IMPACT OF CAPITAL REGULATION ON BANKS' PERFORMANCE: EVIDENCE FROM PAKISTAN

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CERTIFICATE

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Author's Declaration

I Saba Ishaq hereby state that my MS thesis titled "IMPACT OF CAPITAL REGULATION ON BANKS' PERFORMANCE: EVIDENCE FROM PAKISTAN" is my own work and has not been submitted previously by me for taking any degree from this University Pakistan Institute of Development Economics Islamabad, Pakistan or anywhere else in the country/world.

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Dedication

I dedicate my effort to my beloved family and honorable teachers who always guided me. Their love, kindness, encouragement, appreciation have brought to the place where I stand today.

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All and every praise are upon Almighty ***Allah***; ***HE*** has always bestowed upon me the courage and strength and has given direction to complete this thesis. I would like to thank ***HIM*** for the blessings and pray to ***HIS*** guidance and protection throughout my life. At this moment of accomplishment, I am greatly indebted to my supervisors, who guided.me to conduct research required research and draft thesis.

ABSTRACT

This study analyzes the impact of capital regulation and other determinants on the banks' performance in Pakistan using panel data for the period of 2006-2018. Study period covers three capital regulation regimes i.e. Basel I, II and III and hence, respective minimum capital regulatory ratios are used in construction of proxy of Capital Regulation (capital buffer). To achieve the objective of this study three different Generalized Method of Moment regression equations are estimated each with a different indicator of profitability (Return on assets, Return on equity, Net Interest Margin). Study sample include 37 banks in total. Among these 32 are commercial banks and five are Islamic banks. Results show that the Capital Regulation has crucial role in determining banks performance in Pakistan. In Pakistan's banking sector, capital regulations are quite supportive to manage bank's portfolios and act as a catalyst in earning higher profits.

Keywords: Capital Regulation, Capital Buffer, Return on Assets, Return on Equity, Net Interest Margin, Risk, Banks' Performance

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LIST OF ABBREVIATIONS

ROA	Return on assets
ROE	Return on equity
NIM	Net Interest Margin
BS	Bank Size
CR	Capital Regulation
GDP	Gross Domestic Product
Lev	Leverage
PSX	Pakistan Stock Exchange
GMM	Generalized Method of Moment
IFS	International Financial Statistics
CAR	Capital Adequacy Ratio
MENA	Middle East and North Africa
BCBS	Basel Committee of Banking Supervision
EU	European Union
USA	United States of America
UK	United Kingdom
CALMS	Capital adequacy, Asset quality, Management, Earnings, Liquidity, and Sensitivity

CHAPTER 1

INTRODUCTION

International financial system has experienced various shocks in the form of financial crisis since 1980s. Financial crunch lead to bankruptcy with stock market crash leading to economic recession around major world economies. Global financial crisis 2008 also raised serious concerns on existing instruments and methodologies used to hedge risk and improve financial sector health. For this, various reforms have been suggested to improve banking sector governance and minimize risks.

One of the major international intervention was made by Basal committee[1]. Prior to financial crisis Basal committee formulated Basal I and Basal II accords that aimed to formulate capital regulation for international banking system by keeping track of size of banks equity to its investment in risky assets. These accords assigned more weight to credit risk (Basal I), market and operational risk (Basal II) in calculating the overall size of risk. Post financial crisis and increased banking sector challenges came up with Basal III that emphasis on need for hedging risk through equity financing. All these capital regulations made by Basal committee aimed to make banking sector a shock absorber and more stable against financial and economic crisis.

Literature suggests two different school of thoughts on impact of capitalization on performance of banking sector. Some are of the view that there exist a positive association between banks capital and profitability (Haris *et al*. 2019a, Bouzgarrou *et al*. 2018, Siew Peng and Mansor 2017, Sun *et*

[1] Committee on Banking Supervision is the primary global standard setter for the prudential banks regulation. It provides a forum to solve banking supervisory.

al. 2017, Athanasoglou *et al*. 2008). Higher capital especially in the form of equity creates more room to overcome recessionary pressures as more reserves helps banks to maintain their profitability (Admati *et al*. 2010, García-Herrero *et al*. 2009, Athanasoglou *et al*. 2008, Pasiouras and Kosmidou 2007).

Regulatory hypothesis also strengthens positive association between capital and risk. (Rashid & Khalid 2018) study reports a positive association between Pakistan's banks capital level & their risk taking behavior. Regulatory authority keeps check and balance to raise enough capital in accordance with the risky assets to insulate bankruptcy (Dietrich and Wanzenried 2011).

Some studies like Khan *et al*. (2016) indicates negative relationship between banks capital and profitability. The key concern for them is that high capital and reserves leads to banking sector inefficiency and thus reduce their profits. More reserves indicate less investment in business and assets that can have an opportunity to amplify profits. Khan *et al*. (2016) study showed that capital buffer, bank size, and high deposit ratios restricts banks from taking risk and negatively affects banks profitability. Also, in case the presence of regulator, moral hazard leads to negative association between capital and risk.

Agency theory and Financial Intermediation theory provide theoretical support for capital regulations to enhance performance of banking sector. They also highlight the importance of regulatory reforms to better manage conflict of interest between stakeholders and create maximum value by managing risk and utilizing available financial resources in the country more effectively.

Present study explores the impact of the pre- & post-global financial crisis period capital regulation on banking sector performance in Pakistan. Also, the impact of Basel I, II and III varies across countries thus the present study unveils the relationship between capital regulation banks performance in case of Pakistan.

Pakistan's banking industry has been supportive for development and economic growth of the country. In Pakistan banking system is operating under a concept of tow-tier pattern according to the directions provided in the Act of State Bank of Pakistan (SBP). Banking system in Pakistan is diverse and includes commercial banks, Islamic banks, state owned banks, specialized banks, development finance institutions and microfinance banks (Zafar and Aziz, 2013).

In the last decades, the banking industry has performed well in Pakistan. The statistics published in various reports of SBP and specifically in latest issue of The Economic Survey of Pakistan show an increasing trend on most of the banking sector's performance indicators like total assets, investments, advances, deposits and equity during 2015-2019 (see for details, Table 1.1).

Table 1.1: Highlights of the Banking Sector Industry

	Key Variables (Rs billion)				
	CY15	CY16	CY17	CY18	CY19
Total Assests	14,143	15,831	18,342	19,682	21,991
Investments(net)	6,881	7,509	8,727	7,914	8,939
Advances (net)	4,816	5,499	6,512	7,955	8,249
Deposits	10,389	11,798	13,012	14,254	15,953
Equity	1,323	1,353	1,381	1,406	1,658
Source: The Economic Survey of Pakistan (2019-2020)					

Like rest of the world, banking system in Pakistan also has been subject to various capital regulations in last decades. The purpose of this research is to deeply analyze the external governance mechanism effect such as the capital regulation relative to performance of the Pakistani banks (both conventional and Islamic banks).

1.1 Overview of Capital Regulation (Basel Accords)

Regulatory Capital Standards in Pakistan: ("Basel Accord & Implementation", 2016) In Pakistan, banks, Micro financial Banks (MFBs) and Development Finance Institutions (DFIs) are required to meet with two capital standards. These two standards are:

1. Minimum Capital Requirement (MCR)
2. Capital Adequacy Ratio (CAR)

Minimum Capital Requirement (MCR):

It is an absolute amount of capital paid-up / assigned capital (net of losses) determined by SBP. MCR is mandatory for each bank, DFI and MFB.

Capital Adequacy Ratio (CAR):

It is tool for assessing capital adequacy of Financial Institutions. It is calculated as the ratio of Total Eligible Capital (TEC) to Total Risk Weighted Assets (TRWAs). Currently in Pakistan, CAR is set at 10.25% and will be gradually increased to 12.5% by December 31, 2019 as per Basel III instructions with the inclusion of capital conservation buffer for banks/ DFIs.

History of Basel Capital Framework

The emergence of the Basel Capital Framework is connected with the breakdown of the Bretton Woods (a system of managed exchange rates) in 1973. After the collapse of Bretton Woods, various banks suffered large foreign currency losses. On 26 June 1974, the fact revealed that Bankhaus Herstatt's foreign exchange exposure amount is three times more to its capital.

Consequently, West Germany's Federal Banking Supervisory Office withdrew banking licence of Bankhaus Herstatt and this act caused an international dimension chaos because foreign banks (outside from Germany) bore losses on their unsettled trades with Herstatt. In October the same year, another bank named as the Franklin National Bank of New York also closed its doors after having heavy foreign exchange losses.

At the end of 1974 as reaction to theses disruptions in Global financial Markets, a meeting of the central bank Governors of G10 countries held in Basel and they formed a committee on

banking regulatory and supervisory practices. Later this committee formally named the Basel Committee of banking Supervision (BCBS). Major purpose of this committee is to enrich financial stability by improved quality of banking supervision globally.

The committee chose to accomplish its objectives by setting minimum standards for the regulation and supervision of banks; by sharing supervisory issues, methods and techniques to help common understanding and to promote and improve cross-border cooperation; and by trading information on developments in banking sector and financial markets to help recognize present and upcoming risk for global financial system.

In current scenario 28 jurisdictions has membership of BSBC, countries who are member of BCBS their central banks are presenting their banking sector. Decisions made by the Committee have no legal binding. Rather, after formulation committee recommends sounds supervisory standards & guidelines and expects that nations will adopt these standards. Basel Accords are the series of Capital Regulation, formulated and suggested by the BCBS.

