2013. Besides increasing the quality of capital, the Basel III Accord has also been modified to enhance the quantity of capital that banks are bound to hold. By the time participating countries fully implement Basel III in 2019, banks are expected to maintain a total capital ratio of 10.5%, an increase from the 8% requirement under Basel II. The banks under the Basel III Accord are bound to maintain a minimum total capital ratio of at least 8% of risk-weighted assets. However, after the banks calculate their 8% capital requirements, they will still have to maintain and hold additional capital as a conservation buffer, equal to a maximum of at least 2.5% of its risk-weighted assets, bringing the overall total capital requirement to 10.5% of risk-weighted assets. The main purpose to preserve the capital conservation buffer, allocated in the Basel III Accord, leads to an assurance that banks maintain higher levels of sufficient capital so as to absorb losses in assets, especially during periods of financial and economic stress.The Basel III Accord addresses various challenges and problems pertaining to pro-cyclical capital (an increase in economic upturns and vice versa) and counter-cyclical capital regulations (too low in economic upturns and vice versa) by introducing a counter-cyclical capital buffer (Haubrich, 2018). In order to face pro-cyclical behaviors, the banks are bound to manage a counter-cyclical buffer in the Basel III Accord, ranging from 0% to 2.5% of risk-weighted assets. Its real quantity will be allocated by national regulatory authorities, being generally determined through credit available in the economy, whereas more capital will lead to a higher buffer. The counter-cyclical buffer ensures that banks have sufficient capitals during growth of excess credit, which occurs generally when there is a low level of perceived risk in assets. Consequently, when higher capital levels are efficiently maintained during good economic conditions, the banks tend to avoid huge measures to conserve capital in times of bad financial conditions (Cummings & Durrani, 2016).

Moreover, the leverage ratio is implemented under the Basel III Accord in such a way, that banks therein are necessarily required to hold a minimum capital amount equivalent to 3% of its exposures. Consequently, the leverage ratio provides an assurance that the banks are bound to maintain the least amount of capital at all times in the Basel III Accord. Thereby, limited capability in banks is engaged in practices designed so as to scratch away the requirements of minimum capital. The leverage ratio, therefore, forms the basis of capital with an amount for protection against any unforeseen disasters.

The most apparent criticism made on the Basel III Accord relates to the amount of minimum resources (capital) required to be held by banks. If it is considered to be too high it may create negative impact on the lending process. The high levels of capital in the Basel III Accord could gradually reduce the capacity of lending by banks. For example, a bank having 100 US$ (8% minimum capital level required in the Basel II Accord) worth of capital could provide a loan up to 1250 US$, in the capacity of risk-weighted loans. To be even more precise, when the Basel III Accord is fully applicable, 100 US$ would then represent 13% in total risk-weighted assets, showing that banks will provide a loan up to 770 US$ only. Some critics on the subject also tend to point out that reasonable restrictions in the lending process in the form of high capital requirements in the Basel III accord would also effectively restrict the promotion of a robust and sound economy. However, the real and fluent economic influence in the requirements of the Basel III Accord is turning out to become quite a debatable issue. But obviously one cannot tell with certainty regarding the real effect on the banks. However, initial reports project the impact very vaguely (Larson, 2011). See Appendix B for the capital score of Asia Pacific banks.

Table 2.2: Evolvements of the Basel Accord Minimum Capital Requirements

	Basel I	Basel II	Basel III						
			2013	2014	2015	2016	2017	2018	2019
Minimum common equity ratio			3.5%	4%	4.5%	4.5%	4.5%	4.5%	4.5%
Capital conservation buffer						0.625%	1.25%	1.875%	2.5%
Minimum common equity plus capital conservation buffer			3.5%	4%	4.5%	5.125%	5.75%	6.375%	7%
Phase-in of deductions from CET1				20%	40%	60%	80%	100%	100%
Minimum Tier 1 Capital	4%	4%	4.5%	5.5%	6%	6%	6%	6%	6%
Minimum Total Capital	8%	8%	8%	8%	8%	8%	8%	8%	8%
Minimum Total Capital plus conservation buffer	8%	8%	8%	8%	8%	8.625%	9.25%	9.875%	10.5%
Liquidity coverage ratio					60%	70%	80%	90%	100%

Source: Basel Committee on Banking Supervision, http://www.bis.org/bcbs/basel3.htm

Table 2.2 summarizes the evolution of the Basel Accords. It shows that the minimum capital requirement will gradually increase from an actual 8% to a potential 10.5%. At the end of the phase-in period, in 2019, the highest quality components of capital shall represent at least 6% of risk-weighted assets (RWA); more in detail, at least 4.5% of RWA should be held as common equity. A capital conservation buffer is being gradually introduced starting in 2016. Other provisions relate to the deductions from Core Equity Tier 1 (CET1) that were introduced in 2013 and will be gradually increased until 2018. Non-core Tier 1 or Tier 2 capital has to be eliminated from the regulatory capital base as they are being cancelled at the beginning of 2013 over a 10-year period. Moreover, disclosures for Basel III started from January 1, 2015 and the liquidity minimum requirement has been introduced from the same date.

CHAPTER THREE

PERFORMANCE ASSESSMENT OF COMMERCIAL BANKS IN PAKISTAN

This chapter discusses the capital and portfolio risk assessment of Pakistani banks in terms of asset quality, solvency, liquidity and profitability during the period 2004-2017. All data have been provided by the State Bank of Pakistan.

Assets Quality

There has apparently been a continuous rise in the total assets within the banking sector since 2004. Since 2008, an amazingly high rising trend has also seen in non-performing loans (NPLs), which are considered to be one of the main indicators to evaluate the quality of assets, whereas credit quality in loan portfolios showed stability to some extent, but global financial crises destabilized it during 2007-2008. Although this economic crisis also had influence in causing some damage to the economy of Pakistan it yet created no direct impact on its banking sector. The surge in prices in many global commodities played a very predominant role in the catastrophe of affecting the macroeconomic fundamentals, which led towards a deficit of 81.7% in external current accounts during 2008 and at the same time, caused the oil import bill to shoot up to more than US$ 11 billion, which on average, during the period 2004-2007, remained relatively around 5.3 billion US$. A large increasing trend caused a fiscal deficit to account for the delay in the pass-through on an international hike in prices at retail levels (State Bank of Pakistan, 2008-09). In spite of economic challenges in the domestic and international environment, the scenario of the banking sector in Pakistan showed much resilience to early strong winds with a robust capital base and sound profitability. The banking sector coped with the increasing trend in NPLs by heavy provisioning, increasing every year since 2004.

Keeping in view the subtle performance of the banking sector, the government of Pakistan preferred to rely on the banking sector in

acquiring financial assistance for reconciliation in the intensity of the budget deficits. Consequently, in order to redirect their funds in various investment components, the banks also preferred to change the asset portfolio mix and in 2007, this alteration in assets mix showed very important implications from advances from banks, as well as towards their investments in government papers. Eagerness and interest to extend private sector credit were reduced by banks. Moreover, the private sector also found bank credits apparently more expensive, and as an alternative for their investments, opted to keep its borrowings more closely confined to the urgent needs of working capital. To be more precise, the credit demand of the private sector was subdued, and various factors like, persistently on-going energy crises; acute law and order situations; and, the gradual slowdown process of external demands (exports) were some of the major and vital causes of funds refusal for the private sector (State Bank of Pakistan, 2007-2008). Similarly, in 2009-2010, the financial conditions on the whole depicted, a deteriorating power supply, along with security threats which were predicted to be shaky for the economy. The assets mix was further diverted towards investments more intensively and largely in government papers/bonds of Public Sector Enterprises (State Bank of Pakistan, 2013).

The quality of assets had improved during the year 2016, since cash recoveries and upgraded loans pushed the gross NPLs down. On the other hand, fresh NPLs went up and growth in the advances to the private sector was rightly considered to be the most active contributor in increasing the assets of various banks. These improvements in the quality of assets are real indicators for the manifestation of an enabling environment, particularly the low interest rates. As most of the investments portfolio existed in the credit risk-free government securities, similar trends were seen during 2017; not only did the advances in banks show an expansion but classified loans also declined at the same time, resulting in evincing that various indicators of assets quality improved intensively as well.

Solvency

In accordance with the estimations presented by the SBP, the Capital Adequacy Ratio (CAR) within the banking sector increased from 10.5% in 2004 to 15.8% in 2017. Moreover, it provided requisite strength to the banking system to maintain and sustain all adversely impacting future shocks. Although very hard efforts had been made to meet the set minimum regulatory requirement, with repeated reinvesting profits, still

few small banks were unable to fulfill the requisite regulatory requirement. Thereafter, the conditions of these banks were quite challenging on the whole, to bring in more funds and attract investors for further enhancement of the banks' capital base, because blurred macroeconomic situations and the unstable political position of the country hindered their progressive activities (State Bank of Pakistan, 2011). Yet the very close monitoring of the SBP continued to make non-compliant banks strictly follow the set activities for pre-hand rectifications with regard to the capital adequacy requirement (CAR) element (State Bank of Pakistan, 2014). When some improvements in private sector lending were seen during 2015, capital utilization also saw an improved trend, as reflected in a very slight reduction in CAR to stand at 17.3%, which stood and was sustained to continue at 10.25%, being well above the local benchmark. A healthy uptake of credit in the private sector usually is a source of attraction for higher risk weight, largely for unrated borrowers, leading to a higher proportion in risk-weighted assets. Keeping in mind the aspect of the solvency front, the Capital Adequacy Ratio (CAR) slightly declined to 16.2% due to a high rise in advances, but still, it is undoubtedly well above the minimum required level.

Liquidity

Liquidity is described as the ability of a bank to accommodate any downward trends in deposits in a very efficient and economical way and to provide funds when the demand for loans is also seen to be presenting an increasing trend, without placing any negative impact on its earnings. The liquidity stress showed an emerging stance as many global, industry-specific and domestic factors were gradually withered away, which was basically accounted for as a repercussion of the global financial crisis during 2007-2008. Some international financial icons intend to burden liquidity profile, specifically through information of their failure in any aspect. This situation leads to immediate withdrawals of deposits from banks, causing severe negative impacts and undue effects on some banks. But there is capacity to develop a strong resilience and the SBP averted this transitory stress and demonstrated it was a strong regulator. Consequently, the strong offsetting policy of the SBP created positive circumstances and succeeded in preventing the system from being converted into a financial disaster (State Bank of Pakistan, 2008-09).

The share in government securities saw a significant increase in total investments, but these securities were mostly concentrated in short-term

investments. Moreover, such a high concentration in government investments is a reliable source for providing additional liquidity in the system. Again, it is quite astounding to see that circular debt was partially settled in cash, whereas net retirement in loans from the private sector was apparently a source of improving the funding of liquidity in banks (State Bank of Pakistan, 2014). It is also evident that the ratio of Liquid Assets to Total assets remained almost unchanged during 2015. Moreover in 2016, it was determined quite clearly that other liquidity indicators provided sufficient coverage to the banks to compensate for any losses and simultaneously fulfill their guaranteed obligations. However, huge investments by the banking sector in government securities provided a comfort to the overall liquidity profile during 2017, but the maturity preferences showed clear indications of some weakening and deteriorating trends, as well (State Bank of Pakistan, 2017).

Profitability

As mentioned earlier, the global financial crises during 2007-2008 were a critical challenge to survive for some banks and compelled them to work at various strategic plans and recognition strategies in aggressive assets losses, looking out for additional provisions for loss charges in lending, and at the same time, relative increases in costs on the operating process. These factors showed some effects on the profitability of these banks and the main indicators of earnings came under visible pressure, to some extent (State Bank of Pakistan, 2008-09). Furthermore, profitability improved during 2015 due to the very high net mark-up in income, which not only contributed by a margin of 21% in annual growth through well-earned interests on government securities, but also evinced a 13% annual saving on the interest expense on deposits. Similarly, a 25% growth through non-interest profits is attributed primarily to high gains from the sale of PIBs and obviously assisted in further improving the profitability of the banking sector in this year. Since the interest rates of banks remained on the lower side and their investments also showed a lowering trend, the profit of the banking sector was seen to be trending towards the lower end, during 2016. Consequently, considering the comparative profitability for both years, even after the tax deduction of PKR 189.9 billion in 2016, it was still 4.6% lower than the level seen in 2015. Moreover, before tax profit declined by 15%, within the banking sector during 2017. It was primarily attributed to a one-off settlement payment, which was made by a large bank during the third quarter of 2017. The presentation of lower non-interest income and even higher administrative

costs is attributed for this deterioration in profitability. The data from various banks also revealed that the loss-making banks increased in number from 3 in 2016 to 5 in 2017. Ultimately, the NPLs in the corporate loan portfolio showed a declining trend in banks and their profitability ratios had gone down even during the second consecutive year. However, significant signals are seen in the improvement of overall net interest earnings (State Bank of Pakistan, 2017).

CHAPTER FOUR

THEORIES OF CAPITAL AND PORTFOLIO RISK

Theory of Bank Capital

The most significant role of bank capital is that it ensures the provision of a buffer that is able to absorb unanticipated losses, and in this way, bank capital provides assistance in averting bank failures (Derina, 2011). The Modigliani and Miller (1958) indeterminacy principle could be applied if it is assumed that financial markets are complete and the depositors have complete information about risks of failure. This theory was formulated with the supposition that organizations operate in a capital market which is perfect along with perfect information; there is no taxation and no cost of transaction and bankruptcy. If the depositors have all the information about the investment strategies of the bank, they will require the rates of deposit which can reflect the risk the bank is facing. Therefore, it is not possible for shareholders to exploit their dominant position, and maximizing the value of their share would also be the maximization of the total value of the bank. Hence, the portfolio that maximizes the value is always selected and the bank's market value is not related to its capital structure. By following this particular framework, banks tend to prefer and choose levels of risk that are socially optimal and, therefore, the need for regulation would be omitted.

By applying the proposition of Modigliani and Miller (M&M) on capital structure and recognizing the presence of guarantees by the government for the bank's demand deposits, Miller (1995) questioned the relevancy of the bank capital structure in a "perfect" world, having complete contracts and access to full information. If there is an increase in the leverage within the capital structure of a bank, there will also be an increase in the expected earnings per share on equity, however, it will only be sufficient to compensate the shareholders for the risks that the leverage will add.

If some of the Modigliani and Miller (M&M) propositions are weakened, for instance, transactions and bankruptcy costs, taxes and asymmetric information problems, the relevance of a bank's capital structure will

become more significant. When banks acquire information, it leads to asymmetric information problems between lenders, shareholders and the management. There might be equilibrium which might compel the banks to enhance their future performance and possess less capital (Ross, 1977). Thus, just like industrial organizations, bank managers might benefit from the asymmetric information problem by the signaling of information to the market via the capital structure (Stolz, 2007).

By applying the same argument based on asymmetric information, Stein (1998) asserted that adverse-selection problems are created by asymmetric information wherein the investors' incapability to distinguish between good and bad banks results in banks facing difficulties in the issuance of long-term equity. The high cost incurred by the issuance of equity affects the capital-structure decision of the banks due to the fact that greater capitalization of the bank could only be acquired at a higher cost. A study by Berger, Herring and Szego (1995) explicated that if the M&M propositions are relaxed, a safety net, comprising unconditional payment guarantees from the government, insurance on deposits and access to the discount window, might explain the requirement of optimal market capital for banks.

The aforementioned safety net leads to the reduction of market capital requirements and this is done through the protection of banks from possible market discipline. Thus, in general, banks have lower capital as compared to companies operating in other industries that do not enjoy protection through the safety net. The study further argues that if it is costly for banks to raise capital quickly, then banks may hold additional capital.

The theory of bank capital presented by Diamond and Rajan (2000) used a framework wherein the assets of the bank were tied in with the bank's liabilities. Since capital holders, unlike depositors, cannot enjoy a first-come-first-served right to cash flows, it could be optimal for a bank to finance itself with the capital partially. The study also identified the function of bank capital to ascertain the safety of the bank through the surplus capital that could absorb losses, and thus, supporting the bank to be better able to pay the debt holders in full. Through the maintenance of capital and the reduction of deposits to a level deemed safe, the banks are able to refinance at low costs as well as decrease the distress costs. Moreover, the study also maintains that if an appropriate capital structure is present, a bank can benefit by extracting more from borrowers and it will allow the banks to lend more.

Agency Theory

In the banking industry, risk occurs when there is a probability of deviation in the results from the anticipated goals. Risk is associated when the results are not certain due to the variations in returns, or when a new venture is started whose outcomes could be damaging (Drew & Kendrick, 2005). Today, the banking sector faces different risks (Turan, 2016). As indicated by Goyal (2010), credit risk refers to the possibility of a default on the part of a borrower. Market risk is defined as the risk of loss of bank assets held in the market because of market movements and changes in market prices. Operational risks are system failures and the possibility of deceitful activity (Shah, 2003). The interest rate risk occurs on account of fluctuations in the interest rate (Platt, 1986). Exchange rate risk is defined as uncertainty because of fluctuations in exchange rates (Coyle, 2001). Liquidity risk is failure to supply funds for the day-to-day operations of the banks (Heffernan, 1996). As per the Jensen and Meckling (1976) Agency Theory, the phenomenon of risk in the banking industry occurs due to the problems of asymmetric information and conflicts of interest among the agents and principles.

Asymmetrical information is present when the agent (the management) has more information about the banks as compared to the principals (the shareholders). In this scenario, banks are given an incentive for moral hazard (unethical behavior) because it is hard for outsiders to evaluate and monitor the activities of banks. In the banking sector, moral hazard is a significant factor that leads to high risk (Kane, 1997; Bacha, 1998; Barth, Caprio & Levine, 2004; Rahman, 2012).

Risk also occurs when there is a conflict of interest between the agents and principals because their desired goals are different from each other (Eisenhardt, 1989). As the agents do not have a considerable share of wealth effects related to their decisions, there is a possibility for them to become opportunistic when it comes to decision-making on non-contractible matters. In the case of banks, the risk takes place when a bad credit or bad investment decisions are taken by the bank and the savers' money is put at stake. This is against the implicit guarantee that it is the bank's duty to safeguard the interests of the depositors (Saunders & Cornett, 2003).

According to Bacha (1998), banks acknowledge and take risks and that is what facilitates the process of financial intermediation and the payment mechanism. Nonetheless, high risk-taking behavior of banks makes them

vulnerable to financial shocks. Hence, banks that are not sound often take risks, making the bank prone to fragility and the possibility of the bank's failure (Corsetti, Pesenti & Roubini, 1999; Gonzalez-Hermosillo, 1999).

Gonzalez-Hermosillo (1999) also maintained that an early signal of bank failure is represented by high risk-taking behavior and argued that irrespective of the macroeconomics factors, high risk is an important factor that could lead to bank failure. He further explicated that during a crisis all banks do not collapse. It is due to the fact that different banks have different risk-taking preferences. Therefore, a bank's risk-taking preference must be maintained at an acceptable level because high risks could lead to bank failure, which can in turn affect a country's economy (Ciancanelli & Gonzalez, 2000). This is due to the reason that banks play an important role in the overall economy of the country and they have the ability to create systemic risk. It is a kind of risk in which bank failure will not only affect the other banks but could also affect the entire banking industry as well as the whole economic system of a country. Thus, in this study portfolio risk is addressed because it summarizes the effect of all types of risk that are faced by banks.

Financial Intermediation Theory

In developing countries, the economic functions performed by the banking sector are obvious and significantly important. This is due to the reason that banks in developing countries play a major role in their respective economic growth (Arena, 2008). According to Arun and Turner (2004), the banking sector plays a crucial role in the economic growth of a country, particularly in an emerging market. As per the Theory of Financial Intermediation, banks (as financial intermediaries) typically perform four important functions: financial intermediation, as information specialists, as delegated monitors and financial and payment providers (Pyle, 1971; Leland & Pyle, 1977; Scholes, Benston & Smith, 1976; Diamond, 1984; Campbell & Kracaw, 1980; Allen & Santomero, 1997).

As financial intermediaries, banks function between the lender and the borrower. Banks collect deposits from different depositors and lend to economic agents that are in need of loans. Reciprocally, banks make profits through the interest spreads. According to Pagano (2001), banks reduce transactional costs between lenders and borrowers and resolve information asymmetries associated with capturing the value, through their intermediary function.

However, as the banking sector becomes more modernized and financial products become more complex, the aforementioned functioning of the banking sector has become more crucial. Nonetheless, a study by Ciancanelli and Gonzalez (2000) shows that banks reap benefits through this intermediary function by lending loans to risky borrowers and getting a high return from them. The problem becomes more crucial in banks where the ownership is highly concentrated and the banks' shareholders take risks to get maximum returns at the expense of other creditors (Pinteris, 2002).

Scholes et al. (1976) suggest that when functioning as an information specialist, banks can access confidential and privileged data provided by the customer (during the process of lending and borrowing). With this access to customers' information, banks are able to function as producers and information specialists. Nonetheless, Campbell and Kracaw (1980) suggest that while performing this function, banks must keep the customer's information confidential. Moreover, banks also function as delegated monitors for the creditors of the banks. The banks function as agents on behalf of the creditors and are designated as the authorities to make investments in financial assets.

According to Diamond (1984), when banks perform their role as financial intermediaries, they minimize the cost of monitoring information, which is, in turn, useful in resolving incentive-related problems between lenders and borrowers. On the basis of Diamond's (1984) delegated monitoring theory, the author defined that banks are delegated monitors and work on behalf of their creditors to get over the problem related to asymmetry information.

Banks function as the investigators and monitors of the financial activities of their current as well as potential borrowers to ascertain that the interests of the creditors are safe and the banks can perform their business in a sound manner. Therefore, to achieve the aforementioned objective, banks must perform their functions with efficiency and diligence. To this end, banks should allocate money towards investments that can be productive as well as profitable and pose acceptable risks. In this way, borrowers enjoy high liquidity and safety at all times (Ahmad, 2003).

Similarly, if the bank fails to keep a check on its delegated activities, it may give rise to agency problems. For example, if the deposits of the customers are invested in high-risk assets or projects, agency problems may take place when the banks fail to keep a check on the investments and

react promptly when there are signs of risk. When a bank functions as a payment system and financial services provider, it gives the bank a dominant position in the majority of financial markets (Macey & O'Hara, 2003). According to Nam (2004), this particularly holds true for a developing country.

When a bank operates as a payment system provider, it can transfer money in the form of cash as well as cash substitutes. For example, banks can make checks, drafts, electronic transfers, and letters of credit from one party to another. Moreover, when the bank operates as a financial service provider, it provides various services to the customers such as giving loans, receiving deposits, making money transfers, and exchanging currencies and conducts other activities that are associated with the financial sector as per the directives of the central bank. Thus, the role of the banks in a financial market is a very important one and it is essential for banks to self-manage in an efficient manner. This is due to the fact that good management can enable the bank to be more efficient which will, in turn, stimulate growth and productivity and contribute to the strengthening of the entire economic system. As against this, banks operating with poor management can lead to a banking crisis that may consequently affect the economic as well as the social and political situation of a country.

Moral Hazard Theory

In the banking industry, information asymmetries and the mispriced deposit insurance save the banks from the depositors' disciplining control. The main reason why banks exist is because they have the informational benefit of monitoring different firms. Therefore, the lack of information on the depositors' part prevents them from completely evaluating the insecurity of the bank portfolio. Due to this reason, it is beyond the capacity of depositors to sanction and monitor banks efficiently. An advantage that banks enjoy because of having access to information, gives rise to a phenomenon called moral hazard (Stolz, 2007).

According to Krugman (1998), moral hazard is a situation wherein one person decides how much risk should be taken, however, if something goes wrong, someone else has to bear the cost of the damage incurred. For instance, when a lending institution gets financial bailouts from governments, risky future lending could be encouraged by central banks and other institutions given that it is ensured that these institutions do not have to bear the burden of potential losses.

Merton (1977) demonstrated that banks are given an incentive to decrease the capital-to-asset ratios and they can also increase the asset risk via increasing the possibility of extracting and defaulting wealth out of the system of deposit insurance. As per the study conducted by Furlong and Keeley (1989), if in the face of potential risks, a bank's own funds are exposed, there could be a decrease in the flat capital requirement; however, moral hazard could not be eliminated. The reason for this is that a bank's total accumulated capital must be kept on one side against credit risk and it is not reliant on the bank's quality of asset.

As against the aforementioned premise, a study by Koehn and Santomero (1980) suggests that instead of leading to a decrease, the flat capital requirements of a bank could increase the incentive of risk-taking. This is because the forced enhancement in capital financing can cause a decrease in the expected returns of the bank. In turn, the bank attempts to invest in assets that are riskier in order to increase the profitability. Considering the moral hazard theory of banking, the banks can keep only that amount of capital which the regulation allows. The deduction of tax from the deposit insurance and the debt finance (safety net) compels banks to give preference to equity over debt financing. The risk-taking behavior of banks through an excessive leverage ratio could also be comprehended via the theory of moral hazard.

According to Jensen and Meckling (1976), when there is an unequal distribution of information, there is an incentive for equity holders. This incentive calls for pretending to invest in assets that possess low risk, however, after the bonds are sold at a high price there is a rise in portfolio risk or there is an issuance of additional debt. Considering this setting of banking, it implies that in the case that it is not possible for the depositors to interfere in the activities of the banks, or they are unable to make observations about the actions of the banks, interest rates fail to give a complete reflection of the risk of bankruptcy. Moral hazard, thus, arises when the banks enjoy the incentive of increasing leverage and risk.

Moral hazard could also be created for the banks by the deposit insurance. As per empirical evidences, the deposit insurance weakens the incentive for depositors through which they can monitor the banks (Flannery, 1998; Peria & Schmukler, 2001; Peresetsky, 2008; Ioannidou & Dreu, 2006; Stolz, 2007), giving the banks the incentive to embark on excessive risks. The depositors can limit the risk for the bank by charging higher rates of interest. When insurance is provided to deposits, the depositors cannot

have the incentive to monitor the bank (Demirguc-Kunt & Huizinga, 2004; Ioannidou & Penas, 2010).

There is a regulator guarantee for the value of bank deposits. The shareholders of the bank enjoy protection through limited liability. The objective of the bank is to maximize the value of the shareholder, wherein the value of shareholders is the banks' returns linear function. In such a framework, if there is an increase in the variance of return on bank assets without having to decrease the anticipated returns, then the shareholder value is made to reach its optimum limit via bringing the maximum possible increase in the variance. Hence, this results in a simple option interpretation. Regulatory guarantee on the value of deposits combined with limited liability creates an option that whenever there is a situation of liquidity in the bank, the bank's shareholders are given an option to put losses towards the regulator (Merton, 1977). There is an increase in the value of this option every time by widening the distribution of returns. Shareholder value also undergoes an increase when shareholders are paid out of the bank capital because this enhances the value of the put option again. The perspective of the put option is used to quantify the value of the deposit insurance subsidy and also assess the fair risk-adjusted deposit insurance (Marcus & Shaked, 1984; Ronn & Verma, 1986).

Kane (1989) argued that extreme cases of moral hazard take place because deposit insurance leads zombie banks to bet for their resurrection. Those depositors which are insured do not enjoy the incentive to compel insolvent banks into bankruptcy and in this way, the business is continued. Depositors would be providing more funding because they would not be having any risks. In turn, the bank would make an investment in new funds and risky assets in an attempt to become more profitable if conditions are favorable, otherwise in cases where the gamble turns out to be unsuccessful, it would shift all the incurred losses onto the deposit insurance. Large banks and moral hazards often raise serious concerns because knowing their systemic importance, large banks might count on the public to bail them out in the case the bank might face financial distress. Therefore, large banks are in a position to go for risks that are higher in nature and thus be able to exploit the implicit public guarantee.

While this literature review mostly agrees that the possibility of a bank's failure may be very high because of the negative effects caused by mispriced deposit insurance, this literature doesn't agree that capital regulation can effectively reduce the problem of moral hazard effectively. When the deposit insurance has a fixed rate, there is a possibility of

combining asset portfolio regulation with capital requirements so that the probability of failure could be limited.

According to Sharpe (1978), risk-based capital requirements have the ability to eliminate the adverse effects of risk-based deposit insurance to the same extent. However, with the asymmetric information problems existing between the regulators and the banks, together with rapidly developing financial products, pricing risk-sensitive deposit insurance is still a challenge for regulators (Kaufman, 1995; Flannery, 1991).

A study by Giammarino, Lewis & Sappington (1993) based on information asymmetries between banks and supervisors developed a framework wherein managers had information about the bank's inherent quality of having opportunities to make investments instead of the insurer and the regulator. Likewise, according to a study by Flannery (1991), the insurer-regulator must assume the management of tradeoffs taking place between the social costs of avoiding default and the social losses incurred due to default. In order to achieve the best results, the regulators have to make sure that the capital requirement is based on risks and the insurance premium is accompanied by some constraints on lending.

By making an increase in the required levels of capital and, in turn, reducing the put option of the deposit insurance's value; the incentive of the bank to give rise to the levels of portfolio risk is lessened. Thus, moral hazard can be reduced if the capital regulation is more stringent and this will also reduce the chances that a bank might fail (Stolz, 2007). Hence, to mitigate the moral hazard of deposit insurance while protecting the depositors, it is suggested that complementary regulations on capital structure should be formulated (Derina, 2011).

The level of capital that banks maintain in proportion to their assets is determined by capital requirements. There are some mandatory capital requirements imposed by the regulators after acknowledging the significant role of banks in the overall payment system and the multiple impacts that a banking crisis could have on the economy. The presence of asymmetric information among capital markets, borrowers, lenders and banks allows the managers to make capital decisions and signal information to the market (Ross, 1977; Acharya, 1988). When asymmetric information is merged with the relative costs of external versus internal finance, new equity issue transaction costs as well as the relative costs of debt versus equity; banks could be encouraged by the transaction costs and it enables banks to hold a capital buffer that could help them to fund

unanticipated investment opportunities. It also enabled the bank to have protection against unexpected, costly shocks which the capital might incur (Berger et al., 1995). The authors also argue that when regulators provide the safety net comprising payment guarantees, deposit insurance, supervisions and capital unrelated regulations, it protects bank creditors from the complete consequences in case the bank takes a high risk.

There are implicit and explicit guarantees that governments provide to most bank creditors unconditionally. The explicit guarantees are provided in the form of deposit insurance while the implicit guarantees are provided as a policy of too big to fail (TBTF). As per the policy, governments provide a guarantee to bank deposits in case there is a banking crisis and the economy faces severe impacts. This type of implicit guarantee is subjected to political conditions (Merton, 1977) and the cost on the guarantor is fundamentally similar for explicit guarantees.

Hence, protecting the customers as well as the regulators from exploitation by better-informed banks becomes the first goal of the capital requirements regulation. The second purpose that capital regulation serves is to protect the economy from factors like systemic risk. Due to their fragile financial structure, banks become the primary source of generating systemic risk because they have a major role to play in allocating financial resources and a payment system (Berger et al., 1995; Saidenberg & Schuermann, 2003).

In a study by Furlong and Keeley (1989), it is suggested that with regard to increasing asset risk, a deposit insurance option's marginal value declines when there's a decline in the leverages. Therefore, it is argued that if capital regulation becomes more stringent, the insurance system will become less prone to risk provided that the regulations remain stringent on the asset portfolio risk.

During the early phases of capital requirement development, most countries utilized the flat or risk-unadjusted capital requirements. These requirements pertain to the level of capital that the bank is required to maintain in proportion to their risk-unadjusted assets. The justification for regulations of bank capital is presented as the necessity of avoiding the risk-shifting incentive that improperly priced deposit insurance generates. Even though, short-term financial stability is promoted by deposit insurance but the banks' incentives are reduced because of risk-insensitive deposit insurance in order to maintain sufficient capital. This may, therefore, pose a threat to a bank's stability in the long run. Capital

standards have the capability to eliminate the moral hazard problem successfully and this topic has been the center of theoretical argument for many years.

One part of the literature concentrates on the works of Pyle (1971) and Hart and Jaffee (1974), in which the authors proposed that banks are units that maximize utility. A mean-variance analysis was adopted within this kind of framework and in this setup, a study by Koehn and Santomero (1980) demonstrated that with the introduction of high capital-to-asset ratios, banks have to change their portfolio towards high-risk assets and due to this reshuffling, the effect turns out to be larger for those institutions that were holding onto riskier assets per unit of capital. However, Furlong and Keeley (1989) and Keeley and Furlong (1990) challenged this outcome and put forward an option framework that proposed that a higher capital ratio doesn't result in an increased risk asset for banks. Both studies that have opposing results, maintain that the model of mean-variance is not suitable due to the fact that this framework does not sufficiently explain that a bank's investment opportunity comes into being when the deposit insurance's option value is neglected and the possibility that the bank may fail is also ignored.

Therefore, it is shown that when a risk is underpriced by deposit insurance, banks that are looking to increase their capital will also increase their risk-taking (Merton, 1977; Sharpe, 1978; Dothan & Williams, 1980). Nonetheless, if the deposit insurance option's marginal value is increasing with respect to risk, then there will be a reduction in the risk due to more regulatory capital, thereby engendering a negative relationship between regulatory capital and risk (Athanasoglou, 2011). A risk-shifting incentive can be eliminated as per the suggestion of Kim and Santomero (1988), if a bank meets the risk-related capital ratio. However, another study conducted by Rochet (1992) proposes that when banks try to maximize their market value as a result of their forthcoming profits, in that case risk-based capital ratios are unable to stop them from selecting highly specialized and risky portfolios.

Capital Buffer Theory

The traditional moral hazard theory doesn't take the adjustment costs and liquidity into consideration. In these frameworks, banks do not maintain surplus capital of the minimum regulatory requirement but only maintain the required capital. As a matter of fact, however, it might not be possible for banks to make quick adjustments in their risk and capital due to illiquid

markets and adjustment costs. As per a study by Myers and Majluf (1984), if, under asymmetric information, a bank raises its equity capital, it can be seen as a negative indicator regarding the value of the bank, rendering it unwilling to respond to adverse capital shocks spontaneously (Stolz, 2007). In case the bank is severely undercapitalized, there might be reluctance on part of the shareholders when it comes to contributing to new capital, because most of the benefits would be accrued to the creditors. When adjustment costs are made, banks that come under legalized capital requirement might not be in a position to immediately react to such situations. As a result, repeated regulatory penalties are faced by banks and in worst cases, the banks might even close down. Consequently, holding the "capital buffer" is the preferred choice for banks so that the chances of coming under legal capital requirements can be reduced, particularly if capital ratio is excessively volatile in nature. Hence, optimal capital buffer is determined by this trade-off between the cost of holding capital and cost of failure (Myers & Majluf, 1984; Milne & Whalley, 2001).

As per the capital buffer theory, another assertion is made regarding capital adjustments when risk is either negatively or positively related to an increase in the minimum regulatory capital requirement (Milne & Whalley, 2001). This aspect of the theory predicts that if there is an increase in the regulatory minimum requirement, banks' capital buffers act positively and as such banks select the lowest possible assets risk. This finding is the result of the fact that the theory simplifies the assumption that assets risk and anticipated earnings do not have a trade-off existing between them. In the presence of a trade-off adjustment, it is prefigured that if capital requirement is increased, then capital buffers of banks will be decreased. Therefore, there will be an obvious risk aversion. If banks are not in a position to make adjustments with their risks immediately, then unnecessary stretches are usually made and assets risk decreases in several phases. Simultaneously, banks keep on rebuilding their capital in order to reach optimum levels of capital. The risk aversion of banks is lowered when capital is increased, providing an opportunity for the optimum risk levels to rise, as well. As soon as both targeted and actual assets risks retain equal levels, banks are in a position to increase both risk and capital up to such a point so that it obtains optimum capital levels. Hence, the model by Milne and Whalley (2001) predicts that banks in the first stage increase their capital and lower risks when the regulatory minimum is increased at a later stage. As soon as the adjustments are made when banks rebuild capital buffers to a certain degree, both risk and capital are increased accordingly.

According to the buffer theory, when a bank approaches the regulatory minimum capital ratio, then an incentive to boost capital reduces risk so that costs of regulations incurred by breaching the capital requirements are avoided. However, poorly capitalized banks attempt to take more risk for higher expected returns when approaching the regulatory minimum capital ratio (Rime, 2001). Consequently, the surplus capital "capital buffer" is a preferred choice for banks so that the regulatory pressure could be reduced (Saadaoui, 2011). Similarly, Derina (2011) suggests that to maintain their capital ratios as required, banks with a low capital level are forced by regulators to pursue less risky investments whilst banks with less risky investments are not required to increase their capital level. Thus, those banks that have high capital buffers generally show a positive link with capital and risk adjustments while those banks having low capital buffers are negatively related to capital and risk adjustments.

The capital buffer theory suggests that the attitude of the bank towards risk and capital is reliant upon capital size. The optimum capital of a bank is positively reliant upon asset risk. If the asset risk is higher, the bank needs to maintain an increased capital buffer in order to have complete insurance in case the regulatory minimum is violated. Since, in the traditional sense, loans make up the most important category of assets for a bank and asset risk is primarily driven by credit risk. When credit risk undergoes fluctuations during the business cycle; the optimum capital also fluctuates accordingly (Milne & Whalley, 2001; Stolz, 2007). However, the bank behavior toward regulatory capital requirements has a controversial nature and due to that it has become a challenging subject for scholars. Miller (1995) point outs that capital requirements of banks can be continually used as a source of friction and inefficiency between regulators and banks but the study also recognized that within the current regulatory framework, enhanced capital requirement will serve as the cheapest solution. Table 4.1 summarizes the theoretical literature.

Table 4.1: Summary of Theoretical Literature

Theory	Summary
Theory of bank capital	If an appropriate capital structure is present, a bank can benefit by extracting more from borrowers and it allows the banks to lend more. The function of bank capital is to ascertain the safety of the bank through the surplus capital that could absorb losses, thus supporting the bank to be better able to pay the debt holders in full. Through the maintenance of capital and the reduction of deposits to a level deemed safe, the banks are able to refinance at low costs as well as decrease the distress costs (Stein, 1998; Diamond & Rajan, 2000).
Agency Theory	Due to asymmetrical information, banks are given an incentive for moral hazard (unethical behavior) because it is hard for outsiders to evaluate and monitor the activities of banks. Risk also occurs when there is a conflict of interest between the agents and principals because their desired goals are different from each other (Jensen & Meckling, 1976; Eisenhardt, 1989; Kane, 1997; Bacha, 1998; Barth, Caprio & Levine, 2004; Rahman, 2012).
Financial Intermediation Theory	Banks perform four important functions. As financial intermediaries, banks function between the lender and borrower. As information specialists, banks can access confidential and privileged data provided by the customer. As delegated monitors for the banks' creditors, the banks function as agents on behalf of the creditors and are designated as the authorities to make investments in financial assets. As a payment system provider, the bank can transfer money in the form of cash as well as cash substitutes (Pyle, 1971; Leland & Pyle, 1977; Scholes et al., 1976; Diamond, 1984; Campbell & Kracaw, 1980; Allen & Santomero, 1997).
Moral Hazard theory	Banks have more information than depositors so they have an incentive to increase capital and portfolio risk. Deposit insurance is an effective measure to protect the depositors but if the deposit insurance premium does not fully reflect the risk of the asset portfolio then it gives rise to moral hazard. On the other hand, risk-based capital requirements prevent banks from increased risk-taking. However, when banks try to maximize their market value as a result of their forthcoming profits, in that case risk-based capital ratios are unable to stop them from selecting highly specialized and risky portfolios (Pyle, 1971; Hart & Jaffee, 1974; Kim & Santomero, 1988; Furlong & Keeley, 1989; Keeley & Furlong, 1990; Rochet, 1992).
Capital Buffer Theory	Banks in the first stage increase their capital and lower risks when the regulatory minimum is increased at a later stage. As soon as the adjustments are made when banks rebuild capital buffers to a certain degree, both risk and capital are increased accordingly. The attitude of the bank towards risk and capital is reliant upon capital size. The optimum capital of a bank is positively reliant upon asset risk (Myers & Majluf, 1984; Milne & Whalley, 2001).