Ashraf *et al*. (2016) Basel-I Accord came into existence since 1988, Basel II implemented in 2007 and Basel III was developed by the Basel Committee on Banking Supervision in 2010-11 and was scheduled to be introduced from 2013, Below is the detail description pf of three Basel Accords.

Basel-I

- Objectives:
    - To require banks to maintain enough capital to absorb losses without causing systemic problems,
    - To avoid competitiveness conflicts

- Consists of four pillars
    - **Constituents of capital:** *Tier 1 capital* of (a) Paid-up share capital/common stock (b) Disclosed reserves and *Tier 2 capital* consisting of undisclosed reserves, Revaluation reserves, General provisions/general loan-loss reserves, Hybrid debt capital instruments and Subordinated term debt.
    - **Risk weighted system:** *The risk weights (credit risk)* include only five weights: 0, 10, 20, 50 and 100%.
    - **The target standard ratio:** *A target standard ratio* is the ratio of capital to weighted risk assets set at 8% (of which the core capital elements has to be at least 4%).
    - **Transitional and implementation arrangements**
- Risk weighted amount (RWA) consists of
    - Sum of risk weight times asset amount for no-balance sheet items
    - Sum of risk weight times credit equivalent amount for off-balance sheet items
    - Amendments (1998): Bank to measure and hold capital for market risk for all instruments in addition to the BIS Accord credit risk capital
- **Implementation of Basel-I Capital Framework in Pakistan**
    - SBP implemented Basel I in 1997 vide BPRD Circular # 36 of November 4, 1997. However, these guidelines only accounted for credit risk faced by the banks. Subsequently, vide BSD Circular # 12 of August 25, 2004, another version of Basel I framework was introduced which included criteria for the calculation of risk weighted assets for market risk as well.

Basel-II

- Consists of three pillars

- **Minimum capital Requirements:** the banks should measure the risk weighted assets providing the due weightage to the three types of risks such as credit risk, market risk and operational risk
- **Supervisory Review Process:** it is basically intended to ensure that the banks should have enough capital bases to support all the risks associated with the banks business process.
- **Market Discipline:** Disclosure of a banks 's capital and risk-taking positions are recommended to be released to the general public

- **Definition of Capital**
  - Tier 1 capital + Tier 2 capital
  - Total risk-weighted assets are determined by:
    - Multiplying the capital requirements for market risk and operational risk by 12.5 and adding the resulting figures to the sum of risk-weighted assets for credit risk.
  - Tier one capital to total risk weighted credit exposures to be not less than 4%
  - Total capital (i.e. tier one plus tier two less certain deductions) to total risk weighted credit exposures to be not less than 8%
  - Tier two capital may not exceed 100% of tier one capital
- Supervisory Review and Market Discipline
  - Banks should have a process for assessing and maintaining their overall capital adequacy.
  - Supervisory should review and evaluate banks' internal capital adequacy assessments and strategies.
  - Supervisors should expect banks to operate above the minimum regulatory capital ratio.

- Supervisors should intervene at an early stage to prevent capital from falling below the minimum levels
- The purpose of pillar three is to complement the pillar one and pillar two.
- Develop a set of disclosure requirements to allow market participants to assess information about a bank's risk profile and level of capitalization.

- **Implementation of Basel-II Capital Framework in Pakistan**
  - SBP implemented Basel II in 2008 vide BSD Circular # 8 of June 27, 2006. The subject guidelines required the banks to calculate their risk based capital (CAR) against credit, market and operational risks under Pillar 1 whereas rest of the risks are to be covered under Pillar 2.

Basel-III

- Objectives
  - To improve the banking sector's ability to absorb shocks arising from financial and economic stress, whatever the source,
  - To improve risk management and governance
  - To strengthen bank's transparency and disclosures.
- **Better Capital Quality:** Introduction of much stricter definition of capital. Better quality capital means the higher loss-absorbing capacity. Greater focus on common equity.
- **Capital Conservation Buffer:** The buffer will range from 0% to 2.5%, consisting of common equity or other fully loss absorbing capital.
- **Minimum Common Equity and Tier 1 Capital Requirements:** The minimum requirement for common equity, the highest form of loss-absorbing capital, has been raised under Basel III from 2% to 4.5% of total risk-weighted assets

- **Leverage Ratio:** Basel III norms include a leverage ratio to serve as a safety net. A leverage ratio is the relative amount of capital to total assets (not risk-weighted). 3% leverage ratio of Tier 1 will be tested before a mandatory leverage ratio is introduced in January 2018
- **Systemically Important Financial Institutions (SIFI):** As part of the macro-prudential framework, systemically important banks will be expected to have loss-absorbing capability beyond the Basel III requirements.
- **Liquidity Ratio:** Under Basel III, a framework for liquidity risk management will be created. A new Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) are to be introduced in 2015 and 2018, respectively
- The NSFR is defined as the amount of available stable funding relative to the amount of required stable funding.
- "Available stable funding" (ASF) is defined as the portion of capital and liabilities excepted to be reliable over the time horizon considered by the NSFR, which extends to one year. The amount of stable funding required ("Required stable funding") (RSF) of a specific institution is a function of the liquidity characteristics and residual maturities of the various assets held by that institution as well as those of its off-balance sheet (BOS) exposures.
- Liquidity coverage ratio is the ratio of high quality liquid assets to total net cash outflows over next 30 calendar days
- **Comparison between Basel-II and III**

Requirements	Under Basel II	Under Basel III
Minimum Ratio of Total Capital to RWAs	8%	10.50%
Minimum Ratio of Common Equity to RWAs	2%	4.50% to 7.00%
Tier 1 capital to RWAs	4%	6.00%
Core Tier 1 capital to RWAs	2%	5.00%

Capital Conservation Buffers to RWAs	None	2.50%
Leverage Ratio	None	3.00%
Countercyclical Buffer	None	0% to 2.50%
Minimum Liquidity Coverage Ratio	None	Yes
Minimum Net Stable Funding Ratio	None	Yes
Systemically important Financial Institutions Charge	None	Yes

- **Implementation of Basel-III Capital Framework in Pakistan**
    - SBP implemented Basel III in phased manner staring from December 31, 2013 to December 31, 2019 wherein CAR + CCB requirements are to be increased from 10% to 12.50% in a gradual manner.

1.2 Research Gap

The State Bank of Pakistan (SBP) is the sole authority that implement & monitor capital related requirements of capital. Its objective is to strengthen the performance (profitability) and solvency of financial institutions, for this sake, with the changing international economic conditions SBP adopted all Capital Regulations (Basel I, II & III accord). Globally Capital regulation adoption has mixed outcomes on profitability of banks in different economies, capital buffer is a significance apparatus to test the Cr impact on banks' performance.

However, it is important to evaluate the impact of capital regulation on banks' performance and in literature different countries had investigated this relationship (Bagntasarian *et al.* 2019, Tabak *et al.* 2017, Zheng *et al.* 2017, Ozili *et al*. 2017, Tran *et al.* 2016,Vianney *et al.* 2013, Lee *et al.* 2013, Naceur *et al.* 2009, Naceur *et al*. 2011). There is ample literature in Pakistan related to

effects of Capital Regulation (Basel Accords) on banking sector that determines the significance of capital regulation in this economy (Haris *et al*. 2020, Ibrahim (2019), Butt *et al*. 2020).

Moreover, In Pakistan different studies had used different indicators to investigate the capital regulation and performance relationship but capital buffer remain untouched. Whereas, a gap that is aim to cover in literature through this study, is to use capital buffer is an indicator of capital regulation to assess the behavior of profitability in Pakistani banks. Considering capital regulation (capital buffer) this proxy enables the study to observe the effect of capital regulations (Basel I, II and Basel III) on banks' performance with considering regulatory ratio variability respectively.

Capital buffer is calculated by taking the difference between banks' capital ratio and the Regulatory ratio. By using latest available data, the present study contributes to literature by analyzing the impact of two latest capital regulations on banking sector of Pakistan with diverse set of commercial as well as Islamic banks in its sample.

1.3 Problem statement

Capital regulation is an important determinant of banks' performance and hence profitability. Global financial crisis highlighted role of capital regulation even more. The impact of capital regulation on banking sectors' performance has been widely studied in the literature. Nevertheless, it is a broad research area as capital regulation impacts banks' performance via different channels. Therefore, modeling capital regulation and analyzing its impact is not straight forward.

In Pakistan banking sector is growing fast. However, pre and post global financial crisis capital regulation impact on banking sector is still under explored. Also, capital regulation has different impact on varying performance indicators. Thus this study uses three different types of indicators (ROA, ROE, NIM) to gauge banks' performance. It controls for other important

determinants of performance like banks' risk, size, leverage and country annual GDP growth rate along with Capital Regulation to isolate its impacts on performance of banks.

1.4 Research question

This study attempts to answer the following research question:

1. Does the Capital Buffer affect the Banks' Financial Performance in Pakistan

1.5 Research Objective

Broad objective of the study was to investigate how capital regulation impacts banks performance in Pakistan.

1.6 Significance of the study

In Pakistan's banking industry, this research is significantly beneficial for all the stakeholders in several ways, few are elaborated below.