CHAPTER FIVE

FINDINGS OF EMPIRICAL LITERATURE

The Impact of Regulatory Pressure on Bank Capital and Portfolio Risk

Many empirical studies have been undertaken in different countries to determine the impact of regulatory pressures on banks' capital and their risk adjustments. The extent of scrutiny is reliant upon the degree of capital ratio, to be more precise, the degree of regulatory pressures. In accordance with this criterion, less regulatory pressure is exerted on banks with a larger buffer, which is apparently over and above the minimum capital ratio. Under various consequences, this criterion is observed conditionally within the behavior of the concerned banks, i.e. they have to show many fewer influential effects if changes tend to occur in the regulations, assuming that there is a requirement of an increase in capital. As opposed to this argument, higher regulatory pressures will be exerted on banks that attain lower capital ratios. The reasons attributed to an increase in requirement pertaining to minimal capital ratio, consequently lead towards a rise in the desired alterations in the degree of capital or risk adjustment within the banks (Tanda, 2015). At the same time, it is being observed that a majority of the studies tend to make reasonable suggestions in making their arguments more appropriate by proposing that both capital and risks decisions will be affected because of viable changes in the regulations of banks.

The results evolved from various studies of US banks have provided a variation in the estimates. For example, a study undertaken by Shrieves and Dahl (1992), applied the simultaneous equation model and investigated the existence of the capital and risk relationship during the period 1983 to 1987. The authors attempted to prove that with an increase in target capital, banks seemed to be getting more exposed to risk. Risk behavior is not the only factor to deduce the result of regulatory pressure but total risk exposure is limited due to bank owners' and/or managers' personal incentives. Moreover, the estimations proved that banks maintaining capital below the minimum level are placed in a situation to

bear more pressure. However, if a bank attempting to raise its capital ratio had to face an obvious downward trend in risks it is considered to be behaving towards the regulatory directions. On the contrary, Jacques and Nigro (1997) used the same model and evaluated the existence of a negative relationship between changes in capital and risk adjustments for various US banks during 1990 and all throughout 1991. The latter authors also attempted to prove that regulatory pressure on banks showed no significant rise in capital and at the same time, had no impact on risk adjustments.

On the other hand, Aggarwal and Jacques (2001) investigated the effects of the Federal Deposit Insurance Corporation Implement Act (FDICIA) and prompt corrective actions on the capital of banks and their risk management during the period 1991-1996. The authors concluded that banks with adequate capital and undercapitalized banks are inclined to increase the amount of capital as well as risk, because of regulatory pressure, prior to the implementation of the FDICIA in 1991. The authors further proved that adequately capitalized banks and undercapitalized banks had no impact on regulations but showed a decreasing trend in risks, during the period 1993-1996. Moreover, the existence of a negative relationship between changes in capital and risk in US-based banks was prominent in 1991, whereas a positive and eminent relation existed during the period 1992-1996. The results clearly indicated that the impact of the FDICIA was significantly effective since banks increased their capital without off-setting any increase in credit risks. This may be attributed to other variables, such as income, quality of assets, size of banks, holding of government securities, etc. Moreover, Prompt Corrective Action (PCA) had an unintended impact on the risk behavior of banks. The findings of Van Roy (2008) had a similarity with Jacques and Nigro (1997). He had discussed the effects of capital regulation on capital and risk adjustments within 576 commercial banks selected from six of the G10 countries. During the process of implementation of the Basel Accord, the study showed an insignificant impact of regulatory pressure on the capital of banks and their risk adjustments in US, European and Canadian banking sectors between 1988 and 1995. It is therefore precisely argued that the impact of capital requirement is limited outside the US and the role of market discipline influences the capital behavior of US banks.

When we further probe into the relevant literature on the subject, we will find more studies from many other countries. Firstly, we will consider the study undertaken by Saadaoui (2011), who intended to investigate the behavior of 37 emerging banks and all commercial banks located in G10

countries. The results exhibited that in emerging countries risky decisions are taken by under-capitalized banks in order to raise capital and to circumvent the legal constraints since they do not act as per requirements by regulators. The results further showed that banks in G10 countries, also member countries of the Basel committee, are operative in accordance with regulatory requirements and tend to boost their capital but there is no impact of regulatory pressure on banks' risk. Under-capitalized banks are inclined to acquire riskier investments than other banks with adequate capital. In this way, banks facing hardships in confronting capitalization and legal limitations are inclined to keep significantly riskier assets, so as to acquire higher returns or to gamble for resurgence. Contrary to the Saadaoui (2011) estimates, Godlewski (2005) examined 2,779 banks from 30 emerging markets and concluded that adequately capitalized banks increase their capital and undercapitalized banks have negative impact on capital in response to regulatory pressure but there is no impact on the risk of banks. It is due to the reason that well-capitalized banks build excess capital as their cautionary behavior. When the banks run into an under-capitalized situation, it is then usually hard and too late for them to react appropriately. Hence, regulatory pressure tends to be more effective in binding an excessive risk-taking attitude in under-capitalized banks.

On the other hand, Matejasak et al. (2009) conducted a comparative research study for banks operative within the European Union (EU) and in the US. The results showed that EU banks adjusted their capital due to regulatory pressure but it had no effect on their risk adjustments. Surprisingly there is opposing evidence for US banks, i.e., to state precisely that they adjusted capital and reduced risk because of regulatory pressure. Along these lines, the effect of regulatory pressure is larger in magnitude for US banks as compared to EU banks. Moreover, there is one more possible clarification that European Union banks may have more prominent challenges in adjusting their capital or the attitude of regulators may be stricter towards under-capitalized US banks. Therefore, US banks have a greater fear of violating the rules than European Union banks.

For research studies pertaining to Swiss banks, Rime (2001) attempted to prove that regulatory pressure induces banks to raise their capital but there is no effect on the level of risks. The level of capital affected under-capitalized banks positively, whereas no impact occurred on the banks, which had a capital ratio above the minimum regulatory capital. As far as the influence of regulatory pressure on risk exposure is concerned, the authors evolved a typical conclusion depicting that no impact on risk

adjustments was found, since banks increase their capital through retained earnings and not by lowering their risk-taking.

Now turning to a research study on German banks undertaken by Heid et al. (2004), which investigated how German savings banks adjust their capital and manage risk adjustment, under capital regulation between the years 1993 and 2000. The authors attempted to conclude that banks with a low capital buffer made an effort to revive a more suitable capital buffer by raising capital and, at the same time bring down the portfolio risk. It is contrarily evinced that banks with a high capital buffer attempt to keep up their capital buffer by expanding portfolio risk when capital finds a rising trend. Similarly, Kleff and Weber (2008) found that German banks increase their capital when regulatory pressure is imposed on them. The fact behind these factors is that saving banks have more and a better influence on tier 1 and tier 2 capital. Thus, such types of banks are in a position to issue hybrid capital and subordinated debt and attempt to leave the zone of regulatory pressure.

A further probe is made on the subject matter through a research study on 11 developing countries conducted by Hussain and Hassan (2005). The authors concluded to find a negative impact of regulatory pressure on bank capital and risk exposure. This implies that under-capitalized banks show a decreasing trend in their capital ratios in response to regulatory pressure. This statement is quite similar to the argument presented by Godlewski (2005) for emerging markets. Similarly, Ahmad et al. (2008) examined a link between the regulatory capital of banks and their management's risk-taking attitude in developing economies. The authors examined the data of 42 domestic financial institutions in Malaysia during the 7 years between 1995 and 2002, and evolved an inverse influence on capital because of the regulatory pressure. The authors argued that capital in banks is shown to be in excess of a minimum requirement, despite being below the industry average. This is a clear indication that capital regulations tend to cause a decreasing trend in the capital ratio within banks with a low capital buffer.

Looking into the context of Indian aspects of capital and risk within banks, Das and Ghosh (2004) concluded that an inverse relationship exists between regulatory pressure and changes in capital and risk for banks in the public sector, during the period 1995-96 to 2000-01. The authors further argued that banks with adequate capital evidently diminish their capital rather than its other counterpart. Moreover, their assessment also proved that most of the banks lessen their effects in raising capital by diminishing their portfolio risks, and vice versa. On the other hand, Zahid

et al. (2015) presented a research study for Pakistan pertaining to the behavior of banks in responding to capital regulations. The authors found the existence of a constructive outcome of regulations on bank capital during the period, spanning between 2001 and 2009. As their research suggests that banks operating under regulatory pressure are well inclined towards less risky investments, this thus diminishes the probability of failure within banks. Subsequently, regulatory pressure also alleviates the costs of economic and social failure.

Similarly, the study pertaining to Chinese banks conducted by Xu et al. (2015) examined 16 banks located in China, during 2004 and 2010. The authors concluded that banks in China showed a rising trend in their capital due to regulatory pressure, which implies that the imposition of compulsory capital regulation tends to increase their capital buffer and lower the level of risks within the banking sector in China. Moreover, very similar estimates were made by Pereira and Saito (2015) in their study pertaining to 112 Brazilian banks, spanned the period 2001 to 2009. They assessed that a positive effect of regulatory pressure on capital existed and showed inverse impact on their risk adjustments. It leads towards pure evidence that banks with a low capital buffer intend to manage and show a rising tendency in their capital at a proportionately higher rate and specifically try to increase their risk by lowering the rates in contrast with various other banks. Contrary to this study, Murinde and Yaseen (2004) investigated 98 banks from 11 Middle Eastern and North African countries. During the study conducted from 1995 to 2002, the authors concluded that banks have neither the attitude to increase capital nor their risks, while responding to regulations. However, under-capitalized banks find an increasing behavior in their capital under regulatory pressure but it shows no impact on their risk adjustments. Similarly, Bouheni and Rachdi (2015) investigated the efficiency of capital requirements in reducing risk-taking behavior in the largest Tunisian banks during the period 2000-2013. The authors postulated that regulatory pressure demonstrates the feeble administrative parts and pure institutional gestures in Tunisian banks. In this manner, there is no significant impact on the capital of banks and their risk management.

Ghosh (2014) investigated the relationship between capital and risk for 112 banks of 100 GCC countries during the period 1996-2011. The first conclusion proved that banks with high regulatory pressure increase capital less than banks having higher buffers. Although the response to risk appears to be limited, and a negative relationship between regulatory pressure and market discipline for banks with lower capital suggests that

there is a need for closer scrutiny and continuous monitoring. One possible way could be to give priority to risk-based supervision as a way to prevent those banks from gambling in excessively risky strategies. Likewise, for Nigerian banks, Ugwuanyi (2015) assessed the relationship for 55 Nigerian banks operative during 2009 and 2013 and comprehensively found that there is no significant impact of regulatory pressure on the capital of banks and their risk management. Moreover, there is also an insignificant relation between risk and capital. The tightening of regulations negates increased change in capital adequacy, whereas improved regulations bring about a reducing trend in their risks.

The Impact of Business Cycle Fluctuations on Capital and Portfolio Risk

The economic cycle has an influence on risk level and ability to make the process of raising capital easy (Lindquist, 2004; Van Roy, 2008). Moreover, whenever a downturn occurs, the NPLs also tend to show an increasing trend, whereas during an economic boom, in an attempt to expand their assets, the banks show an increase in their risk exposure. However, if there is a counter-cyclical variation, it seems to occur in the capital during economic upturns, whereas during economic downturns, an increasing tendency occurs. Hence, it is costlier for poorly capitalized banks to meet the minimum capital as per the regulations in busts. This is because banks that are not sufficiently capitalized face the challenge of materializing risk in a business cycle and the downturns generally. They have two choices to avert the risk of going down to the minimum capital requirement. The first choice leads to increasing the capital but this option may prove to be even more challenging during a downturn since there are very few but expensive external capital sources, the banks are not in a position to retain their profits and may not find it feasible, because the returns are unexpectedly not so high. The second option may be to reduce the risk-weighted assets, which obviously viably raises the capital of banks (Borio et al., 2001).

Nonetheless, assets that are bank specific are generally more marketable and the costs could be downcast throughout when there is a downturn in the business cycle so much so that a sale connotes losses that are prohibitory. As a result, through a cut in lending, the risk-weighted assets are decreased. If the cutting down of lending is more substantial as compared to the indicated demand of lowering a loan, during the business cycle's downturn there is a further amplification of the capital and the

capital counter-cycle fluctuates during the business cycle (Borio et al. 2001; Ayuso et al., 2004; Stolz & Wedow, 2011). Due to this fluctuation, the impact of economic shocks on lending is magnified and, in this way, the economic stability is impacted by the cyclical behavior of capital. Considering the cyclical behavior of capital led to the introduction of new reforms in Basel III and the counter-cyclical capital buffer requirement is restricted within a range of 0-2.5% imposed on banks. There are a few studies which specifically examine the business cycle impact on the numerator and denominator of capital to risk-weighted assets during capital and risk adjustments (Huang & Xiong, 2015).

In the literature, the term "pro-cyclical" (or counter-cyclical) refers to co-movement (movement in opposing directions) with the business cycle. The term pro-cyclical has not been used so far to refer to any variable that could amplify fluctuations in the business cycle (Stolz, 2007; Boucinha & Ribeiro, 2008; Jokipii & Milne, 2008; Stolz & Wedow, 2011; Busun & Kasman, 2015). On the contrary, capital regulations with pro-cyclical elements exacerbate the fluctuations in the economic cycle (Huang & Xiong, 2015). Many other researchers like Guidara et al. (2013), Pereira and Saito (2015), Xu (2016), and Huang and Xiong (2015) comprehensively defined "cyclicality" as the co-movement between the business cycle and bank capital, whereas, the "positive co-movement" has been referred to counter-cyclicality and the "negative co-movement" implies pro-cyclicality.

The research study pertaining to German banks was conducted by Stolz and Wedow (2011) for the period spanning 1993 and 2004. The study was related to the cyclical fluctuations of capital over the business cycle and attempted to assess that the behavior of capital in banks is forward-looking. It could be easily predicted that when the banks try to expand their lending during the upturns of the business cycle, the probable risks tend to rise. Therefore, in order to tackle these rising risks, the banks make supportive efforts to increase their capital buffers. When the risks are about to materialize, the banks can draw on higher capital in downturns of the business cycle later. The study also revealed that a negative relation exists between risk and the business cycle. However, the authors postulated that banks with lower capitalization increase their risk-weighted assets during downturns and do not withdraw from their lending. Furthermore, a research study undertaken by Shim (2013) for US banks leads to an interesting conclusion that portfolio risk in US banks presented "negative co-movements" within the business cycle ranging from the year 1992 till 2011. During the downturn, banks increase capital while reducing risk-weight assets. On the other hand, a study undertaken by Guidara et al.

(2013) investigated the performance of the six largest Canadian banks, found the existence of an insignificant impact of the business cycle on the portfolio risk during 1982 and 2010. The authors asserted that more capital had been accumulated during the boom period and portfolio risk is not sensitive to capital in Canadian banks.

Busun and Kasman (2015) concluded from a study of Turkish banks that a negative relationship exists between portfolio risk and the business cycle during the period from 2002 till 2012. The risk increases when the economy worsens. The authors argued that during upturns, risk perception falls which prompts credit expansion through loans without capital expansion and it leads to an increase in portfolio risk during downturns. On the contrary, another research study was carried out by Pereira and Saito (2016) on 87 Turkish banks. They examined the association between capital and the business cycle during 1988 and 2009 and found that the business cycle has a negative effect on capital and insignificant impact on portfolio risk. The authors also suggested that capital in banks increases during downturns and risk has no influence on fluctuations in the business cycle. It can be due to the reason that credit expansion takes place by the same category of risk weights.

Similarly, an investigation on 45 Chinese commercial banks was made by Huang and Xiong (2015) for a sampling period between 2000 and 2010. They found a positive influence regarding the business cycle on the capital of banks and their portfolio risk. The authors were of the opinion that capital regulations having pro-cyclical elements exacerbate economic cycle fluctuations. They argued that Chinese banks tend to increase capital during economic upturn trends, whereas these banks are simultaneously inclined towards the expansion of credit growth. Likewise, Xu (2016) also investigated 40 Chinese commercial banks during the period from 2004 to 2014. The author evolved the significant and positive impact of business cycle fluctuations on capital and contrary to Huang and Xiong (2015), found a negative impact of the business cycle on portfolio risk. The authors also asserted that capital tends to increase during upturn trends and risk tends to increase during downturns. The credit assets are the main factors for increasing the capital in banks.

As far as the Indian banks are concerned, there are diverse evidences; the Ghosh (2008) investigation showed the capital behavior for 60 Indian banks during the period from 1997 till 2006. The author found negative impact of business cycle fluctuations on banks' capital and positive impact on portfolio risk. The author reveals that there is shortsightedness. This is

to say that in order to account for the rising credit risks for not being able to build up a capital buffer during the upturns of the business cycle, banks have to increase their capital while experiencing the downturns of the business cycle. Moreover, positive impact on risk is due to a strong pro-cyclical trend of risk-weighted assets. Similarly, in a recently concluded research study, Akinsola and Ikhida (2017) also made an attempt to examine the capital and business cycle relationship for South African banks during 1990 and 2013. They interestingly found that fluctuations in the business cycle have a positive influence on banks' capital. During upturns, capital increases and this implies that capital requirements amplify the business cycle. Thus, there is a scarcity of studies regarding capital cyclical behavior specifically in developing economies.

Impact of Bank Liquidity on Capital and Portfolio Risk

After the determination of the capital ratio, another significant variable, i.e. liquidity, must be taken into consideration. However, the way in which the link goes forward is still not obvious (Jokipii & Milne, 2011; Athanasoglou, 2011). Liquidity may be maintained by banks as insurance whenever there are some shocks and then they gradually utilize this liquidity as a buffer. Thus, limiting the requirement of capital, other small banks may be inclined to enhance their capital in order to make up for the liquidity shortage (Jokipii & Milne, 2011; Distinguin et al., 2013). A further probe into the literature finds that Stolz (2007) found negative impact of liquidity on capital and concluded that liquidity permits banks to face lesser risk and they have an opportunity to maintain a lesser amount of capital, as well. On the contrary, Pereira and Saito (2015) concluded with a positive impact of liquidity on capital. The authors concluded that the positive association between liquidity and bank capital implies the persuasion of better investment opportunities, while holding minimum capital and maintaining liquid assets.

As mentioned earlier, liquidity also places a significant effect on portfolio risks within banks, since very few studies have shown negative links between liquidity and portfolio risk (Stolz, 2007; Stolz & Wedow, 2011; Shim, 2013; Pereira & Saito, 2015). However, Shim (2013) argued that higher liquid assets in banks promptly tend to transform their assets into cash to meet the short-term obligations. This action obviously makes the banks less inclined towards investments in risky situations. As opposed to this scenario, Jokipii and Milne (2011), and Zheng et al. (2012) found that a positive relation exists between these two variables. These studies

concluded that banks with higher liquid assets attempt to show willingness in enhancing the risk levels.

Impact of Bank Profitability on Bank Capital and Portfolio Risk

Earnings are the most beneficial source of building up the capital base of banks. The enhancement in their capital, in turn creates higher profitability within banks. In accordance with various recommendations, presented in the relevant literature, it is concluded that more profitable banks have the tendency to enhance their capital by using the earnings that they had retained instead of equity elements because the investors might see the new issues as a negative factor, unless the regulators impose a policy to raise capital in banks (Kwan and Eisenbeis, 1997; Rime, 2001; Van Roy, 2008; Matejasak et al., 2009; Kashyap, Stein & Hanson, 2010; Tanda, 2015; and Cohen & Scatigna, 2016). These studies further concluded that financial institutions show a tendency to be inclined towards increasing capital through retained earnings. Similarly, empirical evidence from the relevant literature suggests both positive and negative linkage of profitability with the bank capital and portfolio risk. Several other studies found positive linkage between capital and profitability (Rime, 2001; Aggarwal & Jacques, 2001; Heid et al., 2004; Das & Ghosh, 2004; Altunbas et al., 2007; Van Roy, 2008; Floquet & Biekpe, 2008; Kleff & Weber, 2008; Matejasak et al., 2009; Athanasoglou, 2011; Derina, 2011; Maji & De, 2015; Zahid et al., 2015; Pereira & Saito, 2015; Xu et al., 2015; Ugwuanyi, 2015; and Xu, 2016).

The research study undertaken by Maji and De (2015) showed contradictory results. When excessive regulatory pressure exists to maintain minimum requisite capital, then it may show a reducing trend in the profit-earning capacity within banks. This may lead to a negative relationship between profitability and capital. In this regard, Ahmad et al. (2008), and Brei and Gambacorta (2016) found a negative association between profitability and capital. They concluded that higher profits are indications of lower probability of failure. Therefore, higher profitability causes banks to maintain low capital due to low risk levels.

Since higher profits persuade banks to invest in riskier projects with a hope to acquire higher returns, a positive link may exist between their profitability and risk (Ghosh, 2008; Maji & De, 2015). Opposing this statement, some studies found a negative impact of profitability on risk

(Godlewski, 2005; Floquet & Biekpe, 2008; Derina, 2011; Stolz & Wedow, 2011). However, Godlewski (2005) argued that profitability appeared to strain the activities of risk-taking within banks. In order to attain adequate profits, banks should avoid their risky engagements. Contrarily, Maji and De (2015) asserted that occurrence of high profits leads banks to take more risk and they may prefer to create an expansion in advances without any collateral on the basis of higher interest margins.

Impact of Bank Size on Capital and Portfolio Risk

Banks of larger size have better access to equity capital markets and accordingly the capital ratio is expected to be on the lower side in comparison with the capital ratio of banks of smaller size. Moreover, banks in the former category tend to work within a wider range, which simultaneously increases their potential in diversifying the portfolio and in a similar manner, risk apparently shows a decreasing tendency. Therefore, it is accordingly assumed through various studies that variation in the size of banks show a negative relation with the target level of capital and risk (Aggarwal & Jacques, 2001; Rime, 2001; Hussain & Hassan, 2005; and Van Roy, 2008).

The level of target capital of a bank might be affected due to the bank's size as this indicates how much capital the bank can access because larger sized banks can more easily get into the capital markets (Ahmad et al., 2008). According to Heid et al. (2004), hybrid instruments or subordinated debt are used with greater flexibility to increase the capital ratios. This might be dependent on public intervention if the bank undergoes a period of distress (Tanda, 2015). The size of the bank can also have an impact on the targeted risk levels of the banks due to the fact that the size of the bank also affects possibilities of diversification as well as opportunities for investment (Heid et al., 2004). The positive influence of a bank's size on its capital can be seen in cases where there is a prevalence of informational asymmetries, compelling bigger banks to maintain bigger capital so that their enhanced complexity could be compensated for (Gropp & Heider, 2010).

Various studies found that there is a negative relationship existing between the size and capital of banks (Rime, 2001; Aggarwal & Jacques, 2001; Heid et al., 2004; Das & Ghosh, 2004; Murinde & Yaseen, 2004; Lindquist, 2004; Van Roy, 2005; Floquet & Biekpe, 2008; Kleff & Weber, 2008; Ahmad et al., 2008; Matejasak et al., 2009; Derina, 2011; Athanasoglou, 2011; Pereira & Saito, 2015; Zahid et al., 2015; Xu et al.,

2015). These studies also concluded that banks of larger size acquired access to equity markets and the capital ratio is anticipated towards the lower side. On the other hand, Maraghni and Bouheni (2015) and Ugwuanyi (2015) concluded that a positive relationship existed between size and bank capital. The author further argued that increased capital requirements tend to enhance the risk, which ultimately becomes the source to increase profitability and in turn, elevates the size of banks.

The size of the bank is also anticipated to show a significant influence on the risk. With regard to the relationship between risk and size, many studies found a negative association (Godlewski, 2005; Ghosh, 2008; Ahmad et al., 2008; Matejasak et al., 2009; Derina, 2011; Stolz & Wedow, 2011; Athanasoglou, 2011; Pereira & Saito, 2015; Zahid et al., 2015; Huang & Xiong, 2015). These studies concluded that larger banks possess potential in diversifying the portfolio and accordingly risk shows a decreasing trend. A few other studies also asserted after thorough investigations that a positive relationship exists between a bank's size and risk decisions (Rime, 2001; Aggarwal & Jacques, 2001; Heid et al., 2004; Das & Ghosh, 2004; Bouri & Hmida, 2006). The research in these studies attempted to prove that larger banks show a clear disengagement from less risky investments towards a risky portfolio. The less risky investments refer to 50% risk-weighted assets, whereas a risky portfolio includes 100% risk-weighted assets.

Impact of Merger on Capital and Portfolio Risk

In times of financial troubles, banks view mergers with a stable bank to be a feasible solution. Hence, decreased capital and increased risk are expected to be witnessed on the part of the bank that takes over during the year when the merger takes place (Heid et al., 2004; Stolz, 2007; Kleff and Weber, 2008).

Stolz (2007) found a positive effect of merger on capital. Moreover, Kleff and Weber (2008) also found positive impact of merger on capital and concluded that there is no evidence that weakly capitalized banks merged with banks. On the other hand, Ghosh (2008) found a negative effect of merger on capital. The author argued that during a distress merger between a weakly capitalized bank and a stable bank, decreased capital is expected in the year in which the merger takes place. On the contrary, Heid et al. (2004) found an insignificant relation between the two variables. In the case of risk, Stolz (2007) concluded there is a positive link between risk and merger. The author argued that in a distress merger, increased risk is

expected on the part of the bank that takes over during the year of merger. On the other hand, Ghosh (2008) found a negative relation between the two variables. A few studies found an insignificant impact of merger on risk (Heid et al., 2004; Stolz & Wedow, 2011).

Impact of Bank Investment on Capital and Portfolio Risk

Banks having a greater percentage of investments in government securities usually anticipate acquiring more capital when they intend to sell their securities. If banks that have bigger government-security holdings kept them aside and prefer not to sell them, then these securities may lead the bank to have lower capital to abide by the present regulations, during periods of a falling rate environment. Simultaneously, banks that have their ratios higher in the portfolios of their assets because of the presence of government securities tend to show low risk levels. Therefore, both the capital and the risk are considered to be inversely related with holding bonds and government securities by the banks (Aggarwal & Jacques, 2001; Hussain & Hassan, 2005). Moreover, Aggarwal and Jacques (2001) found a positive impact of holding government securities on capital and it has a negative impact on risk. The authors concluded that higher capital is expected through the sale of investments. On the other hand, Hussain and Hassan (2005) found a negative impact on investments in government securities for capital and risk, concluding that banks with higher government securities keep lower capital during a falling rate environment.

Impact of Asset Quality on Risk Decisions

One of the most significant supervisory indices is called "assets quality". The supervisory authority could be related to assets quality for regulatory measures and public reputation. Hence, assets quality is not only the outcome of risk behavior but also influences the risk-taking aspect of banks (Zhang et al., 2008). As a result of customers' bankruptcy, the NPLs show an increasing tendency and are considered to constitute a significant hurdle in the progress of the banking sector (Zhang, Cai, Dickinson & Kutan, 2016; Hassan, Unsal & Tamer, 2016). Higher NPLs (lower assets quality) lead to higher risk, whereas the study by Zhang et al. (2008) established that a positive effect of NPLs is apparently observed on risk. Similarly, Huang and Xiong (2015) also found a positive effect of NPLs on risk. These studies concluded that higher NPLs show an increase in the portfolio risk, which in turn, tends to place a significant impact on assets

quality. On the other hand, Das and Gosh (2004) found an insignificant impact of NPLs on risk.

CHAPTER SIX

METHODOLOGY

Empirical Framework

A framework of the simultaneous equations model established by Shrieves and Dahl (1992) is utilized in this study. The model's two equations explicate the respective adjustments occurring in capital and risk for low and high capital buffer bank samples. The concerned model helps assess the reactions of the banks towards the different requirements that regulators impose on the banks' capital. A significant part of the model is that whenever there is a change in capital and risk, it recognizes these changes to have components that are discretionary (i.e. endogenous) as well as exogenous. In the model, observed changes in the capital as well as the levels of risks consider the two components: a change caused by exogenous factors of the banks together with a discretionary adjustment.

When exogenous changes occurring in capital are taken into consideration, it is found that these changes could be caused due to a rise in capital as per the regulations or they can be even changed unexpectedly by earnings that come as a result of income-related fluctuations. Regarding risk, exogenous changes can allow inadvertent shocks to strike the local or the national economy, for instance, the dynamics of loan portfolios of banks or loan-collateral volatility, e.g. real property (Heid et al., 2004; Matejasak et al., 2009). Since the observed adjustments not only happen because of the bank's discretionary behavior but also due to the exogenous changes occurring in the bank, adjustments are modeled as a total of the discretionary component and the randomly occurring shocks are determined exogenously.

$$\Delta CAP_{i,t} = \Delta CAP^{d}_{i,t} + \varepsilon_{i,,t}, \qquad (1)$$

$$\Delta RISK_{i,t} = \Delta RISK^{d}_{i,t} + \mu_{i,t}, \qquad (2)$$

where CAP is the bank capital measured as the ratio of capital to risk-weighted assets and $RISK$ represents the portfolio risk measured as the ratio of the risk-weighted assets to total assets. Subscripts i and t denote

the individual bank and time period. $\Delta CAP_{i,t}$ and $\Delta RISK_{i,t}$ represent the total changes that are observed in the capital and the portfolio risk for bank i at time t. Meanwhile, $\Delta CAP^{d}_{i,t}$ and $\Delta RISK^{d}_{i,t}$ represent the adjustments determined endogenously, and $\varepsilon_{i,t}$ and $\mu_{i,t}$ represent the exogenously occurring random shocks in levels of capital and risk for the bank i during the time t.

Buffer theory also makes the assumption that banks undergo rigidities as well as adjustment costs that may stop the bank from making discretionary adjustments instantaneously. Therefore, in the observed adjustments of capital and risk, the discretionary part is modeled in a partial adjustment model. According to this model, it is assumed that banks aim to establish the optimum levels of capital and risk, called the "target levels". Actual levels are driven away from target levels by exogenous shocks, after which banks will make adjustments in the capital and risk in order to achieve the target. Nonetheless, complete adjustments could turn out to be very costly and/or not very feasible for banks. Therefore, adjustments in the levels towards the target levels by banks take place only partially. In this model, the discretionary changes in capital and risk are proportional to the difference that exists in period $_{t-1}$ between the target levels and the observed levels (Heid et al., 2004).

$$\Delta CAP^{d}_{i,t} = \alpha(CAP^{*}_{i,t} - CAP_{i,t-1}), \qquad (3)$$

$$\Delta RISK^{d}i,t = \beta(RISK^{*}_{i,t} - RISK_{i,t-1}) \qquad (4)$$

In the equation above, the symbols α and β represent the speeds of adjustments of capital and risk, $CAP^{*}_{i,t}$ and $RISK^{*}_{i,t}$ represent the bank i's target capital and risk level respectively and $CAP_{i,t-1}$ and $RISK_{i,t-1}$ represent the actual levels of capital and risk, respectively in the previous period. In the equation, substituting equations (3) and (4) into equations (1) and (2), the changes observed in the capital $(\Delta CAP_{i,t})$ as well as the risk $(\Delta RISK_{i,t})$ can be written as:

$$\Delta CAP_{i,t} = \alpha(CAP_{i,t} - CAP_{i,t-1}) + \varepsilon_{i,,t}, \qquad (5)$$

$$\Delta RISKi,t = \beta(RISK_{i,t} - RISK_{i,t-1}) + \mu_{i,t}, \qquad (6)$$

Therefore, during the period t, the observed adjustments taking place in capital and risk are a function of the target levels and the lagged levels of capital and risk as well as exogenous shocks. The target capital and risk levels of the bank cannot be observed directly but assumptions are made about them that they are dependent on some sets of variables that could be

observed. These variables describe the financial condition of a bank as well as the economic condition of a country. Moreover, most empirical models do not explain the absolute levels of capital and risk; instead they explain adjustments in capital and risk since the theory of optimal capital structure for banks does not exist. According to this model, it is assumed that banks aim to establish the optimum levels of capital and risk, called the "target levels". Actual levels are driven away from target levels by exogenous shocks, after which banks will make adjustments in the capital and risk in order to achieve the target. Nonetheless, complete adjustments could turn out to be very costly and/or not very feasible for banks. Therefore, adjustments in levels towards the target levels take place only partially in banks (Stolz, 2007). In the equation below, the framework can be determined by equations (5) and (6) as written below:

$$\Delta CAP_{i,t} = \alpha_0 + \alpha_1 DyREG_{i,t} + \alpha_2 CYCLEGAP_{i,t} + \alpha_3 LIQUID_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 INV_{i,t} + \alpha_6 LNSIZE_{i,t} + \alpha_7 DyMERGER_{i,t} + \alpha_8 \Delta RISK_{i,t} - \alpha_9 CAP_{i,t-1} + \alpha_{10} dy2005 + \ldots\ldots\ldots \alpha_{22} dy2017 + \varepsilon_{i,t} \quad (7)$$

$$\Delta RISK_{i,t} = \beta_0 + \beta_1 DyREG_{i,t} + \beta_2 CYCLEGAP_{i,t} + \beta_3 LIQUID_{i,t} + \beta_4 ROA_{i,t} + \beta_5 INV_{i,t} + \beta_6 LNSIZE_{i,t} + \beta_7 DyMERGER_{i,t} + \beta_8 NPL_{i,t} + \beta_9 \Delta CAP_{i,t,} - \alpha_{10} RISK_{i,t-1} + \alpha_{11} dy2005 + \ldots\ldots\ldots \alpha_{23} dy2017 + \mu_{i,t,} \quad (8)$$

where:

ΔCAP = the first difference of the Capital to Risk-weighted assets ratio

$DyREG$ = dummy variable for Regulatory pressure, 1 if CAP < Minimum Capital Ratio requirement + bank-specific standard deviation of CAP and 0 otherwise. In Pakistan the minimum capital ratio was as follows during the period 2004-2014:

2004-2008 = 8%;
2009 = 9%
2010-2014 =10%
2015 = 10.25%;
2016 = 11.25% and
2017 =11.875%

$CYCLEGAP$ = indicating the business cycle, is calculated by subtracting a nonlinear trend from real GDP growth using the Hodrick-Prescott filter

$LIQUID$ = liquid assets over total assets ratio

ROA = Annual net profit over total assets included as a measure of Profitability

INV = government securities investments to total assets ratio

LNSIZE = log of total assets

DyMERGER = dummy variable, unity for the acquirer in the year of the merger, and zero otherwise

$\Delta RISK$ = The first difference of Risk-weighted assets to total assets ratio

CAP_{t-1} = lagged Capital to Risk-weighted assets ratio

$RISK_{t-1}$ = lagged Risk-weighted assets to total assets ratio

NPL = ratio of nonperforming loans to total loans, as a proxy for Asset quality

ε and μ = represent the exogenously occurring random shocks in levels of capital and risk for the bank

α_0 and β_0 = are constants

With respect to the business cycle *(CYCLEGAP)*, the real output gap (GAP), which isolates the business cycle from the economic trend has been used. The output gap is calculated by subtracting a non-linear trend from real GDP using the Hodrick-Prescott (HP) filter. The output gap is then scaled by the potential output in one single variable (CYCLEGAP) as in the literature (Stolz & Wedow, 2011; Guidara et al., 2013; Ayuso et al. 2004; Lindquist 2004). *SIZE* is the bank size measured as the natural log of the bank total assets. *ROA* denotes the ratio of annual net profit to total assets and *INV* is the ratio of government investment to total assets. *LIQUID* is the ratio of liquid assets over the total assets. *DyMERGER* is a dummy variable which is unity for the acquirer in the year of the merger, and zero otherwise. *NPL* is the ratio of non-performing loans to total assets as a proxy for asset quality. To account for changes in the regulatory or macroeconomic environment, Time dummies (dy2005-dy2017) are included in each regression, as in the previous literature, but are not reported due to insignificant effect (Godlewski, 2004; Kleff & Weber, 2008).

Empirical Framework for Low and High Capital Buffer Banks

For a comparison among banks which maintain higher capital buffers and those banks which apparently uphold lower capital buffers, the Heid et al. (2004) criterion has been followed to split the data into low and high capital buffers and estimated by the following equations:

$$\Delta CAP_{i,t} = \alpha_0 + \alpha_1 CYCLEGAP_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 INV_{i,t} + \alpha_5 LIQUID_{i,t} + \alpha_6 DyMERGER_{i,} + \alpha_7 \Delta RISK_{i,t} - \alpha_8 CAP_{i,t-1} + \alpha_9 dy2005 + \ldots\ldots \alpha_{21} dy2017 + \varepsilon_{i,t} \quad (9)$$

$$\Delta RISK_{i,t} = \beta_0 + \beta_1 CYCLEGAP_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 ROA_{i,t} + \beta_4 INV_{i,t} + \beta_5 LIQUID_{i,t} + \beta_6 DyMERGER_{i,t} + \beta_7 NPL_{i,t} + \beta_8 \Delta CAP_{i,t} - \alpha_9 RISK_{i,t-1} + \alpha_{10} dy2005 + \ldots\ldots \alpha_{22} dy2017 + \mu_{i,t}, \quad (10)$$

Empirical Framework for Capital Buffer and Portfolio Risk Analysis

The theory of capital buffer theory deduces that there is a simultaneous determination of capital buffer and risk carried out by the banks. According to empirical studies, the existing link between capital buffer and risk ought to acknowledge that there is simultaneity (Shrieves & Dahl, 1992; Shim, 2013; Busun & Kasman, 2015). Therefore, a framework of simultaneous equations model that is established on previous research conducted by Shrieves and Dahl (1992) is utilized in this study. The partial adjustment model has been applied to capital buffer and risk equations so that the impact caused by fluctuations of the business cycle on the bank's capital buffer and risk-taking decisions could be analyzed. The empirical framework which includes the business-cycle variable *(CYCLEGAP)* as well as characteristics of the bank can be represented by the following simultaneous equations:

$$\Delta AbBUF_{i,t} = \alpha_0 + \alpha_1 CYCLEGAP_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 INV_{i,t} + \alpha_5 LIQUID_{i,t} + \alpha_6 DyMERGER_{i,} + \alpha_7 \Delta RISK_{i,t} - \alpha_8 AbBUF_{i,t-1} + \varepsilon_{i,t} \quad (11)$$

$$\Delta RISK_{i,t} = \beta_0 + \beta_1 CYCLEGAP_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 ROA_{i,t} + \beta_4 INV_{i,t} + \beta_5 LIQUID_{i,t} + \beta_6 DyMERGER_{i,t} + \beta_7 \Delta NPL_{i,t} + \beta_8 \Delta AbBUF_{i,t} - \alpha_9 RISK_{i,t-1} + \mu_{i,t}, \quad (12)$$

where absolute capital buffer *AbBUF* is capital-to-risk-weighted-assets ratio minus minimum capital ratio between 0.08 and 0.1. *RISK* is the ratio of risk-weighted assets to total assets. *CYCLEGAP* is the *Hodrick-Prescott (HP) filtered* GDP growth. It is used as a proxy for the business cycle. *SIZE* is the bank size measured as the natural log of the bank total assets. *ROA* denotes the ratio of annual net profit to total assets and investments in government securities *INV* is the ratio of government investment to total assets. *LIQUID* is the ratio of liquid assets over the total assets. *DyMERGER* is a dummy variable which is unity for the acquirer in the

year of the merger, and zero otherwise. *NPL* is the ratio of non-performing loans to total assets as a proxy for asset quality.