- **Policymakers:**This study is useful for policy makers to understand the impact of CR on banking sector performance specifically on ROA, ROE and NIM of banks in Pakistan.
- **Regulators:** Present study explains regulator how its intervention in the form of CR in banking sector has resulted in Pakistan. Meaning that SBP can have an idea about the direction of effect of CR on performance of banking sector in Pakistan based on results of this study. Like, Result of the first model describe a decrease in profitability. ROA of banking industry negative translates that banks who have significantly large share in the banking industry their performance overshadows the other banks. SBP need to analyze deeply which factor of CALMS[2] system is handled carelessly by the banks.
- **Creditors and Investors:** This study supports to resolve the moral hazard problem between investors, creditors and banks.

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[2] Regulatory banking authorities use CAMELS as an international rating system to rate financial institutions. CAMELS acronym stands for "Capital adequacy, Asset quality, Management, Earnings, Liquidity, and Sensitivity."

Organization of the thesis

This study is organized as follows: Chapter No 2 explains the literature review. Chapter No 3 explains the Data and Methodology of the study. Chapter No 4 presents the results and discussion conclusion of the study and the last Chapter 5 is comprised of conclusion of the study.

CHAPTER 2

LITERATURE REVIEW

Given the comprehensive nature of the regulatory reform in a country, impacting a wide range of institutions, markets and business activities, it is understandable that the study of banking sector is quite important. While generally supporting the underlying objectives of the regulatory reform by recognizing the responsibilities of the financial institutions many researchers have conducted studies and a vast literature exist.

In this chapter we provide brief summary of existing literature related to banking sector's performance and its association with capital regulations and other factors like bank risk and size, leverage and GDP growth rate of the country. The chapter consists two sections, first section presents theoretical background of the study and second section reviews empirical evidences from international literature as well as studies from Pakistan.

2.1 Theoretical Background

2.1.1 Agency theory

Agency theory works with two dimensions that is the relationship between agent and principal. Agent is a representative of the principal. Particularly in the business transaction context, agents supposed to perform in the best interest of the principal disregard self-interest (Vianney *et al*. 2013). When interest of bank and principal differs than a conflict arises because of the miscommunication and disagreement. Incompatible desires may create a wedge between each stakeholder that generates many inefficiencies in the business termed as principal-agent problem. The principal-agent problem appears when the interest of an agent and principal differs. Thus, sound policies are helpful to minimize the principal-agent problem in companies and institutions.

Regulations save common man interest against the other stakeholders (self-interest group of individuals i.e stakeholders or firms). Regulators emphasize on providing all the information

that is required for decision making just to protect common man interest on the other hand when private interest arises enforced rules are used to accommodate selected personnel instead of the public interest Howells and Bain (2004).

2.1.2 Financial Intermediation Theory

Theory of financial intermediation is based on the idea that intermediaries play a role in cost reduction and correcting information asymmetries. Financial intermediation is an economic process of value-creating. Advancement in information technology, financial markets deregulation tends to decrease transaction costs and information asymmetries. However, some are of the view that financial intermediation theory seems like intermediation becomes useless as it does not justify the concept of financial intermediation.

There are some important points about the theory of financial intermediation that are helpful to understand and better explains the actual behavior and existence of real-life financial intermediaries. Financial intermediation is favorable when it is not backed by information asymmetries and there is no commercial or personal motive involved. In addition to this, banks serve as risk manager and shock absorbers they drive value creation by managing several types of risks simultaneously. For example, market risk, operational risk, maturity risk, counterparty risk, etc. are involved and are managed. Diversified portfolios are maintained to provide security to risk averse savers and policy maker. Financial intermediaries are independent financial institutions and they actively participate in the financial system. Savers are most risk averse as compare to investors. Unlike individuals, financial institutions present themselves as an important entity with sound reputation, asset base and ability to hedge risk.

When intermediation activity is fueled or backed by information asymmetries and there is no commercial motive behind the elimination of the financial intermediation. Bank risk management and risk drives the value creation. Risk absorption and management is the core function of the banking business.

2.1 International literature on Banking

Various important international studies focus on the banking sector and are reviewed here. Ibrahim *et al.* (2019) examined the impact of capital regulation on the Islamic banking performance. The panel data set of 13 countries is used for this analysis and its time duration was 2000 to 2014. Other than capital regulation there are other common bank specific variables such as bank size, liquidity, and cost inefficiency. In finding small Islamic banks found less stable and less profitable, in addition to this small Islamic banks also cut their lending growth as for them capital regulation became more stringent. Moreover, with low liquidity and high capital holding capital regulation impact on Islamic banks profitability is negative.

Lee *et al.* (2013) conducted a study using dynamic panel data of banks for forty-two countries from Asia. Study period consists 1994-2008. This study observed the effects of capital regulation on profitability and risk of banks. Using the GMM for dynamic panels this study expressed the results country-wise i.e categorically, investment banks findings show the lowest and positive effect on profitability in terms of capital regulation and the highest reverse effect on risk in commercial banks in terms of capital regulations. Secondly, low-income countries' banks show a higher impact on profitability in terms of capital regulation. Lower middle-income countries' banks have the highest reverse capital impact on risk, while the opposite effect in banks in high-income countries.

Thirdly, in the Middle East banks hold the highest capital effect on profitability with the largest reverse capital impact on risk in the largest reverse capital impact on risk occurs in Far East. & the Central Asian banks have the lowest one being the Middle Eastern countries' banks.

Another study by Altunbas *et al.* (2007) investigated the association among capital, efficiency and risk. They used a large sample of European banks over the period of 1992 to 2000. The study, however, found no positive association between inefficiency and the risk-taking by banks. It found that more capitalized inefficient European banks take on less risk. A positive

relation is evident between capital and less risk. This study also found that there is a positive influence on reducing bank risk-taking and capital levels by the corporate's financial strength. Comparing commercial and savings banks, they found no notable differences in the relation between risk, capital and efficiency. However, there were few co-operative banks in the study. Their results depict that a reverse relation between capital levels and risks, this study also finds that inefficient banks possess lower capital levels.

Ozili *et al*. (2017), study explores into the determinants of profitability for the sample of African banks. Employing static and dynamic panel estimation method, the findings indicate that total regulatory capital, loan-loss provisions and bank size significantly determine the ROA of listed banks in comparison to non-listed banks. Compared to non-listed banks, regulatory capital has a substantial increasing effect on the return on assets of listed banks, particularly when listed banks have enough regulatory capital ratio. This study found that higher regulatory thresholds show a negative impact on the performance of non-listed banks.

Naceur *et al.* (2011) considered commercial bank net interest margins and profitability across a pool of Middle East and North Africa (MENA) countries. It analyzed the effect of bank regulation, concentration, and financial as well as institutional development on these banks. The results suggested that bank-specific attributes like credit risk and bank capitalization have a significantly positive effect on cost efficiency, NIM and profitability. There is no substantial effect of macroeconomic indicators on NIM, except on inflation. The study concludes that bank specific and regulatory variables have significant impact on banks' performance.

García-Herrero *et al*. (2009) analyzed the reasons behind the Chinese bank's low profitability during the years of 1997–2004. This study found that better-capitalized banks were more profitable. It also found that bank profitability can be increase by a less concentrated banking system. Study indicates that the four (state-owned) commercial banks – and the largest in China– have been the major hindrance for the system's profitability.

Pasiouras and Kosmidou (2007) in their paper studied that how overall environment and specific characteristics of banks affected profitability of banks including domestic, commercial, and foreign banks operating in fifteen EU countries in the period of 1995–2001. The results indicated that the bank specific characteristics along with the macroeconomic conditions and financial market structure affect profitability of foreign and domestic banks. Their analysis reflected that massive amount of reserve may not be efficient and might lead to a decline in profits.

Another important work done by Dietrich and Wanzenried (2011) observed that capitalization negatively affected profitability for Swiss banks, in the span of 2007-2009. Kosmidou *et al*. (2007), found that there was strong correlation between profits and the capitalization level in a study of Greek banks doing business in international markets (foreign markets). Tran *et al*. (2016) added that in higher capitalized banks regulatory capital is negatively connected to banks' profitability. However, the effect is opposite for the lower capitalized banks.

Khan *et al*. (2016) using United States of America data provide empirical evidence that capital buffers and bank size normally handicap them from risk-taking when having lower funds. Banks risk taking attitude has implications for its profits. In this way, study concludes that bank's risk and profits are significantly impacted by the capital requirements regulations.

Berger (1995) used annual data of commercial banks in USA during 1983-1989. A positive association between equity return and capital is reported in this study. Additional evidences like, Jokipii and Milne (2008) suggested that equity has negative relationship with profitability. Moreover, Flannery and Rangan (2008) have shown positive association between capital buffer and the banks performance. Furthermore, Nier and Baumann (2006) and Shim (2013), both also reported similar positive relation between banks capital buffer and performance. Myers (1984) also report positive relationship between capital & banks profitability.

To investigate the impact of capital buffer on the banks' performance, mostly researchers used return on assets and return on equity as proxies for banks' profitability. However, though

limited in number, some studies use NIM to model profitability. For example, Bagntasarian and Mamatzakis (2019) used NIM in addition to ROA and ROE as performance measure, in the examination of capital buffer impact on the bank's financial performance. They analyzed bank-level unbalanced panel data of 27 European Union countries (commercial and saving banks) from 2004 to 2013 to explore the impact of capital buffer on the performance of banks. The study found a positive association between capital buffer and the performance of banks (for banks that fall in the low performance regime, and vice versa). Although regulation reforms, aimed at raising capital requirements can improve bank stability and performance, the effects of these reforms are not consistent across banks.