Data

The commercial banks include 5 public sector banks, 20 local private banks and 5 foreign banks as of December, 2017. The commercial banks are selected as the unit of analysis of this study because the most vital financial intermediaries are the commercial banks in Pakistan (see Appendix A for scheduled banks and their branches). In order to examine the relationships of variables in the research framework, annual data of all commercial banks have been extracted from the Bankscope database and the State Bank of Pakistan (SBP) during the period 2004-2017. Data are compiled into panels in Excel. The relationship between capital and portfolio risk with the business cycle is investigated by using Hodrick-Prescott (HP) filtered GDP growth as a proxy for the business cycle (Hodrick & Prescott, 1997). It is calculated by subtracting a nonlinear trend from real GDP growth using the Hodrick-Prescott filter. Moreover, most of the literature measures the capital buffer as the absolute difference in the actual capital ratio and the minimum regulatory capital ratio. For comparison among banks, which maintain higher capital buffers and those banks, which apparently uphold lower capital buffers the Heid et al. (2004) criterion has been followed to split the data into low and high capital buffers. First the absolute capital buffer is calculated as the capital-to-risk-weighted-assets ratio minus the minimum capital ratio requirement between 8% to 11.875% because in Pakistan the CAR requirement was 8% during the period 2004-2008, 9% during 2009, 10% during the period 2010-2014, 10.25% in 2015, 10.65% in 2016 and 11.275% in 2017, and the CAR requirement will be increased to 12.5%, with the inclusion of the capital conservation buffer, in a phased manner by December 31, 2019 as per the Basel III instructions. Then, the standardized capital buffer is calculated as the absolute capital buffer divided by the bank-specific standard deviation of the absolute capital buffer over the observation period. Banks are classified as low capital buffer banks if the bank has a standardized capital buffer equal to or less than the median and a high capital buffer if a bank has a standardized capital buffer greater than the median.

Hypotheses for Capital and Portfolio Risk Analysis

The capital buffer theory leads to an assumption that banks approaching the ratio of minimum regulatory capital may have benefits in capital enhancement and reduction in risks, which resultantly, saves regulatory costs which are activated by any violation of rules pertaining to capital requirements. However, inadequately capitalized banks may even go for more risks in the temptation to acquire higher returns that may help them to increase their capital. In other words, we may call it a gamble for resurrection (Stolz, 2007). On the basis of this assumption, two competing alternative hypotheses are identified:

H_1: Adjustments in bank capital are significantly affected by the regulatory pressure.

H_2: Adjustments in bank portfolio risk are significantly affected by the regulatory pressure.

Banks generally increase their capital (risk) as a result of an increase in risk (capital) whilst maintaining their capital adequacy ratio. The result of this positive association supports Buser, Chen and Kane (1981) who argue that, with regulation, banks whose capital level has increased are allowed to pursue riskier investments, whilst banks with risky investments are forced to increase their capital. Capital buffer theory further states that the optimum capital level of banks relies on assets risk positively. Traditionally, loans are considered to be the most important category of assets, whereas credit risk is obviously the main driver of assets risk. With the degree of fluctuation in credit risk over the fluctuation in the business cycle, the optimum level of capital also fluctuates accordingly in the business cycle. In order to find out if capital fluctuates pro-cyclically or counter-cyclically depends on whether materializing for credit risk is provided by banks in a downturn by raising capital in an upturn trend. Hence, two competing alternative hypotheses are identified:

H_3: Adjustments in capital are positively affected by the business cycle fluctuations.

H_4: Adjustments in portfolio risk are positively affected by the business cycle fluctuations.

Capital Buffer Theory states that the behavior of banks depends on the size of the excess capital a bank holds above the minimum capital requirement (Heid et al., 2004). The model adopted by Milne and Whalley (2001)

forecasts that initially banks raise capital and lower assets risk, following a rise in minimum regulatory standards. However, after the adjustment period, when capital buffers are reinstated, then capital as well as risk show growing trends. As the theories come to rivaling predictions for capital and risk adjustments after an increase in the regulatory minimum capital requirement, what actually happens is ultimately an empirical question. So in this study, the prediction of the capital buffer theory is tested, that making adjustments in capital and risks by banks is mainly reliant on capital buffers, even if banks, in particular, raise or lower risks when requirements for capital compel them to hold a high level of capital accordingly. Therefore, for low and high capital buffer banks the following competing alternative hypotheses are identified:

H_5: Adjustments in bank capital are negatively affected by the adjustments in portfolio risk for low capital buffer banks.

H_6: Adjustments in portfolio risk are negatively affected by the adjustments in bank capital for low capital buffer banks.

H_7: Adjustments in bank capital are positively affected by the adjustments in portfolio risk for high capital buffer banks.

H_8: Adjustments in portfolio risk are positively affected by the adjustments in bank capital for high capital buffer banks.

Hypotheses for Capital Buffer and Portfolio Risk Analysis

According to the theory of capital buffer, banks' optimum capital buffers could be predicted as positively reliant on assets risk. If banks have increased assets risk, a need for a higher capital buffer is seen (Myers & Majluf 1984; Milne & Whalley 2001; Heid et al., 2004). The prime determinant factor of asset risk for traditional banks is credit risk. Therefore, those banks that have higher credit risks also have more eminent optimum capital buffers. During a boom, there is a pro-cyclic fluctuation of credit risk when it is being materialized over the business cycle. At the time of busts, there is less likelihood of loans becoming defaulters. However, during booms when the loan portfolio of the banks is being expanded, there is a high probability for banks to take credit risks. Thus, during booms, banks that are forward-looking build up their capital buffers so that they are in a position to better materialize their credit risks at the time of busts. As against this, those banks that are shortsighted do not provide for credit risks at the time of booms but during busts, they are

required to increase their capital buffers (Borio et al., 2001; Milne & Whalley, 2001; Ayuso et al., 2004).

The economic cycle has influence on risk level and the ability to make the process of raising capital easy (Lindquist, 2004; Van Roy, 2008). At the time of downturns, the NPLs tend to increase whereas when there is an economic boom; banks increase their risk exposure by expanding their assets. There is a counter-cyclical variation occurring in the capital buffer over economic upturns and increases during economy downturns. Hence, it is more costly for poorly capitalized banks to meet the minimum capital as per the regulations in busts. This is because banks that are not sufficiently capitalized face the challenge of materializing risk in a business cycle and the downturns generally have two choices to avert going down to the minimum capital requirement. The first option is to increase the capital but this may turn out to be very difficult in a downturn due to the reason that there are expensive and very few external capital sources and retaining the profits may be infeasible for the bank because the returns are not high. The second option is that by reducing the risk-weighted assets, the capital buffer of the banks may rise (Borio et al., 2001).

Nonetheless, assets that are bank specific are generally more marketable and the costs could be downcast throughout when there is a downturn in the business cycle so much so that a sale connotes losses that are prohibitory. As a result, through a cut in lending, the risk in weighted assets is decreased. If the cutting down of lending is more substantial as compared to the indicated demand of lowering loans, during the business cycle's downturn there is a further amplification of the capital buffers and these buffers fluctuate counter-cyclically during the business cycle (Borio et al., 2001; Ayuso et al., 2004; Stolz & Wedow, 2011). Due to this fluctuation, the impact of economic shocks on lending is magnified, and in this way, economic stability is impacted by the cyclical behavior of the capital buffer. Considering the cyclical behavior of the capital buffer led to the introduction of new reforms in Basel III and the negative capital buffer requirement restricted within a range of 0-2.5% imposed on banks.

Therefore, this study will also assess whether the capital buffer of banks faces fluctuations pro-cyclically or counter-cyclically during the business cycle and the following competing alternative hypotheses are identified:

H_9: Adjustments in capital are significantly affected by the business cycle fluctuations.

H_{10}: Banks' portfolio risk fluctuates pro-cyclically over the business cycle.

Model Estimation

The simultaneous equations model which builds on earlier work by Shrieves and Dahl (1992) has been used and the two equations are estimated by using the three-stage least squares (3SLS) method. This allows taking account of the simultaneity of banks' capital and risk adjustments and getting asymptotically more efficient estimates than two-stage least squares. In the 3SLS estimates all exogenous variables are used to get a predicted value of the dependent variables, which was used in the instrumental variable.

CHAPTER SEVEN

EMPIRICAL RESULTS FOR CAPITAL AND PORTFOLIO RISK ANALYSIS

Descriptive statistics depict the basic features of the data. The purpose of these statistics is just to abridge a data set to see the summary of large data, rather than being used to test hypotheses. Table 7.1 shows the number of observations, mean, standard deviation, minimum and maximum values of dependent and independent variables. Descriptive statistics of capital and portfolio risk analysis show that the mean value of changes in capital *(ΔCAP)* is 3% and the mean of lagged capital *(CAP_{t-1})* is 36%. It indicates that banks are increasing capital to meet the minimum capital requirement but the change in adjustments is small. The mean of changes in risk-weighted assets *(ΔRISK)* is -1% and that of lagged risk is 66%. It shows that overall banks are managing their portfolio by including less risky investments in the asset portfolio.

Table 7.1: Descriptive Statistics of Variables for Capital and Portfolio Risk Analysis

Variables	Definitions	Obs	Mean	Standard Deviation	Min	Max
CYCLEGAP	Business cycle	422	0.4828	1.9802	-3.8015	4.1235
ΔRISK	Changes in risk	367	-0.0117	1.2215	-16.0780	16.4710
LIQUID	Liquidity	417	0.4012	0.2301	0.0000	3.0566
LNSIZE	Size	422	10.9191	2.0857	0.9780	14.3860
ROA	Return on Assets	421	-0.1506	2.2485	-32.6555	0.1403
INV	Investments	402	0.2393	0.1343	0.0030	1.3974
CAP_{t-1}	Lagged Capital	362	0.3633	0.8545	-0.0406	7.0660
ΔCAP	Changes in capital	377	0.0353	0.8672	-4.1301	13.8664
$RISK_{t-1}$	Lagged risk	375	0.6689	0.8755	0.0714	17.0090
NPL	Asset quality	371	0.1327	0.1361	0.0002	1.1090

The results of the simultaneous equation model estimated by 3SLS indicate that banks under regulatory pressure have the significant impact of regulations and these banks are able to increase their capital to meet the minimum capital requirement. The result supports the hypothesis that adjustments in capital are significantly affected by the regulatory pressure.

In the risk equation, regulatory pressure *(DyREG)* has a positive but insignificant effect on changes in portfolio risk *(ΔRISK)*. The result does not support the hypothesis that adjustments in portfolio risk are significantly affected by the regulatory pressure. It also implies that regulatory pressure exerts no influence on portfolio risk adjustments of banks having capital less than the minimum capital requirement.

In order to estimate the effect of business cycle fluctuations on changes in banks' capital and portfolio risk, the business cycle is separated from economic trends through the real output gap and calculated by taking away a non-linear trend from real GDP through the application of the Hodrick-Prescott Filter (Ayuso et al., 2004; Boucinha & Ribeiro, 2008; Stolz & Wedow, 2011; Tabak, et al., 2011; Guidara, Soumare & Tchana, 2013; Busun & Kasman, 2015; Azeem, 2015). In this study the term pro-cyclical (countercyclical) refers to co-movement with (movement in the opposite direction of) the business cycle. The term pro-cyclical has not been used to refer to a variable that amplifies business cycle fluctuations, it is consistent with the previous studies (Stolz, 2007; Boucinha & Ribeiro, 2008; Jokipii & Milne, 2008; Stolz & Wedow, 2011; Busun & Kasman, 2015). Thus, capital regulations having pro-cyclical elements exacerbate economic cycle fluctuations (Huang & Xiong, 2015). On the contrary, Guidara et al. (2013), Pereira and Saito (2015), Xu (2016), and Huang and Xiong (2015) defined cyclicality as co-movement between business cycles and bank capital. Positive co-movement refers to counter-cyclicality and negative co-movement implies pro-cyclicality. Capital has to be accumulated in economic upturns and lower in economic downturns to have counter-cyclicality between bank capital buffers and the business cycle. These studies defined pro-cyclicality as negative co-movement between capital and the business cycle.

The results indicate the pro-cyclical fluctuations of capital in the sense that capital increases as economic conditions improve. The result supports the hypothesis that adjustments in capital are positively affected by business cycle fluctuations. However, the period between 2003 and 2006 evinced high growth and low interest rates in Pakistan (State Bank of Pakistan, 2011). In the risk equation, there is also a positive and significant impact of business cycle fluctuations *(CYCLEGAP)* on changes in portfolio risk *(ΔRISK)*, the result indicates that banks' asset portfolio risk increases as economic conditions improve with a small magnitude. The result supports the hypothesis that adjustments in portfolio risk are positively affected by the business cycle fluctuations. It may be due to the reason that Pakistani banks increase their capital to risk-weighted assets to meet the minimum

capital requirements due to investments/loan demand in an upturn and this situation in turn affects the risk-weighted assets in the portfolio. Heavy investments in government securities and less deployment of funds towards the corporate sector may bring a small increase in the portfolio risk.

The capital buffer theory assumes that the optimum capital level of banks relies on assets risk positively. Banks with high assets risk must have high capital as an insurance against a riskier asset portfolio. Traditionally, loans are considered to be the most important category of assets, whereas credit risk is obviously the main driver of assets risk. With the degree of fluctuation in credit risk over the fluctuation in the business cycle, optimum levels of capital also fluctuate accordingly in the business cycle. Capital fluctuates pro-cyclically or counter-cyclically depending on whether materializing for credit risk is provided by banks in a downturn through raising capital buffers in an upturn trend (Stolz, 2007; Stolz & Wedow, 2011). The results support the capital buffer theory assumption that optimal capital levels of banks are anticipated to show a pro-cyclical behavior if banks are forward-looking. Hence, throughout the upturns of the business cycle when banks are in the process of expanding their lending, there is a tendency for potential risks to increase. Consequently, banks also have to increase their capital levels above the minimum capital requirement in order to be sustainable in a stable position to tackle the growing risks. At the time when risks materialize during the downturns of a business cycle, banks could draw on the surplus capital.

Changes in portfolio risk *(ΔRISK)* have an insignificant impact on changes in capital *(ΔCAP)* but lagged capital (ΔCAP_{t-1}) has a negative and significant effect on changes in portfolio risk *(ΔRISK)* and there is one-way coordination between capital and portfolio risk, which runs from capital to risk only, not vice versa. The results support the buffer theory prediction that banks approaching the minimum capital requirement increase capital by reducing risk to avoid regulatory costs (Rime, 2001; Stolz, 2007). On the contrary, the portfolio model theory of Pyle (1971) and Hart and Jaffee (1974) provides a rationale for a positive relationship between changes in capital and risk. In this model banks are treated as utility maximizing units. Using the same model, Koehn and Santomero (1980) concluded that an increase in risk is quite possible as a result of an increase in the capital standard. Derina (2011) also argued that a compulsory increase in the capital ratio forces banks to increase their risks with the higher return intended to compensate for the diminished expected returns arising from relatively expensive equity and vice versa.

Liquidity *(LIQUID)*, *LNSIZE,* Profitability *(ROA)* and Merger *(DyMERGER)* have an insignificant impact on changes in capital *(ΔCAP)* and changes in portfolio risk *(ΔRISK)*. Moreover, Investments in government securities *(INV)* have a negative and significant effect on changes in capital *(ΔCAP)*. The result indicates that banks' large holdings of government securities decrease the capital to risk-weighted assets ratio. By the end of December 2015, Pakistani banks' investments in government debt securities stood at Rs 6.33 trillion out of Rs 6.96 trillion (Iqbal, 2016). Hussain and Hassan (2005) argued that for banks having bigger government-security holdings kept aside and not sold, these securities may lead the bank, during a falling rate environment, to have low capital to abide by present regulations.

The effect of investments in government securities *(INV)* on changes in portfolio risk *(ΔRISK)* is significant and negative. The result reflects that banks with high ratios of government securities in their asset portfolios will be exhibiting lower levels of risk. Non-performing loans *(NPL)* have been included as a proxy for asset quality. There is a significant and positive impact on changes in portfolio risk *(ΔRISK)*. It indicates that high non-performing loans (low asset quality) are increasing asset portfolio risk. The quality of assets is not only consequential of risks behavior, but also an influencing factor on the risk taken by the bank. To control and bring down the assets risk, Pakistani banks started investments in government securities and by the end of June 2018 total investments of the banking sector amounted to Rs. 7.372 trillion. On the other hand, by the end of 2017, provisions against advances were Rs 484.89 billion and non-performing loans amounted to Rs 592.54 billion (State Bank of Pakistan, 2017). Table 7.2 presents the Simultaneous Equations Results estimated by the three-stage least squares method for capital and portfolio risk analysis.

Table 7.2: 3SLS Estimations for Capital and Portfolio Risk Analysis

Independent Variables	ΔCAP			Independent Variables	ΔRISK		
	Beta Coefficient	t-value	p-value		Beta Coefficient	t-value	p-value
Constant	0.040***	4.904	0.000	Constant	0.428***	3.779	0.000
DyREG	0.253**	2.204	0.030	DyREG	0.041	1.136	0.261
CYCLEGAP	0.029***	3.242	0.002	CYCLEGAP	0.002**	0.187	0.03
ΔRISK	-0.029	-0.486	0.627				
LIQUID	-0.005	-0.048	0.962	LIQUID	-0.029	-0.486	0.627
LNSIZE	-0.003	-0.159	0.874	LNSIZE	-0.005	-0.048	0.962
ROA	1.884	0.943	0.346	ROA	0.003	0.159	0.874
DyMERGER	-0.400	-1.513	0.131	DyMERGER	0.000	0.166	0.869
INV	-0.784***	-2.782	0.006	INV	-1.701**	-2.429	0.016
CAP_{t-1}	-0.647***	-5.004	0.000	ΔCAP	-0.037***	-5.045	0.000
				$RISK_{t-1}$	-0.828**	-2.866	0.005
				NPL	0.428***	3.779	0.000
F ratio	142.911***		0.000	F ratio	87.688***		0.000
R2	0.682			R2	0.556		

***, ** and * indicate statistical significance at the 1, 5, and 10 per cent level, respectively

CHAPTER EIGHT

EMPIRICAL RESULTS FOR LOW AND HIGH CAPITAL BUFFER BANKS

Results for Low Capital Buffer Banks

In Table 8.1, Descriptive statistics of capital and portfolio risk analysis for low capital buffer banks show that the mean value of changes in capital *(ΔCAP)* is 12% and the mean of lagged capital *(CAP_{t-1})* is 28%. It indicates that low capital buffer banks are increasing capital to meet the minimum capital requirement with large magnitude. The mean of changes in risk-weighted assets *(ΔRISK)* is 0.03% and that of lagged risk is 82%. It shows that overall banks are increasing their portfolio risk with small magnitude.