Tabak *et al*. (2013) an empirical study was conducted in Brazil using panel data comprising quarterly information for 71 Brazilian banks. This study used ROA and ROE to find Brazilian banks' profitability determinants. Results demonstrated that there is a positive relationship between the capital buffer held by the banks and the profitability of banks. Stability in the market is the argument behind holding a higher capital buffer. In Brazilian banks there is a positive relationship between the GDP growth & profitability. Whereas, the relationship between the bank size and profitability is negative.

Based on data of six large Canadian chartered banks during the period of 1982 to 2009 Guidaraa *et al*. (2010) explored the impact of capital buffer on the performance of Canadian Banks. This study demonstrated that the Canadian banks capital buffer varies with changes in capital regulation and capital buffer has positive effect on the profitability of Canadian banks. ROA is used as an indicator of performance in this study. They also suggested that capital buffer varies more in the crisis period compared to an economic boom period and indicated that the risk exposure of banks is increased by capital buffer.

Alfon *et al*. (2004) analyzed that the regulatory requirements affect the amount of capital owned by building societies and banks in UK. They used both quantitative and qualitative

approaches to examine different determinants of capital held by banks in UK. Their result supported the argument that the amount of capital depends on regulatory environment, market discipline and on the risk management.

2.2 National Literature on Banking Sector of Pakistan

Haris *et al.* (2020) Haris *et al.* (2020) examined the relationship between the capitalization and the bank profitability in Pakistan. This study used a panel data consists of 29 Pakistani banks over the period of 2007-2018. Study employed four measures of banks profitability i.e. Return on Avg. Assets (ROAA), Return on Avg. Equity (ROAE), Net Interest Margin (NIMAR), and Profit Margin (NMAR). Generalized Method of Moments (GMM) system estimator technique is applied. Three measure are used for the capitalization i.e the Capital Ratio (CR), Capital Adequacy Ratio (CAR), and Minimum Capital Requirement (MCR). Result of this study expressed that profitability increased upto a certain level with an increase in capitalization and further increase in capitalization cause decline in profitability. This research also described that banks in Pakistan who maintained Minimum capital requirement (MCR) are more profitable than others who don't.

Tariq *et al*. (2018) evaluated the impact of different profitability determinants in Pakistan's banking sector. Using different bank specific, macroeconomic and industry specific variables they analyzed unbalanced dynamic panel data for twenty-eight banks collected over the period of 2007-2016. Analytical model used was two-step generalized method of momentum (GMM). Findings of study suggested that in Pakistan bank size, operating cost, higher solvency, market power, financial structure, labor productivity, and economic growth are important determinants of banks' profitability. They reported an inverted U-shape association of bank size and profitability. Moreover, their analysis indicated lower profitability in Pakistan's banking sector in government transition period. Results also reveal that specialized banks are earning more net interest margin compare to commercial banks.

Goraya *et al.* (2015) performed fixed effect panel analysis and under various regulatory crisis examined the behavior of banks in Pakistan over the period (2004 - 2009) with regard to capital adequacy especially when the global financial crisis hit the world. The focus in this study is to analyze institutional reaction to the changes made by the regulatory capital requirements. The study found a positive and statistically significant relationship between return on assets and the capital ratio. This finding supports the argument that to raise capital holdings, banks rely heavily on retained earnings. Further the results suggested that bank size has discouraging impact on capital. Meaning that larger banks are less likely to hold greater amounts of capital and vise-versa.

Hu *et al.* (2016) using panel data from 2005-2012 for twenty-one listed commercial banks, analyzed how risk-based capital requirements impacts banks' risk-taking behavior in Pakistan. The empirical model used in the study are bias corrected least squares dummy variable and system GMM. The findings report that tight risk-based capital requirements result in decreased assets portfolio risk. This result hold for all banks irrespective of their risk-based capital ratios levels in comparison to regulatory requirements.

Qamar *et al.* (2016) used panel data from 2001-2012 for forty-seven banks and investigated empirically pro-cyclical impacts of the Basel II induced capital regulations in Pakistan. Econometric techniques used is one step and two step GMM. Results indicate that capital buffer is not pro-cyclical and rather are counter-cyclic. However, this result does not hold for specialized banks that have significantly different operations structure. This study concludes that costs incurred for raising capital, adjustments and bankruptcy determine primarily capital buffer in Pakistan. Too big to fail hypothesis is confirmed from the findings reported in this study.

Using the same dataset, Qamar *et al.* (2016) in another analysis report that capital regulation as proposed in Basel II is pro-cyclical in Pakistan. While digging into the sample, they divided the sample in two regimes, i.e. Tier I and Tier II capital regimes. This exercise suggests that in pre-Basel regime, Tier I (positive) and Tier II (negative) capital has opposite association with loan

loss provisions. The converse finding is reported for two tiers of capital in post Basel capital regime. Loan loss provisions are influenced positively (negatively) by business cycle fluctuations in pre (post) Basel regime. It confirms the pro-cyclical impacts of new capital regulation.

Ashraf *et al*. (2016) analyzed the effects of risk-based capital requirements on bank assets portfolio risk. This study used an unbalanced panel dataset of 21 listed commercial banks of Pakistan over the period from 2005 to 2012. Capital adequacy ratio used to measure bank capital and risk-weighted assets to total assets ratio to measure bank assets portfolio risk for the main analysis. This study also examined two regulatory pressure variables to check the response of banks having actual risk-based capital ratios either lower or higher than the regulatory required minimum limits.The results confirmed that stringent risk-based capital requirements have caused a decrease in assets portfolio risk of commercial banks in Pakistan.

Rashid and Khalid (2018) analyzed bank capital is one of the most important determinant of bank risk, in this study Panel data is used to study Pakistan banks risk taking behavior during 2006-2015. Profitability, bank size interest/ financing rate are other determinants of bank risk that employed in this research. Dynamic ordinary least square (DOLS) and the two-step system generalized method of moments. Result showed a positive relationship between capital and risk taking behavior of Pakistan's banks while bank size a negative association with risk taking but interest rate is positively associated with risk.

Mostly the empirical evidences provide support to the underlying theoretical idea for banking sector regulations i.e. capital regulations help to strengthen the banking system while making it more resilient to shocks. Nonetheless, we found mixed evidences on association of banks profitability and capital regulations while controlling for other important variavles. Those reporting positive association advocate capital regulation on the grounds that it works counter-cyclically in recessionary periods (see for example, (Haris *et al*. 2019a, Mamatzakis (2019), Bouzgarrou *et al*. 2018, Siew Peng and Mansor 2017, Sun *et al.* 2017, Admati *et al.* 2010, Athanasoglou *et al*. 2008,

Bagntasarian and Athanasoglou *et al*. 2008), García-Herrero *et al*. 2009, Pasiouras and Kosmidou 2007).

However, the studies like (Khan *et al*. 2016, Ayadi *at al.* 2014, Guidara *et al*. 2013, Alfon *et al*.2004, Jokipii and Milne 2008, Nier and Baumann 2006) that found negative association between banks performance and capital regulations, discourage banking sector regulations for the reason that high capital and reserves resulting from these regulations may lead to banking sector inefficiency and thus reduce their profits. Mixed empirical evidences support the need to further investigate the association between capital regulations and banking sector performance with other controls particularly in countries like Pakistan where economy is in transition phase and its banking sector is evolving day by day.

2.3 Hypotheses

$\boldsymbol{H_0}$: Capital Buffer (CB) has no significant impact on Banks' Performance

$\boldsymbol{H_1}$: Capital Buffer (CB) has a significant impact on Banks' Performance

$\boldsymbol{H_0}$: Bank Risk (BR) has no significant impact on Banks' Performance

$\boldsymbol{H_2}$: Bank Risk (BR) has a significant impact on Banks' Performance

CHAPTER 3

DATA AND METHODOLOGY

As discussed in the previous chapter exiting literature suggests alternative variables to access capital regulation and banks performance. The present section explains data with detail description of proxies and sample of banks used in the analysis. As Basal Accords are key measures for capital regulation thus a brief overview of Basal Accords is also elaborated. In addition to this, methodology to empirically estimate the relationship between capital regulation and profitability is also explained.

3.1 Data and sample selection

The quantitative approach in this study is based on secondary data. Aim of this study is to analyze the association between capital buffer, bank risk and other determinants of banks' performance in Pakistan. Study includes all commercial and Islamic banks of Pakistan. Data is obtained from the Pakistan Stock Exchange (PSX), Business recorder (Brecorder), World development indicators (WDI), and International Financial Statistics database (IFS). Panel of 37 banks (19 Private Commercial Banks, 8 Foreign Commercial Banks, 5 Islamic Banks and 5 Public Sector Commercial Banks. [3]Specialized Banks are excluded) over the period from 2006 to 2018 is used in the study.

The criteria of selection of banks has been followed has done by Abbas *et al.* (2019) (1) status of the bank must be active on the reported date. (2) Missing values for any variables in banks must not be more than three years. (3) Only Islamic and commercial banks are included while industrial commercial banks are excluded due to their different structure. Moreover, is added

[3] Because of their different operational structure

3.2 Definitions and Measurement of Variables

To measure the banks' performance profitability is one of the significant performance indicators. In this study banks profitability is employed as dependent variable for the banks' performance analysis. It is measured by three performance indicators that are return on assets (ROA-hereafter), return on equity (ROE-hereafter) and net interest margin (NIM-hereafter). Two main independent variables in this study are capital regulation and bank risk. For the measurement of capital regulation this study employs proxy of capital buffer.

Bank size, leverage and gross domestic product growth (GDP-hereafter) are control variables employed in the analysis. Bank size (BS-hereafter) is measured by natural logarithm of total assets. Leverage (Lev-hereafter) is accessed by total liabilities over total assets of the banks. While GDP growth is used to gauge growth prospects of economy. The table below gives detail description about variables and proxies used in this study.

Table 3.1 Description of the variables

Variables	Acronym	Measurement	Reference
Dependent Variable			
Profitability	ROA	Return on assets i.e. Net income over total assets	Tabak *et al.* (2017)
	ROE	Return on equity i.e. Net income over shareholder's equity.	Rahman *et al.* (2015)
	NIM	Net interest margin i.e. ratio between the difference of interest income and interest expense to total assets.	FSA by SBP
Main variable			
Capital Buffers	CB	Difference between banks' capital ratio and the Regulatory ratio	Tabak *et al.* (2017)
Bank Risk	BR	Loan loss provision to Net Interest Revenue	Bashir *et al.* (2018)
Bank independent control variables			
Bank size	BS	Natural logarithm of total assets	Zheng *et al.* (2017)
Leverage	Lev	Calculated as annual total debt over total assets	Zheng *et al.* (2017)
Macroeconomic variables			
GDP growth	GDP	Annual GDP growth rate	Naceur *et al.*(2009)

3.3. Bank performance indicators

3.3.1 Profitability

In literature banks' performance is measured through multiple indicators. This study uses profitability to measure banks' performance. Literature suggests three most relevant profitability ratios i.e. ROA, ROE, and NIM. Detailed description of these three profitability ratios is mention below;

3.3.1.1 Return on Assets (ROA)

Following Tabak *et al*. (2017) and Rahman *et al*. (2015) study uses return on asset ratio (ROA) as the first proxy to measure banks' performance. It is an important and widely used indicator in profitability measurement it is define as net income over total assets. This ratio explains banks' earning ability of their total assets which are involved in the business. It helps in assessing banks 'administration ability that how they utilize financial resources as well as investments for earning profits.

$$ROA = \frac{Net\ Income}{Total\ assets} \tag{3.1}$$

3.3.1.2 Return on Equity (ROE)

Following Fahad & N. U. (2014), Rahman *et al.* (2015) and Ongore *et al.* (2013) study uses return on equity ratio (ROE) as second proxy to measure banks' performance. Return on equity (ROE) is obtained by dividing net income to shareholders' equity. Shareholders' equity is obtained by subtracting debt from assets. ROE is the return on net assets. So, the profits generated through shareholder's invested amount is called return on equity ROE.

$$ROE = \frac{Net\ Income}{Shareholder'\ Equity} \tag{3.2}$$

3.3.1.3 Net interest margin (NIM)

Following Afzal et al. (2012), Islam et al. (2016) and Demirguc et al. (1999) study considered net interest margin ratio (NIM) as a third proxy to measure banks' performance. NIM is an accounting-based calculation of profitability. It is widely used in the literature as an indicator of profitability. NIM highlights earning capacity of banks via their assets utilization and shows banks' ability to make right decisions about banking spread in relation to its interest expense. Banks performs intermediation role between the saver and investors (lend to investors that is borrowed from savers). NIM is defined as the difference of interest income & interest expense to total assets.

$$NIM = \frac{Interest\ Income - Interest\ Expense}{Total\ assets} \tag{3.3}$$

3.3.2 Capital Buffer

Like Tabak *et al.* (2017) used capital buffer for banks performance measurement. Capital buffer is modeled as the difference between two ratios such as bank's capital ratio i.e Capital Adequacy Ratio (CAR) & regulatory ratio. Capital ratio is bank's capital to its risk-weighted assets. Regulatory ratio defines as amount of capital a bank has to hold as required by its financial regulator. Both regulatory ratio and capital ratio is measured in terms of percentage. Under Basel I & II the regulatory minimum capital requirement in Pakistan was 8% while the updated (under Basel-III) minimum regulatory capital requirement in Pakistan is 10%. This study considers change in minimum regulatory capital requirement ratio for calculating capital buffer. As Basel-I Accord came into existence since 1988 and it was adopted by Pakistan since 1997. Basel-II Accord that is an advanced version of Basel-I came into existence in 2004 and implemented in Pakistan in 2008. While Basel Committee of Banking Supervision (BCBS) introduced Basel-III Accord in 2010 and Pakistan adopted it in 2014.

$$CB = CAR - MCR \tag{3.4}$$

3.3.3 Bank Risk

Following Bashir *et al.* (2018), this study uses the ratio of loans loss provision to net interest revenue as a proxy for bank risk. This is to study the quality of the loan of a bank. The lower value of the Bank Risk indicates Bank Risk is low and vice versa.

$$Bank\ Risk = \frac{Loan\ Loss\ Provision}{Net\ interest\ revenue} \tag{3.5}$$

3.3.4 Bank Size

Bank size variable is represented as proxy for degree of monopoly of banks in banking sector. Following Zheng *et al.* (2017), Rahman *et al*. (2015) and Naceur *et al.* (2009) study calculates bank size by taking total assets natural logarithm. Larger the size of bank greater the degree of the monopoly power. Large bank size has enabled banks to earn a higher cost of intermediation. Due to [4]economies of scale profits increases. On the basis of size of banks, risk taking incentives are different for both small and large bank.

Large banks can easily operate in market with less capital. They have more incentive and opportunities in terms of internal diverseness and additional size advantages. Large banks can take advantages of their internal diversification by participating in risky interest free income-generating activities. Therefore, on interest income large banks dependency is less as compared to small banks. However, in literature the empirical results of bank size are mixed. Berger et al.(1997) reported economies of scale for the big banks while Vander et al. (1998) showed diseconomies of scale for big banks.

$$Natural\ logarithm\ of\ total\ assets \tag{3.6}$$

[4] "The characteristics of a production process in which an increase in the scale of the firm causes a decrease in the long run average cost of each unit."

3.3.5 Leverage

Leverage is another control variable in this study. Like Zheng *et al.* (2017), Rahman *et al*. (2015) and Naceur *et al.* (2009) proxy used to determine leverage ratio is annual total debt to total assets ratio. Total Liabilities are considered as to calculate total debt in both all Islamic and commercial banks. Higher leverage ratio can be beneficial and can be costly to the bank. However, interest payments come up with tax shield as higher leverage ratio might raise profit. By contrast, higher interest payments on debt associated with a higher leverage ratio might impose pressure on bank profitability. Therefore, the effect of the leverage ratio on banks' profitability is uncertain.

$$Leverage = \frac{Total\ Debt}{Total\ assets} \tag{3.7}$$

3.3.6 GDP growth

Significant macroeconomic indicators are used by studies to consider process of planning and formulating policies. GDP Growth is often used to describe overall health of an economy. Many empirical studies such as Vong *et al.* (2009), Rahman *et al*. (2015) and Rahman *et al*. (2017) also used GDP growth as the macroeconomic variable in studying banks performance.

$$GDP\ growth\ rate = \frac{GDP_t - GDP_{t-1}}{GDP_{t-1}} \tag{3.8}$$

3.4 Methodology

In this study, the sample comprised of a panel data. Panel data can overcome the unobservable, the constant, and especially the heterogeneous attribute of overall sample i.e. banks in this study. Staikouras *et al*. (2004), Sufian *et al*. (2008) in few studies the fixed-effect model is used to analyze the banks' profitability. Tan & Y (2016) the fixed-effect model cannot handle certain issues such as [5]endogeneity, unobserved heterogeneity, and autocorrelation problems etc.

[5] Endogeneity simply means an existence of correlation between the regressors and the error term.

In this study objective is to check how CR affects banks' profitability and by construction profitability has inertia meaning that current profits are effected by previous levels or its lagged values. So the appropriate econometric technique is Panel GMM given the panel nature of the data and persistence in dependent variable. Generalized Method of Moment (GMM) pioneered by Arellano Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998).

Diagnostics checks show that Difference GMM is the most suitable technique for our analysis and it has employed vastly in literature (Dietrich *et al.* 2011, Goddard *et al.* 2013, Noman *et al*. 2017, Tan & Y 2016). Consequently, Generalized Method of Moment (GMM) based on Arellano and Bond (1991) has used for estimation.

The GMM estimator considers the dynamic adjustment to bank returns, that's, the need to use lagged dependent variable in the model to capture the dynamic behavior of banks profitability and to control for the endogeneity of the explanatory variable(s) arising from second differencing. Before applying GMM estimator three types of Panel Data Regression models such as Pooled OLS Regression Model, Fixed effect model and Random effect model & certain diagnostic test were estimated. Wald test is used for diagnosis of endogeneity issue.