Table 8.1: Descriptive Statistics of Variables for Low Capital Buffer Banks

Variables	Definitions	Obs	Mean	Standard Deviation	Min	Max
CYCLEGAP	Business cycle	188	1.498	1.778	-3.801	4.123
ΔRISK	Changes in risk	167	0.037	2.536	-16.078	16.471
LIQUID	Liquidity	188	0.398	0.321	0.02	3.057
LNSIZE	Size	188	10.969	1.523	6.332	13.617
ROA	Return on Assets	187	0.164	2.389	-32.656	0.140
INV	Investments	185	0.185	0.154	0.003	1.397
CAP_{t-1}	Lagged Capital	174	0.284	0.547	0.063	4.885
ΔCAP	Changes in capital	170	0.121	0.470	-4.130	3.392
$RISK_{t-1}$	Lagged risk	174	0.828	1.762	0.150	17.009
NPL	Asset quality	174	0.080	0.138	0.03	1.109

In the capital equation, the business cycle fluctuations (CYCLEGAP) have a positive and significant effect on changes in capital (ΔCAP). The result indicates the pro-cyclical fluctuations of capital, in the sense that capital increases as economic conditions improve. There is also a positive and significant impact of business cycle fluctuations (CYCLEGAP) on changes in portfolio risk *(ΔRISK)*. It indicates that banks' portfolio risk adjustments increase as economic conditions improve. However, the magnitude of pro-cyclical fluctuation of capital is smaller than portfolio risk and low capital buffer banks increase a small percentage of capital during an upturn. It may be due to expansion in investments and the loan

portfolio. Adjustments in portfolio risk *(ΔRISK)* have a negative and significant impact on adjustments in capital *(ΔCAP)*. The result supports the hypothesis that adjustments in bank capital are negatively affected by the adjustments in portfolio risk for low capital buffer banks. On the other hand, adjustments in capital *(ΔCAP)* have also a negative and significant effect on adjustments in portfolio risk *(ΔRISK)*. The result also supports the hypothesis that adjustments in portfolio risk are negatively affected by the adjustments in bank capital for low capital buffer banks. It implies that banks adjust their capital and risk simultaneously. There is a two-way inverse coordination between capital and portfolio risk, which runs from risk to capital and vice versa. The results support the prediction of the capital buffer theory that initially banks raise capital and lower assets risk, following a rise in minimum regulatory standards. However, after the adjustment period, when capital buffers are reinstated, then capital as well as risk show growing trends (Milne & Whalley, 2001; Rime, 2001; Stolz, 2007). On the contrary, Derina (2011) argued that a compulsory increase in the capital ratio forces banks to increase their risks with the higher return intended to compensate for the diminished expected returns arising from relatively expensive equity and vice versa.

Liquidity *(LIQUID)* has a negative and significant impact on changes in capital *(ΔCAP)*. However, it implies that higher liquidity ratios allow banks to face lesser risks. Hence, banks need to maintain a lower amount of capital (Hussain & Hassan, 2005). Liquidity *(LIQUID)* has a positive and significant impact on changes in portfolio risk *(ΔRISK)*. It indicates that banks with higher liquidity ratios may attempt to show willingness to enhance their levels of risk. It also implies that higher liquidity allows banks to take high risk.

LNSIZE has a negative and significant impact on changes in capital *(ΔCAP)*. It indicates that low capital buffer banks face less pressure to increase their capital than small banks since comparatively larger banks acquire access to equity capital markets. On the other hand, *LNSIZE* has an insignificant impact on changes in portfolio risk (ΔRISK), and the result is in line with the findings of Stolz (2007), and Athanasoglou (2011), who found an insignificant relation with the risk for low capital banks. The authors argued that due to high costs, low capital banks prefer to reduce capital at the development stages and increase it when reaching a certain point.

Profitability *(ROA)* has a positive and significant impact on changes in capital *(ΔCAP)*, indicating that low capital buffer banks increase their

capital through retained earnings. Moreover, Profitability *(ROA)* has a positive and significant impact on changes in portfolio risk *(ΔRISK)*. It implies that higher profitability may induce low capital buffer banks for risky investments. Tariq, Usman, Mir, Aman & Ali (2014) argued that banks who keep up a capital buffer are seen to be less risky and such an edge leads them to higher profitability.

Merger *(DyMERGER)* has a negative and significant impact on changes in capital *(ΔCAP)*. It implies that acquiring banks are typically better capitalized before a merger and when weakly capitalized banks are merged with healthy banks. Consequently, reduction in capital is expected in the year of merger. In Pakistan, the wave of mergers and acquisitions is continued to meet the minimum capital requirement of the SBP (Dawn, 2011). Merger *(DyMERGER)* has a negative but insignificant impact on changes in portfolio risk *(ΔRISK)*. Heid et al. (2004) and Stolz (2007) also found an insignificant impact of merger on risk for low capital buffer banks. Derina (2011) argued that the provision of a capital buffer that could absorb unanticipated losses supports the bank. Investments in government securities *(INV)* have a negative and significant effect on changes in capital *(ΔCAP)*. It indicates that banks have retained investments in government securities. The effect of investments in government securities *(INV)* on changes in portfolio risk *(ΔRISK)* is negative but insignificant. The result implies that low capital buffer banks are inducive to risky investments. Alternatively, the insignificant impact of investments also indicates that low capital buffer banks' profitability is increasing through risky investments.

Lagged capital (CAP_{t-1}) parameter estimates show the speed of adjustments in the capital ratio to desired levels and it is negative and significant with parameter estimates of -0.43. Lagged risk $(RISK_{t-1})$ parameter estimates show the speed of adjustments in portfolio risk to desired levels and it is negative and significant with parameter estimates of -0.55. The empirical literature shows that banks adjust capital faster wherein their capital buffers are low as compared to banks with a high level of capital buffers (Shrieves & Dahl 1992; Ediz et al., 1998; Aggarwal & Jacques, 2001). The results support the prediction of the capital buffer theory that the behavior of banks depends on the size of their capital buffer where initially banks raise capital and lower assets risk (Milne & Whalley, 2001). Non-performing loans *(NPLs)* have a positive and significant impact on changes in portfolio risk *(ΔRISK)*. It shows that high non-performing loans raise portfolio risk and spoil the asset quality. Zhang et al. (2008), and Huang and Xiong (2015) postulated that an increase in non-performing

loans leads to an increase in asset risks. Table 8.2 presents the Simultaneous Equations Results estimated by the three-stage least squares method for low capital buffer banks.

Table 8.2: 3SLS Results for Low Capital Buffer Banks

Independent Variables	ΔCAP			Independent Variables	ΔRISK		
	Beta Coefficient	t-value	p-value		Beta Coefficient	t-value	p-value
Constant	1.619**	2.459	0.019	Constant	0.009	0.088	0.930
CYCLEGAP	0.145***	2.781	0.006	CYCLEGAP	0.231***	4.786	0.000
ΔRISK	-0.180***	-3.720	0.000				
LIQUID	-0.283***	-1.801	0.090	LIQUID	0.094**	2.462	0.015
LNSIZE	-0.310***	-5.509	0.000	LNSIZE	0.052	0.684	0.495
ROA	0.166**	2.293	0.024	ROA	0.058*	0.887	0.06
DyMERGER	-0.168***	-2.207	0.001	DyMERGER	-0.110	-1.631	0.106
INV	-0.165***	-4.460	0.000	INV	-0.617	-0.203	0.847
CAP_{t-1}	0.432***	10.776	0.000	ΔCAP	-0.134**	-1.542	0.02
				$RISK_{t-1}$	-0.55**	-2.491	0.014
				NPL	0.511***	6.433	0.000
F ratio	128.68***		0.000	F ratio	252.55***		0.000
R2	0.673			R2	0.695		

***, ** and * indicate statistical significance at the 1, 5, and 10 per cent level, respectively.

Results for High Capital Buffer Banks

In Table 8.3, Descriptive statistics of capital and portfolio risk analysis for high capital buffer banks show that the mean value of changes in capital *(ΔCAP)* is 5% and the mean of lagged capital *(CAP_{t-1})* is 32%. It indicates that on average high capital buffer banks are increasing capital to meet the minimum capital requirement with a small magnitude since they have already capital above the minimum capital requirement. The mean of changes in risk-weighted assets *(ΔRISK)* is -2% and that of lagged risk is 61.7%. It shows that on average banks are managing risk since average risk aversion is very small.

Table 8.3: Descriptive Statistics of Variables for High Capital Buffer Banks

Variables	Definitions	Obs	Mean	Standard Deviation	Min	Max
CYCLEGAP	Business cycle	209	-.180	1.826	-3.801	4.123
ΔRISK	Changes in risk	205	-.024	.195	-1.222	1.124
LIQUID	Liquidity	205	.453	.192	.025	.971
LNSIZE	Size	209	10.976	2.479	.978	14.386
ROA	Return on Assets	209	.008	.019	-.076	.077
INV	Investments	201	.319	.127	.039	.626
CAP_{t-1}	Lagged Capital	207	.323	.736	.043	7.066
ΔCAP	Changes in capital	206	.055	1.086	-1.717	13.866
$RISK_{t-1}$	Lagged risk	207	.617	.246	.071	1.847
NPL	Asset quality	186	.134	.142	.002	1.105

In the capital equation, a business cycle fluctuation (CYCLEGAP) has a negative and significant effect on changes in capital *(ΔCAP)*. It indicates the counter-cyclical fluctuations of capital, in the sense that capital increase as economic conditions worsen. It implies that in Pakistan, high capital banks may not adjust their capital immediately due to business cycle fluctuations. It may be due to the reason that high capital buffer banks meet the minimum capital requirement and hold capital above the minimum requirement.

Capital buffer theory assumes that there may be two arguments for the counter-cyclical fluctuations of capital buffer as suggested by Ayuso (2004), (Stolz, 2007), one may imply shortsightedness; in order to account for the rising credit risks for not being able to build up surplus capital during the upturns of the business cycle. Hence, banks have to increase their capital while experiencing the downturns of the business cycle. As against this, demand-side effects could also be witnessed as a negative sign, because the rising loan demand decreases (or increases) the capital of banks during the upturns of the business cycle. There is a positive and significant impact of business cycle fluctuations *(CYCLEGAP)* on changes in portfolio risk. It refers to supply side effect as argued by Stolz (2007) that during upturn rising loan demand increase bank risk.

Adjustments in portfolio risk *(ΔRISK)* have a negative and significant impact on adjustments in capital *(ΔCAP)*. It implies that high capital buffer banks reduce portfolio risk to build capital. The result does not support the hypothesis that adjustments in bank capital are positively affected by the adjustments in portfolio risk for high capital buffer banks. On the other hand, adjustments in capital *(ΔCAP)* has a negative and significant effect on adjustments in portfolio risk *(ΔRISK)* at $p<0.01$. It implies that high capital buffer banks increase their capital while reducing risk. The result does not support the hypothesis that adjustments in bank portfolio risk are positively affected by the adjustments in capital for high capital buffer banks. It implies that in order to comply with the regulations, banks raise their capital and diminish portfolio risk. There is a two-way coordination in capital and portfolio risk for high capital buffer banks. Contrary to expectations, the results reject the prediction of capital buffer theory that after the adjustment period, when capital buffers are reinstated, then bank capital as well as risk show growing trends (Milne & Whalley, 2001; Rime, 2001; Stolz, 2007). However, in Pakistan the coordination of capital and risk adjustments is the same with low and high capital buffer banks. It runs conversely from risk to capital and vice versa. The results are

consistent with the previous studies (Aggarwal & Jacques, 2001; Hussain & Hassan, 2005; Godlewski, 2005).

Liquidity *(LIQUID), LNSIZE*, Profitability *(ROA) and* Investments in Government securities *(INV)* has an insignificant impact on changes in capital *(ΔCAP)*. Liquidity *(LIQUID)* has also an insignificant impact on changes in portfolio risk *(ΔRISK)*.

LNSIZE has a negative and significant impact on changes in portfolio risk *(ΔRISK)*. It implies that large high capital buffer banks diversify their asset portfolio risk but not substantially. On the other hand, profitability *(ROA)* has a positive and significant impact on changes in portfolio risk *(ΔRISK)*. The magnitude shows that higher profitability may induce high capital buffer banks for risky investments. Merger *(DyMERGER)* has a negative and significant impact on changes in capital *(ΔCAP)*. Merger *(DyMERGER)* has also a negative and significant impact on changes in portfolio risk *(ΔRISK)*. It indicates that banks' risk diminishes due to merger. Ghosh (2008) also found a negative impact of merger on risk. In contrast, Stolz (2007) argued that risk of high capital buffer banks increases when weakly capitalized banks are merged with them. *(INV)* on changes in portfolio risk *(ΔRISK)* is a negative and significant. It shows changes in investments decrease portfolio risk. Hussain and Hassan (2005) asserted that banks with higher ratios on investments in the portfolios of their assets because of the presence of government securities tend to show low risk levels.

Lagged capital (CAP_{t-1}) parameter estimates show the speed of adjustments in the capital ratio to desired levels and it has a negative and significant impact with parameter estimates of 0.31. On the other hand, lagged risk $(RISK_{t-1})$ parameter estimates show the speed of adjustments in portfolio risk to desired levels and it is negative and significant with parameter estimates of 0.26. Meanwhile, an amplitude of the estimates shows that banks with high capital adjust their capital faster than risk. Athanasoglou (2011) reported a fast speed of adjustment of capital for high capital buffer banks. Non-performing loans *(NPL)* have a positive and significant impact on changes in portfolio risk *(ΔRISK)*. Table 8.4 shows the Simultaneous Equations Results estimated by the three-stage least squares method for high capital buffer banks.

Table 8.4: 3SLS Results for High Capital Buffer Banks

Independent Variables	ΔCAP			Independent Variables	ΔRISK		
	Beta Coefficient	t-value	p-value		Beta Coefficient	t-value	p-value
CONSTANT	0.180**	2.193	0.030	CONSTANT	0.893***	17.305	0.000
$CYCLEGAP_2$	-0.055***	-4.418	0.000	CYCLEGAP	.048*	1.886	0.061
ΔRISK	-0.078***	-3.850	0.000				
LIQUID	-0.018	-0.639	0.524	LIQUID	-0.025	-1.317	0.190
LNSIZE	-0.025	-1.402	0.806	LNSIZE	-1.364***	-3.328	0.001
ROA	0.008	1.236	0.218	ROA	0.668*	1.757	0.091
DyMERGER	-0.018***	-0.639	-0.004	DyMERGER	-0.067**	-2.010	0.046
INV	-0.114	-1.112	0.268	INV	-0.282***	-2.550	0.010
CAP_{t-1}	-0.315***	-3.129	0.002	ΔCAP	-0.217***	-2.442	0.010
				$RISK_{t-1}$	-0.264***	-6.068	0.000
				NPL	0.963***	2.972	0.003
F ratio	214.25***		0.000	F ratio	195.26***		0.000
R2	0.662			R2	0.651		

***, ** and * indicate statistical significance at the 1, 5, and 10 per cent level, respectively

CHAPTER NINE

THE IMPACT OF THE BUSINESS CYCLE ON BANKS' CAPITAL BUFFER AND PORTFOLIO RISK

In Table 9.1, Descriptive statistics of capital buffer and portfolio risk analysis for banks show that an average change in absolute capital buffer *(ΔAbBUF)* is 2% and average lagged absolute capital buffer is 24%. It indicates that banks are increasing the capital buffer under regulatory requirement. An average change in risk-weighted assets *(ΔRISK)* is -1% and the average lagged risk is 67%. It shows that banks are managing their risk-weighted assets while maintaining a capital buffer. Average liquidity *(LIQUID)* is 42% and average *ROA* is -7%.

Table 9.1: Descriptive Statistics of Variables

Variables	Definitions	Obs	Mean	Standard Deviation	Min	Max
CYCLEGAP	Business Cycle	411	0.34	1.94	-3.80	4.12
ΔRISK	Changes in risk	364	-0.01	1.22	-16.08	16.47
LIQUID	Liquidity	406	0.42	0.22	0.02	3.05
LNSIZE	Size	411	10.99	2.15	0.97	14.38
ROA	Return on assets	410	-0.07	1.61	-32.65	0.14
INV	Investments	370	0.26	0.14	0.003	1.39
$AbBUF_{t-1}$	Lagged capital buffer	409	0.24	1.02	-0.14	17.03
ΔAbBUF	Changes in absolute capital buffer	367	0.02	0.86	-4.13	13.86
$RISK_{t-1}$	Lagged risk	366	0.67	0.88	0.07	17.00
NPL	Non- performing loans	363	0.12	0.13	0.0001	1.10

The estimation results in the absolute capital buffer *(ΔAbBUF)* equation suggest that adjustments in the capital buffer *(ΔAbBUF)* are significantly and adversely affected by business cycle fluctuations *(CYCLEGAP)*. The negative coefficient indicates that the capital buffer fluctuates counter-cyclically. In other words, the capital buffer increases with the worsening of economic conditions. Capital buffers fluctuate pro-cyclically or counter-cyclically depending on whether materializing for credit risk is provided by banks in a downturn through raising capital buffers in an

upturn trend (Stolz, 2007; Stolz & Wedow, 2011). The result contradicts the capital buffer theory assumption, there may be two arguments for the counter-cyclical fluctuation of the capital buffer as suggested by Ayuso (2004) (Stolz, 2007), one may imply shortsightedness; in order to account for the rising credit risks for not being able to build up a capital buffer during the upturns of the business cycle. Hence, banks have to increase their capital buffer while experiencing the downturns of the business cycle.

As against this, demand-side effects could also be witnessed as a negative sign, because the rising loan demand decreases (or increases) the capital buffers of banks during the upturns of the business cycle. The result also suggests that the Basel III counter-cyclical capital buffer justifies the financial stability. It is accumulated in economic upturns to be used in economic downturns, which may indicate a rise in non-performing loans and a cut in lending (Tabak, et al., 2011). There is also a positive and significant impact of business cycle fluctuations *(CYCLEGAP)* on changes in portfolio risk *(ΔRISK)*. It indicates that banks' portfolio risk increases as economic conditions improve. It refers to the supply-side effect as argued by Stolz (2007) that during an upturn, a rising loan demand increases bank risk.

Changes in portfolio risk *(ΔRISK)* have a negative and significant impact on changes in the absolute capital buffer *(ΔAbBUF)*. It may indicate that most of the assets of Pakistani banks are tied up in risk-free government securities. Changes in the absolute capital buffer *(ΔAbBUF)* have a negative and significant effect on changes in portfolio risk *(ΔRISK)* reflecting that banks increase their capital buffer by reducing asset portfolio risk and there is a two-way relationship between adjustments in the capital buffer and portfolio risk. The result is in line with the finding of Guidara et al. (2013). It may imply that banks maintain a capital buffer in Pakistan by holding substantial investments in risk-free government securities. The results also depict the clear situation of Pakistani banks since according to the SBP; an average banking sector's capital adequacy ratio during the period 2004-2017 was above the minimum capital adequacy requirement, ranging from 10.5% to 15.8%. On the other hand, during the same period the investments in government debt securities increased from Rs 0.66 trillion to Rs 7.33 trillion (State Bank of Pakistan, 2017). This scenario clearly shows the inverse relationship between capital buffer and portfolio risk.