In this study, EViews-9 is used for data analysis. A theoretical model to be estimated in the thesis is following: Banks' Performance = f (Capital Buffer, Bank Risk, Bank Size, Leverage, GDP growth). In dynamic panel models equations can be written in the following manner

$$Prof_{it} = \alpha + \beta_1 Prof_{it-1} + \beta_2 CB_{it} + \beta_3 BR_{it} + \beta_4 BS_{it} + \beta_5 Lev_{it} + \beta_6 GDP_t + \mu_i + v_{it} \quad (1)$$

Where α is the intercept, β denotes coefficient, suffix $_{it}$ represents bank i at time t, $Prof_{it}$ represents profitability that is dependent variable and $Prof_{it-1}$ is presenting Lag dependent variable. CB_{it} is presenting Capital Buffer, BR_{it} is presenting Bank Risk, BS_{it} is presenting Bank Size, Lev_{it} is presenting Leverage and GDP_t is representing the annual growth rate of GDP. μ_{it} denotes the

error term. We estimated three different regressions equations in which used three profitability indicators. The unit of measurement in all variables is percentage.

$$ROA_{it} = \alpha + \beta_1 ROA_{it-1} + \beta_2 CB_{it} + \beta_3 BR_{it} + \beta_4 BS_{it} + \beta_5 Lev_{it} + \beta_6 GDP_t + \mu_i + v_{it} \quad (2)$$

$$ROE_{it} = \alpha + \beta_1 ROE_{it-1} + \beta_2 CB_{it} + \beta_3 BR_{it} + \beta_4 BS_{it} + \beta_5 Lev_{it} + \beta_6 GDP_t + \mu_i + v_{it} \quad (3)$$

$$NIM_{it} = \alpha + \beta_1 NIM_{it-1} + \beta_2 CB_{it} + \beta_3 BR_{it} + \beta_4 BS_{it} + \beta_5 Lev_{it} + \beta_6 GDP_t + \mu_i + v_{it} \quad (4)$$

Where the acronyms ROA, ROE and NIM are dependent variables and ROA denotes Return on assets and ROE denotes Return on equity and NIM denotes the Net interest margin.

CHAPTER 4

RESULTS AND DISCUSSION

The sample size selected for the study consists annual observations for forty banks during 2006-18. Basic data quality checks show that 15 observations are outliers in the data. While looking at the distribution of data points these observations significantly diverge from rest of the data points overtime. There is no concrete evidence that supports these unusually high (low) values overtime in the variables included. Consequently, these observations are dropped from sample for further analysis (Scatter plots are given in appendix). Another, sample selection criterion followed in the study is to drop the banks with more than three missing values for any of the variables included in study. After basic data cleaning sample size is reduced to 3249 observations (time units equals 13 years and cross sections units equal 37 bank). Table 4.1 below reports descriptive statistics.

Table 4. 1 Descriptive statistics (%)

Variable	Mean	Std.Dev. (SD)	Min	Max
ROA	.87	2.18	-26.89	19.75
ROE	14.90	78.78	-253	1474.27
NIM	3.04	3.12	-.026	16.40
CB	5.17	7.86	-6.95	48.28
BR	2.48	14.89	-67.29	219.15
BS	8.09	0.70	6.20	9.46
Lev	0.92	0.83	0	11.92
GDP	4.16	1.48	1.61	6.18

Source: Author's calculations

ROE has highest mean and SD (14.90, 78.78) values compared to other proxies of profitability (ROA and NIM) included in this study. It ranges between -253 (losses) and 1474.27 in the sample. All profitability indicators show that the banks included in the sample are very diverse. Some are enjoying high profits while others are facing losses. So, the sample is quite heterogeneous. The mean value of The CB ranges between -6.96 and 48.28 with a mean value of 5.17. Whereas, BR has mean value of 2.48 (almost half as of CB) with a SD of 14.89 (almost double than SD of CB). BR shows higher variation compared to CB. BS and Lev have low SD values that indicates their distribution is skewed relatively in comparison to other independent variables. BS has a mean of 8.09 and Lev 0.92. Average GDP growth rate is 4.16 and it ranges from 1.61 to 6.18 showing significant variation in growth rate in the country over the study period. Descriptive stats show that the sample is valid enough to perform GMM regression analysis.

Table 4. 2: Correlations Matrix

Variables	CB	BR	BS	Lev	GDP
CB	1.00				
BR	-0.09	1.00			
BS	0.11	-0.11	1.00		
Lev	0.08	-0.02	-0.26	1.00	
GDP	0.05	0.01	0.19	0.08	1.00

Source: Author's calculations

The correlation matrix reveals the degree of association and the direction among the variables included in the analysis. It presents values of partial correlation coefficient[6] for different pairs of independent variables. This table of correlation matrix shows that among independent variables included in the study doesn't have problem of multicollinearity as the degree of

[6] Ranges between -1 (strong negative correlation) and +1 (strong positive correlation), zero indicates no correlation.

association between different pairs of independent variables is very low (mostly below 10%). Direction of association is also according to the theory. For example, BR have negative association with CB, BS and Lev. GDP has weak positive association with all other variables.

Table 4.3 depicts the results of Arellano and Bond (1991) difference GMM estimators of Return on Assets, Return on Equity and, Net Interest Margin. Empirical results of three models are presented.

Table 4. 3 : Panel Generalized Method of Moments

Variables	**(Model 1)**	**(Model 2)**	**(Model 3)**
	ROA (%)	**ROE (%)**	**NIM (%)**
L.ROA$_{t-1}$	0.3467*** (68.4789)		
L.ROE$_{t-1}$		0.1812*** (15.4418)	
L.NIM$_{t-1}$			0.47224*** (37.6331)
CB$_{it}$ (%)	-0.0374*** (-2.3889)	0.3718*** (11.2135)	0.02013*** (8.4341)
BR$_{it}$ (%)	0.0204*** (73.4294)	0.0781*** (3.2671)	-0.0495*** (-4.9188)
BS$_{it}$ (%)	-0.3622** (-2.0330)	-13.9131*** (-17.3903)	-4.5561*** (-32.8456)
Lev$_{it}$ (%)	0.5295 (1.5388)	-0.6005*** (-8.1857)	-0.5545*** (-7.7958)
GDP$_t$	0.0663*** (6.2342)	0.5330*** (20.5638)	0.3409*** (22.7990)
Number of obs.	275	246	264
J-statistic	25.57	26.18	26.18
Prob.(J-statistic)	(0.32)	(0.29)	(0.24)

Note: The subscript ***t*** refers to the year and ***i*** to bank. In Parenthesis are the robust t-Statistic. * indicates level of significance i.e. *****p<0.01, **p < 0.05, *p < 0.1**

Table 4.3 presents the results of Arellano and Bond (1991) difference GMM estimators of Return on Assets (ROA), Return on Equity (ROE) and, Net Interest Margin (NIM) against Capital Buffer (CB) and a group of variables i.e lag dependent variable, Bank Risk (BR), Bank Size (BS),

Leverage (Lev), Gross Domestic Product (GDP). As explained in data and methodology section, alternative indicators are used to model profits of banks. Shair *et al*. (2019), Dietrich *et al.* (2011) explains that studies investigating factors effecting banks' profitability often focus returns on their assets & equity as well as net interest margins.

To estimate the impact of Capital Regulation and other determinants on Performance of Banks, a balanced panel data of 37 banks of Pakistan are used from 2006 to 2018. In the sample commercial banks from different sectors are included such as 19 Private Commercial Banks, 8 Foreign Commercial Banks, 5 Islamic Banks and 5 Public Sector Commercial Banks. For the analysis of Banks' Performance, specialized banks are deliberately excluded from the sample because of their different operational structure compared to other commercial banks. A large number of banks added in the sample helps to analyze the common factors that impact banks' profitability. Also, the sample from 2006 to 2018 efficiently captures the dynamics of the relationship among the variables in the dual capital regulation regime.

During the study period we have capital regulation structure under Basal I & II (2006-2013) and III (2013 onwards). As explained in earlier sections it has important consequences for CB. Diagnostic statistics analysis guided that the suitable model to attain the aim of this study is Diff-GMM. Hence, the study employs Diff-GMM. All the variables are measured in percentage.

Capita Buffer is calculated by taking the difference of the Banks' Capital ratio and the Banks Regulatory Ratio. Data is retrieved from the financial statements of the banks which are obtained from sources like the Pakistan Stock Exchange (PSX), Business recorder (Brecorder), World development indicators (WDI), and International Financial Statistics database (IFS). In Table 4.3, Model 1-3, present the results when ROA, ROE and NIM are used as dependent variables respectively.

To consider for potential endogeneity and persistence effect in Diff-GMM framework, study included first lag of respective dependent variable in each specification. Results show that lag dependent variable has positive significant coefficient in all the specifications. It shows the existence of significant persistence in banks 'profitability no matter what indicator of profitability is used. Study reports highest impact of past profits for NIM and lowest for ROE.

Results indicate that a 1% change in ROA brings in't-1' brings about 35% change in profits in't' period. Similarly, 1% change in ROE and NIM in't-1' changes profits in't' by 18% and 47% respectively. These results are similar with Shair *et al.* (2019), Dietrich *et al.* (2011) Reason for this positive association is that profits situation in 't-1' is perceived as an indicator of better performance of bank and help attract investors' attention and confidence. Also due to the inertia effect, today's investment gives return at least after one year or more than one year.