Liquidity *(LIQUID)* has a positive and significant impact on changes in the absolute capital buffer *(ΔAbBUF)*. Hence, an unexpected positive effect shows that banks with higher levels of liquid assets in their portfolios also uphold higher capital buffers. An alternative interpretation for this positive impact may be such that banks hold high capital buffers by minimizing the denominator in the capital to risk-weighted ratio. Moreover, liquid assets comprise cash, balances with banks, call money lending, repo lending, federal government securities and provincial government securities. Hence government securities in liquid assets reduce the weightage of risk. Stolz and Wedow (2011) defined a positive relationship to provide for the corresponding market risk. Shim (2013) suggested a liquidity source is used when external financing is costly in the presence of market frictions. Liquidity *(LIQUID)* has a negative but insignificant impact on changes in portfolio risk *(ΔRISK)*.

LNSIZE, Return on Assets *(ROA)* and Investments in Government securities *(INV)* have a negative but insignificant impact on changes in the absolute capital buffer *(ΔAbBUF)*. Similarly, on the other hand, *LNSIZE* and Merger *(DyMERGER)* also have an insignificant impact on changes in portfolio risk *(ΔRISK)*. This reflects that size has no influence on portfolio risk.

Return on Assets *(ROA)* has a positive and significant impact on changes in portfolio risk (ΔRISK). It shows that higher profitability may induce banks to increase risk for higher returns. Merger *(DyMERGER)* has a negative and significant impact on changes in the absolute capital buffer *(ΔAbBUF)*. It reflects that acquiring banks are typically better capitalized before a merger and when weakly capitalized banks are merged with healthy banks, a decrease in capital buffer is expected in the year of merger. Kleff and Weber (2008), and Azeem (2015) also argued that to rescue financial distress, capital is consumed by merger.

Merger *(DyMERGER)* has a positive but insignificant impact on changes in portfolio risk *(ΔRISK)*. It indicates that an acquirer bank is quite healthy for a distress merger so that merger could not significantly have effect on portfolio risk. The effect of Investments in government securities *(INV)* on changes in portfolio risk *(ΔRISK)* is negative and significant. It implies that the bank asset portfolio comprises less risky investments and Pakistani banks may increase the capital buffer by decreasing risk-weighted assets.

Lagged absolute capital buffer capital *($AbBUF_{t-1}$)* parameter estimates show the speed of adjustments in the capital buffer to desired levels and it is negative and significant with parameter estimates of -0.38. On the other hand, lagged risk *($RISK_{t-1}$)* parameter estimates show the speed of adjustments in portfolio risk to desired levels and it is negative and significant with parameter estimates of -0.077. The amplitude of the estimates shows that banks adjust the capital buffer faster than portfolio risk. Non-performing loans *(ΔNPL)* have a positive and significant impact on changes in portfolio risk *(ΔRISK)*. It indicates that by adjustments in non-performing loans, the portfolio risk also increases. In Pakistan non-performing loans amounted to Rs 604.6 billion by the end of 2014 (State Bank of Pakistan, 2014). Moreover, NPLs jumped to Rs 611.8 billion by September, 2017 but total risk-weighted assets reached Rs 8282.2 billion in December, 2017 from Rs 6307.7 billion in 2011 (State Bank of Pakistan, 2017). Table 9.2 presents the Simultaneous Equations Results estimated by the three-stage least squares method (3SLS) for capital buffer and portfolio risk analysis.

Table 9.2: 3SLS Estimations for Capital Buffer and Portfolio Risk Analysis

	ΔAbBUF				ΔRISK		
Independent Variables	Beta Coefficient	t-value	p-value	Independent Variables	Beta Coefficient	t-value	p-value
CONSTANT	(0.494)***	14.86	0.000	CONSTANT	(0.358)***	8.437	0.000
CYCLEGAP	(-0.321)***	-13.15	0.000	CYCLEGAP	(0.399)**	12.826	0.040
ΔRISK	(-0.043)***	-2.675	0.007				
LIQUID	(0.002)***	1.235	0.021	LIQUID	(-0.002)	-1.583	0.114
LNSIZE	(-0.001)	-0.789	0.430	LNSIZE	(-0.007)	-1.492	0.150
ROA	(0.150)	6.894	0.212	ROA	(0.499)***	5.027	0.000
DyMERGER	(-0.332)***	-13.07	0.000	DyMERGER	(0.007)	-1.650	0.699
INV	(-0.013)	-3.850	0.320	INV	(-0.411)***	-12.677	0.000
$AbBUF_{t-1}$	(-0.381)**	-4.903	0.030	ΔAbBUF	(-0.241)***	-7.218	0.000
				$RISK_{t-1}$	(-0.077)*	-3.015	0.060
				ΔNPL	(0.317)***	8.338	0.000
F ratio	45.399***		0.000	F ratio	25.38***		0.000
R^2	0.5089			R^2	0.602		

***, ** and * indicate statistical significance at the 1, 5, and 10 per cent level, respectively

CHAPTER TEN

CONCLUSION

This study investigated capital and risk behavior in three parts. The first part examined the effect of regulatory pressure on the capital and portfolio risk of Pakistani banks. The study also examined the impact of business cycle fluctuations on adjustments of capital and portfolio risk in order to elucidate whether banks behave pro-cyclically or counter-cyclically over the business cycle. The second part investigated how low capital buffer and high capital buffer banks adjust capital and portfolio risk and the third part investigated the impact of business cycle fluctuations on bank capital buffer and portfolio risk. Moreover, the simultaneous equation model with partial adjustments has been estimated by using the three-stage least squares (3SLS) method during the period 2004-2017.

This study concludes that due to regulatory pressure, undercapitalized banks are able to increase their capital to meet the minimum capital requirement but regulatory pressure exerts no influence on portfolio risk adjustments of banks having capital less than the minimum capital requirement. There is a pro-cyclical fluctuation of capital in the sense that capital increases as economic conditions improve. Similarly, portfolio risk also increases, with a small magnitude, as economic conditions improve. It may be due to the reason that Pakistani banks increase their capital to risk-weighted assets to meet the minimum capital requirements due to investments/loan demand in upturns and this situation in turn affects the risk-weighted assets in the portfolio. Heavy investments in government securities and less deployment of funds towards the corporate sector may bring a small increase in portfolio risk. Moreover, banks with high ratios of government securities in their asset portfolios will be exhibiting lower levels of risk and high non-performing loans (low asset quality) are increasing asset portfolio risk. The quality of assets is not only consequential of risks behavior, but also an influencing factor on the risk taken by the bank. To control and bring down the assets risk, Pakistani banks started investing in government securities and by the end of June 2018 total investments of the banking sector amounted to Rs 7.372 trillion.

It is found that in Pakistan, the coordination of capital and risk adjustments is the same for low and high capital buffer banks. An adjustment in capital is negatively affected by the adjustments in portfolio risk and vice versa. Contrary to expectations, the results for high capital buffer banks reject the prediction of the capital buffer theory that after the adjustment period, when capital buffers are reinstated, then bank capital as well as risk show growing trends. Moreover, high capital buffer banks lagged behind in adjustment in capital and risk as compared to low capital buffer banks. The results indicate that low and high capital buffer banks increase their risk-weighted assets as profitability enhances. Consequently, it affects asset quality.

The study also concludes that bank capital buffer fluctuates counter-cyclically and it indicates that banks increase the capital buffer as economic conditions worsen. The counter-cyclical fluctuation of the capital buffer, as suggested by Ayuso (2004) (Stolz, 2007), may imply shortsightedness; in order to account for the rising credit risks for not being able to build up capital buffer during the upturns of the business cycle. As against this, demand-side effects could also be witnessed as a negative sign, because the rising loan demands decrease (or increase) the capital buffers of banks during the upturns of the business cycle. On the contrary, business cycle fluctuations have a pro-cyclical impact on portfolio risk adjustments and indicate that during upturns rising loan demand increases bank risk.

Policy Implications

It is recommended that in the present financial market of Pakistan, the overcapitalized banks should invest in international markets, like the purchase of Euro bonds, foreign currencies, gold or other precious minerals. The banks should also work on enhancing their product line and offering of multiple leasing alternatives to consumer markets. Hence, to fulfill the capital buffer requirement by the Basel III, with the increase in the risk profile of the portfolio, banks should have sufficient capital built up at all times to protect themselves from defaults and to help lessen contagion risk in the economy. However, in recessions due to under stress conditions, banks' capital might decrease on account of booking of losses. Recently, the State Bank of Pakistan announced that the capital adequacy ratio with the inclusion of the capital conservation buffer will be gradually increased to 12.5% by the end of 2019. It is the regulator's duty to ensure that banks have a sufficient surplus capital built up at all times to help

protect the banks, their depositors and the economy at large. In Pakistan, the existing capital adequacy requirements imposed on the banking institutions are effective to control banks' risk-taking. However, precautions should also be in place because the results show that higher capital adequacy requirements have unintended effects whereby banks responded to the higher capital by decreasing their risk-taking and increasing their investments in government securities. By the end of December 2015, Pakistani banks' investments in government debt securities stood at Rs 6.33 trillion out of Rs 6.96 trillion (Iqbal, 2016). It also affects the assets portfolio. In Pakistan, total risk-weighted assets reached Rs 8,282.2 billion in December, 2017 from Rs 6,307.7 billion in 2011 (State Bank of Pakistan, 2017). Thus, it is recommended that exposure to government bonds/treasury bills should be reduced. This will enable banks to deploy the funds in loans to the corporate sector, agricultural and SME sectors which will boost the economic activity in the country.

It is recommended that mergers and acquisitions should be encouraged for smaller banks to ensure they have a larger capital base. Since 2008 some of the smaller banks have had a tough time to improve their CAR because of (i) their previously acquired poor quality assets, and (ii) their inability to turn their losses into profits and thereby stop their capital from decreasing. In order to increase the CAR banks needs to fund their investment or lending operation either through fresh borrowing or through equity injection. Since small banks have weaker balance sheets, the capacity to borrow also weakens and fresh deposits with the bank require a higher deposit rate or costs high to the bank. This in turn reduces bank margins leading to either low profitability or losses owing to a higher persisting cost-to-income ratio. When such banks opt for the second option of fresh equity flow, they face difficulty in raising capital through equity markets, which generally demand high discount to subscribe the right shares. Regulators and policy makers should play a major role in mergers and acquisitions of banks.

Lately, interest rates have been increased to two digits. However, going into fiscal year 2017, inflation is likely to attain a higher plateau due to a variety of reasons: firstly, relatively faster pickup in demand compared to its gradually improving supply dynamics could lead inflation on the higher side. Secondly, the recent spike in international energy prices especially crude oil prices is yet to be incorporated in our country. This will result in higher fuel prices and, in turn, higher food prices. Thirdly, some risks, such as the imposition of new taxation measures and an increase in

electricity and gas tariffs, if realized, would put upward pressure on CPI inflation (The Express Tribune, 2016). Since higher potential inflation in the coming months is expected so there may be little room available to economists to reduce the interest rate any further. There is a floor on deposit rates for the banks that is limiting their spread with easing interest rates. Therefore, if the banks opt to maintain their spreads/margins they must seek higher yield alternatives; which in the present scenario are core banking i.e. lending to the private sector. Policy makers should maintain the existing capital adequacy requirement and ensure its compliance in order to control the risk-taking of the banking institutions.

Moreover, it is evident that in Pakistan, non-performing loans amounted to Rs 604 billion at the end of 2014 as compared to Rs 611.8 billion by September 2017 (State Bank of Pakistan, 2017). The banks may restructure the non-performing asset which is to outsource that business function gradually, and for some time raise more capital by liquefying the available stocks, that will help the bank to recover itself in the short run. On the other hand, recently Pakistan's senate standing committee on finance approved the Corporate Restructuring Companies Bill 2016, which allows the creation of corporate restructuring companies, public limited companies that will take over the assets of bankrupt companies and transform them into financially and operationally viable corporates. They will be licensed and regulated by the Securities and Exchanges Commission of Pakistan (SECP). The bill will benefit banks by enhancing their recovery efforts and strengthening their ability to resolve problematic assets in a timely manner since restructuring companies can purchase non-performing loans from banks and restructure the defaulters. This will result in greater ease of getting rid of non-performing loans and cleaning bank balance sheets and with fewer problem assets, banks will increase lending to the private sector (Moody's Global Credit Research, 2016). In this regard the regulators should ensure the smooth implementation of the process.

APPENDIX A

SCHEDULED BANKS AND THEIR BRANCHES IN PAKISTAN

End of Period	Pakistani Banks		Foreign Banks		Total	
	No. of Banks	No. of Branches	No. of Banks	No. of Branches	No. of Banks	No. of Branches
1986 Jun.	9	6,955	22	60	31	7,015
Dec.	9	6,988	22	62	31	7,050
1987 Jun.	9	7,023	23	63	32	7,086
Dec.	9	7,061	25	65	34	7,126
1988 Jun.	9	7,141	28	65	37	7,206
Dec.	9	7,168	28	65	37	7,233
1989 Jun.	9	7,188	25	66	34	7,254
Dec.	10	7,222	25	66	35	7,288
1990 Jun.	10	7,337	26	67	36	7,404
Dec.	10	7,372	27	67	37	7,439
1991 Jun.	10	7,480	26	69	36	7,549
Dec.	10	7,477	29	72	39	7,549
1992 Jun.	18	7,538	28	71	46	7,609
Dec.	20	7,574	27	70	47	7,644
1993 Jun.	20	7,634	27	71	47	7,705
Dec.	20	7,648	27	73	47	7,721
1994 Jun.	21	7,663	26	72	47	7,735
Dec.	23	8,055	26	79	49	8,134
1995 Jun.	25	8,200	25	73	50	8,273
Dec.	25	8,345	26	77	51	8,422
1996 Jun.	25	8,387	28	82	53	8,469
Dec.	25	8,450	27	82	52	8,532

1997 Jun.	25	8,446	27	84	52	8,530
Dec.	25	8,190	27	88	52	8,278
1998 Jun.	25	7,921	27	91	52	8,012
Dec.	25	7,867	27	93	52	7,960
1999 Jun.	25	7,841	27	94	52	7,935
Dec.	25	7,779	27	95	52	7,874
2000 Jun.	25	7,755	26	92	51	7,847
Dec.	24	7,741	25	87	49	7,828
2001 Jun.	24	7,165	25	88	49	7,253
Dec.	24	6,898	25	90	49	6,988
2002 Jun.	25	6,878	24	88	49	6,966
Dec.	24	6,869	22	80	46	6,949
2003 Jun.	24	6,834	22	82	46	6,916
Dec.	26	6,823	20	81	46	6,904
2004 Jun.	28	6,803	17	79	45	6,882
Dec.	27	6,959	17	90	44	7,049
2005 Jun.	28	7,014	17	91	45	7,105
Dec.	28	7,234	17	114	45	7,348
2006 Jun.	30	7,296	17	125	47	7,421
Dec.	32	7,644	13	60	45	7,704
2007 Jun.	34	7,691	13	64	47	7,755
Dec.	34	8,101	12	68	46	8,169
2008 Jun.	33	8,274	12	69	45	8,346
Dec.	33	8,655	13	89	46	8,744
2009 Jun.	32	8,686	13	97	45	8,783
Dec.	33	8966	13	93	46	9,059
2010 Jun.	33	9,007	13	89	46	9,096
Dec.	34	9,281	12	58	46	9,339
2011 Jun.	32	9,341	12	58	44	9,399

Dec.	31	9,712	13	60	44	9,772
2012 Jun.	31	9,792	13	55	44	9,847
Dec.	31	10,262	7	33	38	10,295
2013 Jun.	31	10,332	7	29	38	10,361
Dec.	31	10,913	7	27	38	10,940
2014 Jun.	31	10,957	7	27	38	10,984
Dec.	31	11,533	6	18	37	11,551
2015 Jun.	30	11,705	5	11	35	11,716
Dec.	31	12,283	4	10	35	12,293
2016 Jun.	31	12,414	4	10	35	12,424
Dec.	30	12,983	4	10	34	12,993
2017 Jun.	30	13,029	4	10	34	13,039
Dec.	29	13,618	4	10	33	13,628

Source: State Bank of Pakistan

APPENDIX B

CAPITAL ADEQUACY SCORE OF ASIA PACIFIC BANKS

Bank Name	Country	Capital Adequacy Ratio Score
Commonwealth Bank of Australia	Australia	4
Westpac Banking Corporation	Australia	4
Australia and New Zealand Banking Group	Australia	4
National Australia Bank	Australia	4
Macquarie Bank	Australia	4
HSBC Bank Australia	Australia	3.5
AMP Bank	Australia	4
Bank of Queensland	Australia	3.5
Citibank Australia	Australia	5
Members Equity Bank	Australia	3.5
Bendigo and Adelaide Bank	Australia	3.5
Suncorp-Metway	Australia	4
ING Bank (Australia)	Australia	3.5
Rabobank Australia	Australia	4
Islami Bank Bangladesh	Bangladesh	3
Agrani Bank	Bangladesh	2.5
Janata Bank	Bangladesh	2.5
Sonali Bank	Bangladesh	2.5
Bank Islam Brunei Darussalam	Brunei	4.5
Industrial and Commercial Bank of China	China	4
Agricultural Bank of China	China	3.5
Bank of China	China	4
China Construction Bank Corporation	China	4
Bank of Fushun	China	4
Bank of Baoding	China	4.5
Guangdong Huaxing Bank	China	4
Bank of Chengde	China	3.5
Wuhan Rural Commercial Bank	China	3.5
Shanghai Rural Commercial Bank	China	4

Nanyang Commercial Bank (China)	China	4.5
Citibank (China)	China	4.5
Bank of Taizhou	China	4
Chongqing Rural Commercial Bank	China	3.5
Postal Savings Bank of China	China	3.5
Bank of Shanghai	China	4
Bank of Guiyang	China	3
Bank of Zhengzhou	China	3.5
Bank of Huzhou	China	4
Zhejiang Xiaoshan Rural Commercial Bank	China	3.5
Guangdong Nanhai Rural Commercial Bank	China	4
Nanchang Rural Commercial Bank	China	4
Bank of Jining	China	3.5
Bank of Guangzhou	China	3.5
Xiamen International Bank	China	3.5
Bank of Chengdu	China	3.5
Mianyang City Commercial Bank	China	3
China Merchants Bank	China	4
Bank of Changsha	China	3
Chengdu Rural Commercial Bank	China	3.5
Chang'an Bank	China	3
Bank of Ningbo	China	3.5
Jiangxi Bank	China	3.5
Bank of Luoyang	China	4
Bank of Cangzhou	China	4
Foshan Rural Commercial Bank	China	4
Huishang Bank	China	3.5
Qilu Bank	China	4
Wuxi Rural Commercial Bank	China	4
Deutsche Bank (China)	China	5
Bank of Taian	China	3
Zhejiang Tailong Commercial Bank	China	3.5
Bank of Qingdao	China	4.5
Bank of QinHuangDao	China	3.5
Bank of Gansu	China	3
Bank of Huludao	China	3
Bank of Communications	China	3.5
Xiamen Bank	China	4
Bank of Hangzhou	China	4