Results for CB are also statistically significant in the three models and show that it affects negatively ROA and positively ROE and NIM. The results strongly reject the null hypothesis: $\boldsymbol{H_0}$: Capital Buffer (CB) has no significant impact on Banks' Performance and accept the alternate hypothesis: $\boldsymbol{H_1}$: Capital Buffer (CB) has a significant impact on Banks' Performance. On average, an increase of 1 % in Capital Buffer (CB) caused a decrease of 3.7 % in Return on Assets (ROA), an increase of 37 % in Return on equity and 2 % in Net Interest Margin. Return on equity (ROE) is influenced, the most, by CB compared to other proxies of profit in this study.

The results favor the Capital Regulation agreements and that the Capital Buffer (CB) helps to enhance Pakistan's banks performance in model 2 and 3. Pasiouras and Kosmidou (2007), García-Herrero *et al*. (2009) and Athanasoglou *et al*. (2008) have similar findings that more capitalized banks' performance is high and better. This result is aligned with the finding of Tabak *et al*. (2017) results supporting that banks with an adequate capital buffer is perceived as a reliable signals to the market of banks financial strength. That is helpful for banks to cut down their funding

cost through creditworthiness. Consequently, this reduction in funding cost impacts profits positively.

However, negative association between CB and ROA can be justified for reasons like poor management skills of the bank that affect assets management adversely. Also, literature shows that there is an optimal level of CB beyond which further increases in CB lowers ROA. This is evident in Tabak *et al*. (2017), who reports a negative relationship between quadratic term of CB and ROA. It is possible that in present sample majority of the banks have already passed this threshold level of CB and hence, results produce a negative correlation between the CB and ROA.

Negative relationship between BR and NIM is because of investment in risky assets. As a result of investment in the risky assets the probability of recovery of interest income seems less and banks maintain loan loss provisions account and keep more amount in loan loss provisions account accordingly and this leads to less interest margin. Hence the negative association between the BR and NIM is well justified in this way and can be concluded that credit risk is high in Pakistan.

Further, findings of the study indicate that Bank Risk (BR) has significant effect on Banks' Performance. As BR in the first two models Bank Risk (BR) has a positive effect on Profits but in the Net Interest Margin (NIM) case Bank Risk (BR) affects profits negatively. An increase of 1% in BR increases ROA by 2%, ROE by 8% while it reduces NIM by 5% on average keeping all other factors constant.

Positive association b/w BR and profitability in first two models explains that for surviving in high competitive market environment banks opt for higher levels of risk in order to increase the profits margins. This behavior is motivated by the thinking that higher risk can lead to higher return as well.

The relationship of NIM of bank and Bank Risk exposure can be easily understood by an implicit assumption of bank behavior towards any type of risk exposure, i.e. banks deal risk exposure by simply pricing it and by doing the settlement between the interest rate spread (loan and deposit rate). This spreads between loan and deposit rate has enough absorbing capability for any abnormality in the result of intense risk exposure. So, the spread between rates mirrors the Bank Risk. In Pakistani culture public has less tendency towards interest, this can be a reason of negative association of NIM and BR.

Bank Size (BS) has a negative association with profitability in each model. In the second and third model, results for Bank Size (BS) are significant at p-value<0.01 compared to the first model where the significance in at p-value<0.05. This indicates diseconomies of scale in Pakistan's banking sector. An increase of 1% in Bank Size on average decreases ROA by 36%, ROE by 13.91 percentage points and NIM by 4.56 percentage points Since, Pakistan is a developing country smaller banks are mostly operating at increasing returns to scale portion of their production functions.

Whereas, larger banks have already reached to their optimal level and are enjoying a state of constant returns to scale. In this situation, though small, an increase in BS will increase profits to smaller banks. It may or may not be the case with larger banks (significant increase in BS may bring negligible increase in profits). However, when banks are pooled together the negative association between BS and profitability can be an outcome of dominance of the effect for larger banks. Boyd and Runkle (1993), Micco *et al.* (2007), Naceur (2003) also reports similar findings.

Leverage (Lev) has a positive effect (53%) on the profits in the first model. On contrary, in the second and third model it has a strongly negative effect on the profits of the banks. An increase of 1% in the Leverage (Lev) causes on average a reduction of 60 % in Return on Equity (ROE) and 55 % in Net Interest Margin (NIM).

Moreover, there is a strong positive relationship between the growth rate of GDP and Banks' Performance in all models. Specifically, on average a 1% increase in the Gross Domestic Product (GDP) growth rate may causes a 7 % increase in Return on Assets (ROA), 53 % increase in Return on Equity (ROE) and 34 % increase in Net Interest Margin (NIM). This is so because high GDP growth rate means increase in incomes of people. Higher incomes results in higher savings according to Keynes Psychological law of consumption (that states Marginal Propensity to consume is less than one). People tend to deposit their savings with banks that increases banks' investment options and hence, profitability. Rahman *et al.* (2015), Pasiouras *et al*. (2007), Bikker *et al*. (2002), Athanasoglou *et al*. (2008) also concludes similar relation between GDP growth rate and banks 'profitability.

Model diagnostics are also presented in table 4.3. The sample size is 275, 246, and 264 in model 1-3 in order. In all specifications the Sargan and Hansen J tests results are insignificant that shows validity of the instruments used in this study. It implies that the first difference instrumental variable has no significant correlation with the error term and hence there the problem of endogeneity is captured in our estimates. Due to endogeneity problem study used second lag of the instruments. Additionally, the Arellano–Bond test results confirm absence of serial correlation.

CHAPTER 5

CONCLUSION

This study has explored the impact of capital regulation on performance of banking sector in Pakistan. In this connection three models are estimated and compared. Data is exploited from various sources including Pakistan Stock Exchange (PSX), Business recorder (Brecorder), World development indicators, and International Financial Statistics database (IFS). Banks's performance is measured alternatively using ROA, ROE and NIM (three different indicators of profitability). Data structure shows that the appropriate econometric technique to achieve study objective is Diff-GMM. Consequently, we estimate Diff-GMM for three different specifications with sample size of 275, 246, 264 observations respectively. We included 19 Private Commercial Banks, 8 Foreign Commercial Banks, 5 Islamic Banks, and 5 Public Sector Commercial Banks.

Results of this study show that Capital regulation when measured as CB (the difference) has significant positive association with ROE and NIM and negative significant association with ROA. Also, that banks 'profitability in Pakistan has persistence. Bank Risk has positive impact on ROA and ROE while negative effect on NIM. Banks' performance in this sample is influenced negatively by BS and Leverage (except in Model 1) and positively by GDP growth rate.

All model diagnostics are as expected and confirm the validity of estimates. Based on this analysis with controls for relevant variables, study concludes that capital regulation has important implications for banking sector's performance in a country like Pakistan. Capital regulations increase credit worthiness to shareholders and improves customers' confidence in bank that results in higher performance and profits of banks. However, accumulation of capital buffer should be upto an optimal level. Beyond a certain level it may affect adversely banks' profitability.

Results of our study provide few useful guidelines to regulators and bank managers. Like, results provide assistance to the regulatory authority to make better an optimal regulations for efficient asset quality of banks in Pakistan. For bank managers, this is helpful to hedge risk of risky assets better wia maintaining an adequate level of bank capital. Moreover, bank managers can construct well-diversified portfolios for investment in risky assets. Results may also help to the customers and investors to choice suitable banks for borrowing and investing activities.

This research has a limitation that it due to unavailability of necessary data beyond 2018 study couldn't add in further years in estimation. In future, it will be useful to explore the association between CR and banks performance by addition of Management efficiency variable.

The overall findings of this study encourage that all banks should maintain an adequate capital level, and get optimal earnings efficiently by hedging risk. Findings of this study are positively helpful to the stakeholders (investors, depositors and customers) and suggest cautiously make decisions while doing business with banks. Policy implication from this study is that capital regulations are benefitting Pakistan's banking sector and they help banks to manage their portfolios better to earn higher profits.