Bank of Chongqing	China	3.5
Hankou Bank	China	3.5
Bank of Ganzhou	China	3.5
Shengjing Bank	China	3.5
China Zheshang Bank	China	3.5
Chongqing Three Gorges Bank	China	3.5
Industrial Bank	China	3.5
Bank of Jinzhou	China	3
Bank of Weifang	China	3.5
Bank of Dalian	China	3
Guangzhou Rural Commercial Bank	China	3.5
Bank of Jiujiang	China	2.5
Bank of Xi'an	China	3.5
Harbin Bank	China	3.5
Bank of Lanzhou	China	3.5
Bank of Nanjing	China	3.5
China Bohai Bank	China	3
Zhuhai Rural Commercial Bank	China	3.5
Bank of Beijing	China	3.5
Bank of Jiangsu	China	3.5
Bank of Kunlun	China	4.5
Jiangsu Changshu Rural Commercial Bank	China	3.5
Jiangsu Wujiang Rural Commercial Bank	China	3.5
United Overseas Bank (China)	China	4.5
Shanghai Pudong Development Bank	China	3.5
Bank of Anshan	China	3.5
China Everbright Bank	China	3.5
Weihai City Commercial Bank	China	3.5
Ningbo Commerce Bank	China	4
Bank of Jiaxing	China	3
Zhejiang Wenzhou Longwan Rural Commercial Bank	China	0
Zhongyuan Bank	China	3.5
Guangdong Shunde Rural Commercial Bank	China	3.5
Jiangsu Zhangjiagang Rural Commercial Bank	China	3.5
Bank of Suzhou	China	3.5
China CITIC Bank Corporation	China	3

Zhejiang Chouzhou Commercial Bank	China	3.5
Jiangsu Zijin Rural Commercial Bank	China	3.5
Jilin Jiutai Rural Commercial Bank Corporation	China	3.5
Jiangsu Jiangyin Rural Commercial Bank	China	4
China Minsheng Banking Corporation	China	3
Tianjin Rural Commercial Bank	China	4
Hubei Bank Corporation	China	3.5
Sichuan Tianfu Bank	China	3.5
Yantai Bank	China	3.5
Bank of Hebei	China	3.5
Longjiang Bank Corporation	China	3
Ping An Bank	China	3
Bank of Jilin	China	2.5
Leshan City Commercial Bank	China	3.5
Bank of Liaoyang	China	3.5
Bank of Fuxin	China	3
Hua Xia Bank	China	3.5
Bank of Shaoxing	China	3
China Resources Bank of Zhuhai	China	3.5
Bank of Tianjin	China	2.5
Bank of Yingkou	China	2.5
Bank of Ningxia	China	3.5
Shanghai HuaRui Bank	China	3.5
DBS Bank (China)	China	4
Fudian Bank	China	3.5
China Guangfa Bank	China	2.5
Bank of Rizhao	China	3.5
Bank of Jinhua	China	4
Zhejiang Mintai Commercial Bank	China	3.5
Bank of Tangshan	China	3.5
Chinese Mercantile Bank	China	3.5
LinShang Bank	China	3.5
Bank of Inner Mongolia	China	3
Hankou Rural Commercial bank	China	4
Ningbo Yinzhou Rural Commercial Bank	China	4
OCBC Wing Hang Bank China	China	5
BNP Paribas (China)	China	4
Dongguan Rural Commercial Bank	China	4

Sumitomo Mitsui Banking Corporation (China)	China	5
Bank of Xingtai	China	3
Mizuho Bank (China)	China	4.5
Bank of Urumqi	China	4
Bank of Dongguan	China	4
Beijing Rural Commercial Bank	China	4
Guilin Bank	China	3
Guangxi Beibu Gulf Bank	China	3
Tianjin Binhai Rural Commercial Bank Corporation	China	3.5
Jiangsu Kunshan Rural Commercial Bank	China	4
Standard Chartered Bank (China)	China	4.5
Bank of Langfang	China	3
Bank of Wenzhou	China	3
Bank of Handan	China	3.5
Laishang Bank	China	4
Jiangsu Haian Rural Commercial Bank	China	3.5
Qingdao Rural Commercial Bank	China	3.5
Bank of Shizuishan	China	3.5
JPMorgan Chase Bank (China)	China	5
Hangzhou United Rural Commercial Bank	China	4
Yibin City Commercial Bank	China	3
KEB Hana Bank (China)	China	4
Australia and New Zealand Bank (China)	China	5
Qishang Bank	China	3.5
Dongying Bank	China	3
Bank of Qinghai	China	3.5
Guangdong Nanyue Bank	China	3
Guiyang Rural Commercial Bank	China	0
Great Wall West China Bank	China	0
Fujian Haixia Bank	China	3.5
HSBC Bank (China)	China	4.5
MUFG Bank (China)/Bank of Tokyo Mitsubishi UFJ (China)	China	4
Panzhihua City Commercial Bank	China	0
Bank of Liuzhou	China	0
Bank of East Asia (China)	China	3.5
Hang Seng Bank (China)	China	3.5
Fubon Bank (China)	China	3.5

ChangChun Rural Commercial Bank	China	0
Bank of China (Hong Kong)	Hong Kong	5
Hang Seng Bank	Hong Kong	5
HSBC	Hong Kong	5
Industrial and Commercial Bank of China (Asia)	Hong Kong	4.5
Citibank (Hong Kong)	Hong Kong	5
Nanyang Commercial Bank	Hong Kong	5
Bank of East Asia	Hong Kong	4.5
Chong Hing Bank	Hong Kong	4.5
Standard Chartered Bank (Hong Kong)	Hong Kong	5
Wing Lung Bank	Hong Kong	5
Chiyu Banking Corporation	Hong Kong	5
Shanghai Commercial Bank	Hong Kong	5
China Construction Bank (Asia)	Hong Kong	4.5
Dah Sing Financial Holdings	Hong Kong	5
DBS Bank (Hong Kong)	Hong Kong	5
China CITIC Bank International	Hong Kong	5
OCBC Wing Hang Bank	Hong Kong	4.5
Fubon Bank (Hong Kong)	Hong Kong	5
HDFC Bank	India	4
HSBC Bank India	India	5
Citibank India	India	5
IndusInd Bank	India	4
YES BANK	India	5
City Union Bank	India	4.5
Kotak Mahindra Bank	India	5
RBL Bank	India	4
State Bank of India	India	3.5
Deutsche Bank India Branches	India	4
Karnataka Bank	India	3.5
Indian Bank	India	3.5
Vijaya Bank	India	3.5
Federal Bank	India	4
ICICI Bank	India	4.5
IDFC Bank	India	4.5
South Indian Bank	India	3.5
AXIS Bank	India	4.5
Karur Vysya Bank	India	4
UCO Bank	India	3
Bank of Maharashtra	India	3
Bank of Baroda	India	3.5

DBS Bank India	India	4.5
IDBI Bank	India	2.5
Jammu & Kashmir Bank	India	3
Canara Bank	India	3.5
Andhra Bank	India	3
Tamilnad Mercantile Bank	India	4
United Bank of India	India	3.5
Punjab & Sind Bank	India	3
Union Bank of India	India	3
Oriental Bank of Commerce	India	2.5
Indian Overseas Bank	India	2
Allahabad Bank	India	1.5
Dena Bank	India	3
Bank of India	India	3.5
Standard Chartered Bank India	India	4.5
Syndicate Bank	India	3.5
Central Bank of India	India	2
Lakshmi Vilas Bank	India	2
Punjab National Bank	India	2
Corporation Bank	India	0
Bank Central Asia	Indonesia	5
Bank Rakyat Indonesia	Indonesia	5
Bank Negara Indonesia	Indonesia	5
Bank Mandiri	Indonesia	5
Bank HSBC Indonesia	Indonesia	5
Bank OCBC NISP	Indonesia	4.5
MUFG Bank – Jakarta Branch	Indonesia	5
Bank Mega	Indonesia	0
Bank CIMB Niaga	Indonesia	5
Bank Permata	Indonesia	5
Bank Danamon Indonesia	Indonesia	5
Bank Tabungan Pensiunan Nasional	Indonesia	5
Bank UOB Indonesia	Indonesia	4.5
Panin Bank	Indonesia	5
Bank Pembangunan Daerah Jawa Barat dan Banten	Indonesia	5
Bank Tabungan Negara	Indonesia	5
Bank Maybank Indonesia	Indonesia	4.5
Bank Bukopin	Indonesia	3
Sumitomo Mitsui Financial Group	Japan	5
Mitsubishi UFJ Financial Group	Japan	4.5
Mizuho Financial Group	Japan	5
Seven Bank	Japan	5

Rakuten Bank	Japan	3
Aozora Bank	Japan	2.5
Shinsei Bank	Japan	3.5
Japan Post Bank	Japan	4.5
Hachijuni Bank	Japan	5
SBI Sumishin Net Bank	Japan	2
Suruga Bank	Japan	3.5
Tokyo Star Bank	Japan	2
Sony Bank	Japan	2.5
Shizuoka Bank	Japan	4
Hokkoku Bank	Japan	3.5
Japan Net Bank	Japan	5
Shinhan Bank Japan	Japan	2.5
Yamaguchi Financial Group	Japan	3.5
Eighteenth Bank	Japan	3
San-In Godo Bank	Japan	4
First Bank of Toyama	Japan	3
ORIX Bank Corporation	Japan	2.5
Resona Holdings	Japan	2.5
Chiba Bank	Japan	3.5
Iyo Bank	Japan	4
77 Bank	Japan	2.5
Chugoku Bank	Japan	3.5
Shiga Bank	Japan	4.5
Awa Bank	Japan	3
Towa Bank	Japan	3
Toho Bank	Japan	2
Hiroshima Bank	Japan	3
Daishi Bank	Japan	2.5
Concordia Financial Group	Japan	3.5
Fukuoka Financial Group	Japan	2
Kyushu Financial Group	Japan	3
Bank of Kyoto	Japan	3
Gunma Bank	Japan	3.5
Shikoku Bank	Japan	2.5
Oita Bank	Japan	2.5
North Pacific Bank	Japan	3.5
Bank of Okinawa	Japan	2.5
Mebuki Financial Group	Japan	2.5
Bank of Iwate	Japan	3.5
Hyakugo Bank	Japan	2.5
Akita Bank	Japan	3
Yamagata Bank	Japan	3
Nagano Bank	Japan	2.5

Aomori Bank	Japan	2.5
Nanto Bank	Japan	2
AEON Bank	Japan	3.5
Tochigi Bank	Japan	3.5
Hyakujushi Bank	Japan	2
Senshu Ikeda Holdings	Japan	3
Kiyo Bank	Japan	2
Hokuetsu Bank	Japan	2
Keiyo Bank	Japan	2.5
Bank of Nagoya	Japan	3.5
Kinki Osaka Bank	Japan	2.5
Juroku Bank	Japan	2
Daiwa Next Bank	Japan	5
Ehime Bank	Japan	1.5
Daito Bank	Japan	2
Tomony Holdings	Japan	1.5
Hokuhoku Financial Group	Japan	2
Fukui Bank	Japan	2
Bank of the Ryukyus	Japan	2
Saikyo Bank	Japan	1.5
Aichi Bank	Japan	3
Miyazaki Bank	Japan	2
Fidea Holdings	Japan	2
Michinoku Bank	Japan	1.5
Miyazaki Taiyo Bank	Japan	2.5
Tottori Bank	Japan	2
Nishi-Nippon Financial Holdings	Japan	2
Minato Bank	Japan	1
Kita-Nippon Bank	Japan	2.5
Musashino Bank	Japan	2
Chukyo Bank	Japan	1.5
Shimizu Bank	Japan	2.5
Tajima Bank	Japan	1.5
Ogaki Kyoritsu Bank	Japan	2
Chiba Kogyo Bank	Japan	1.5
Bank of Saga	Japan	1
Tsukuba Bank	Japan	1.5
MIE Bank	Japan	1.5
Tokyo Kiraboshi Financial Group (Tokyo TY Financial Group)	Japan	2
Taiko Bank	Japan	2
Jimoto Holdings	Japan	1.5
Daisan Bank	Japan	1.5
Chikuho Bank	Japan	1.5

Bank of Kochi	Japan	2.5
Tohoku Bank	Japan	1.5
Kansai Urban Banking Corporation	Japan	1
Fukushima Bank	Japan	2
Okinawa Kaiho Bank	Japan	1.5
Tomato Bank	Japan	1.5
Minami-Nippon Bank	Japan	1.5
Tokyo Tomin Bank	Japan	1
Tai Fung Bank	Macau	4
Bank of China – Macau Branch	Macau	0
Industrial and Commercial Bank of China (Macau)	Macau	4.5
Banco Nacional Ultramarino	Macau	4.5
Luso International Banking	Macau	0
Public Bank	Malaysia	4.5
Hong Leong Financial Group	Malaysia	4.5
Maybank	Malaysia	5
CIMB Group Holdings	Malaysia	4.5
BIMB Holdings	Malaysia	4.5
United Overseas Bank (Malaysia)	Malaysia	5
Citibank Malaysia	Malaysia	5
HSBC Bank Malaysia	Malaysia	5
RHB Bank	Malaysia	4.5
OCBC Bank (Malaysia)	Malaysia	5
AMMB Holdings	Malaysia	4.5
Alliance Bank Malaysia	Malaysia	5
Standard Chartered Bank Malaysia	Malaysia	4.5
Bank Muamalat Malaysia	Malaysia	5
Affin Bank	Malaysia	4.5
Bank Simpanan Nasional	Malaysia	0
ANZ Bank New Zealand	New Zealand	4
ASB Bank	New Zealand	4
Bank of New Zealand	New Zealand	3.5
Westpac New Zealand	New Zealand	4.5
Westpac Banking Corporation – New Zealand Branch	New Zealand	0
Kiwibank	New Zealand	3.5
Rabobank New Zealand	New Zealand	3.5
Bank AL Habib	Pakistan	3.5
Meezan Bank	Pakistan	3.5
MCB Bank	Pakistan	4.5
Habib Metropolitan Bank	Pakistan	4.5
United Bank	Pakistan	4
Allied Bank	Pakistan	5

National Bank of Pakistan	Pakistan	4.5
Bank Alfalah	Pakistan	3.5
Askari Bank	Pakistan	3.5
Habib Bank	Pakistan	4
Bank of Punjab	Pakistan	2
OCBC Bank	Singapore	4.5
United Overseas Bank	Singapore	5
DBS Group	Singapore	4
Bank of China – Singapore Branch	Singapore	4
Maybank Singapore	Singapore	0
Citibank Singapore	Singapore	5
HSBC Bank (Singapore)	Singapore	5
Standard Chartered Bank (Singapore)	Singapore	5
KB Financial Group	South Korea	4
Shinhan Financial Group	South Korea	4
Hana Financial Group	South Korea	4
Woori Bank	South Korea	4
Industrial Bank of Korea	South Korea	4
Suhyup Bank	South Korea	4
Standard Chartered Bank Korea	South Korea	4
Citibank Korea	South Korea	5
DGB Financial Group	South Korea	3.5
JB Financial Group	South Korea	3.5
BNK Financial Group	South Korea	3.5
Bank of Ceylon	Sri Lanka	4
Commercial Bank of Ceylon	Sri Lanka	4
People's Bank	Sri Lanka	3.5
Hatton National Bank	Sri Lanka	4.5
National Savings Bank	Sri Lanka	4
Bank of Taiwan	Taiwan	3.5
Mega International Commercial Bank	Taiwan	4
Taipei Fubon Commercial Bank	Taiwan	3.5
CTBC Bank	Taiwan	4
King's Town Commercial Bank	Taiwan	4
Cathay United Bank	Taiwan	4
E. Sun Commercial Bank	Taiwan	4
Shanghai Commercial & Savings Bank	Taiwan	3.5
First Commercial Bank	Taiwan	3.5
Citibank Taiwan	Taiwan	4.5
Yuanta Commercial Bank	Taiwan	4
Bank SinoPac	Taiwan	4

KGI Bank	Taiwan	4
Land Bank of Taiwan	Taiwan	3.5
Taiwan Cooperative Bank	Taiwan	3.5
Chang Hwa Commercial Bank	Taiwan	3.5
Standard Chartered Bank (Taiwan)	Taiwan	4.5
Union Bank of Taiwan	Taiwan	4
Hua Nan Commercial Bank	Taiwan	4
Sunny Bank	Taiwan	3.5
Far Eastern International Bank	Taiwan	4
Taishin International Bank	Taiwan	4
O-Bank	Taiwan	3.5
Ta Chong Bank	Taiwan	4.5
Taiwan Shin Kong Commercial Bank	Taiwan	3.5
Taiwan Business Bank	Taiwan	3.5
DBS Bank (Taiwan)	Taiwan	3
Agricultural Bank of Taiwan	Taiwan	3.5
Bank of Panhsin	Taiwan	3
Jih Sun International Bank	Taiwan	4
EnTie Commercial Bank	Taiwan	3.5
Bank of Kaohsiung	Taiwan	2.5
Taichung Commercial Bank	Taiwan	3.5
Chunghwa Post	Taiwan	0
HSBC Bank (Taiwan)	Taiwan	4
Bank of China – Taipei Branch	Taiwan	0
Bangkok Bank	Thailand	5
Siam Commercial Bank	Thailand	4.5
Kasikornbank	Thailand	4.5
Government Savings Bank	Thailand	3.5
Citibank Thailand	Thailand	3.5
Krung Thai Bank	Thailand	4.5
Thanachart Bank	Thailand	5
TISCO Financial Group	Thailand	5
Bank of Ayudhya	Thailand	4.5
Kiatnakin Bank	Thailand	4.5
United Overseas Bank (Thai)	Thailand	5
TMB Bank	Thailand	4.5
Land and Houses Bank	Thailand	5
Industrial and Commercial Bank of China (Thai)	Thailand	4
Sumitomo Mitsui Banking Corporation – Bangkok Branch	Thailand	5
Government Housing Bank	Thailand	4
CIMB Thai Bank	Thailand	4.5

Mizuho Bank – Bangkok Branch	Thailand	4.5
BDO Unibank	The Philippines	4
Metropolitan Bank & Trust Company	The Philippines	4
Bank of The Philippine Islands	The Philippines	3.5
Philippine National Bank	The Philippines	4
Security Bank Corporation	The Philippines	4.5
Union Bank of the Philippines	The Philippines	4
China Banking Corporation	The Philippines	4
Land Bank of the Philippines	The Philippines	3
East West Banking Corporation	The Philippines	4
Rizal Commercial Banking Corporation	The Philippines	4
United Coconut Planters Bank	The Philippines	1.5
Citibank Philippines	The Philippines	4.5
Vietcombank	Vietnam	3
Techcombank	Vietnam	3.5
Military Commercial Bank	Vietnam	3.5
Asia Commercial Bank	Vietnam	3
Vietinbank	Vietnam	0
Vietnam Bank for Agriculture and Rural Development	Vietnam	0
Bank for Investment and Development of Vietnam	Vietnam	0
Vietnam Prosperity Bank	Vietnam	4
Ho Chi Minh City Development Bank	Vietnam	3.5
Sai Gon Commercial Bank	Vietnam	2
Saigon-Hanoi Bank	Vietnam	3
Sacombank	Vietnam	3
Lien Viet Post Bank	Vietnam	0
Vietnam Exim Bank	Vietnam	4

	Capital Adequacy Ratio										
Measurement Range	5	4.5	4	3.5	3	2.5	2	1.5	1	0.5	0
Weight	>18%	16.18%	14.16%	12.14%	11.12%	10.11%	9.10%	8.9 0%	6.8 0%	0.60%	<0

5 = Highest score, 0 = Lowest Score

Source: Asian Banker Research

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