APPENDIX

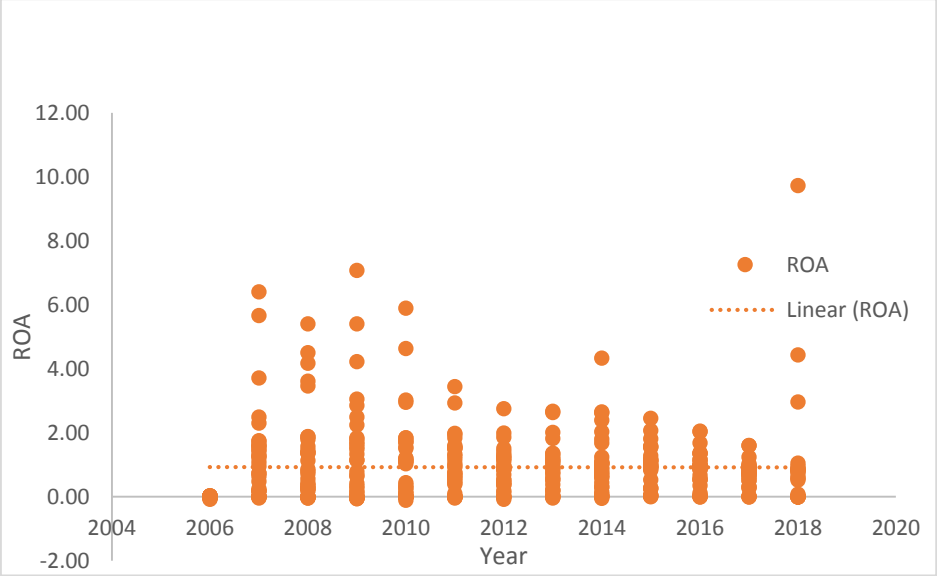

Fig.1: Scatter Plot of Return on Assets

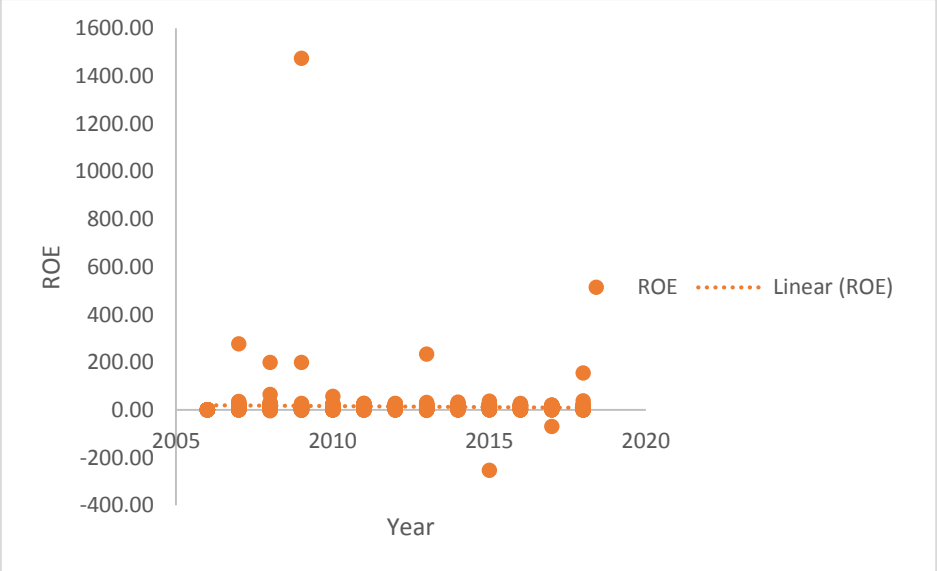

Fig.2: Scatter Plot of Return on Equity

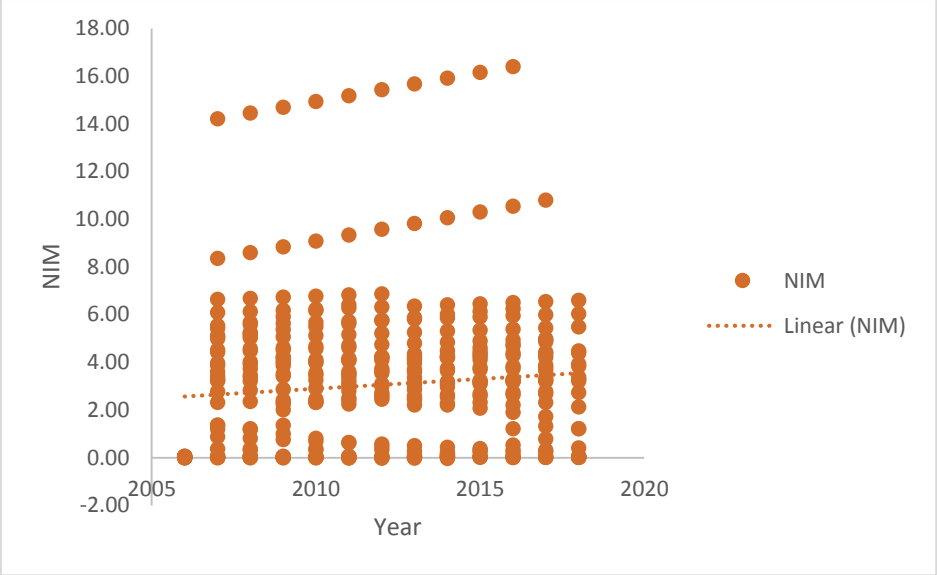

Fig.3: Scatter Plot of Net Interest Margin

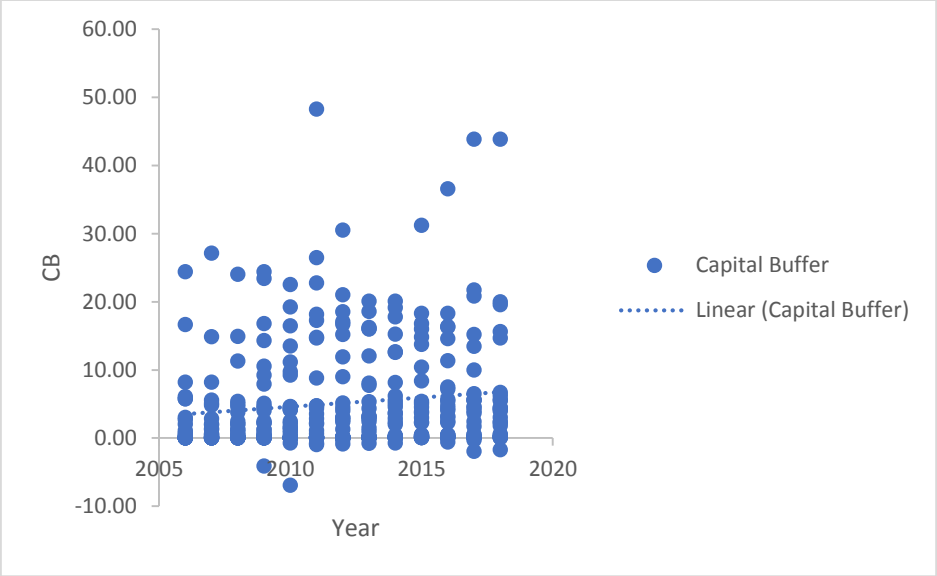

Fig.4: Scatter Plot of Capital Buffer

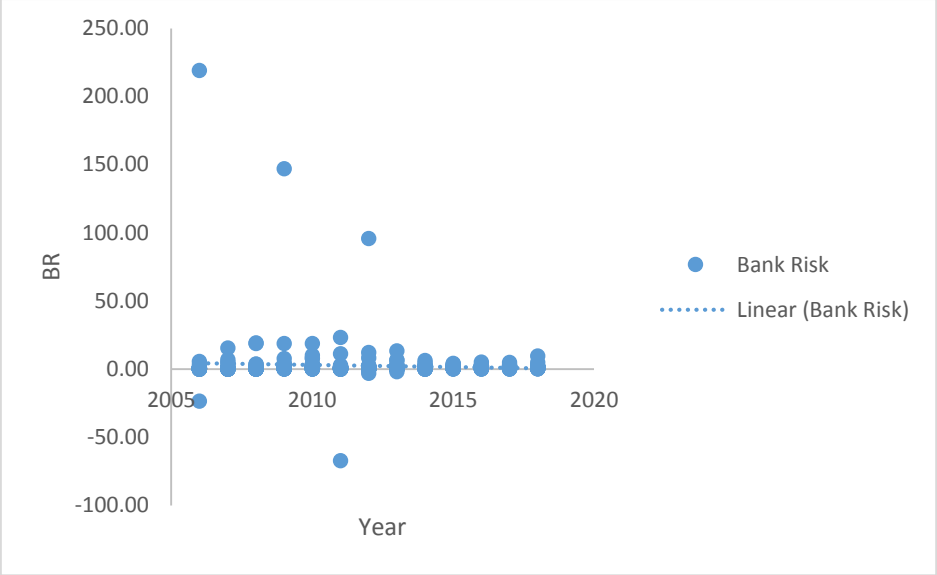

Fig.5: Scatter Plot of Bank Risk

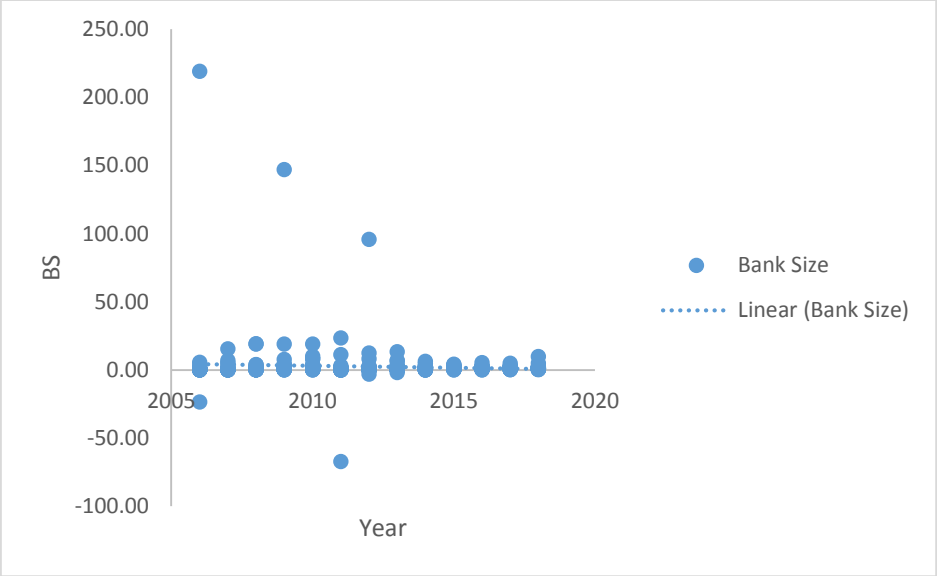

Fig.6: Scatter Plot of Bank Size

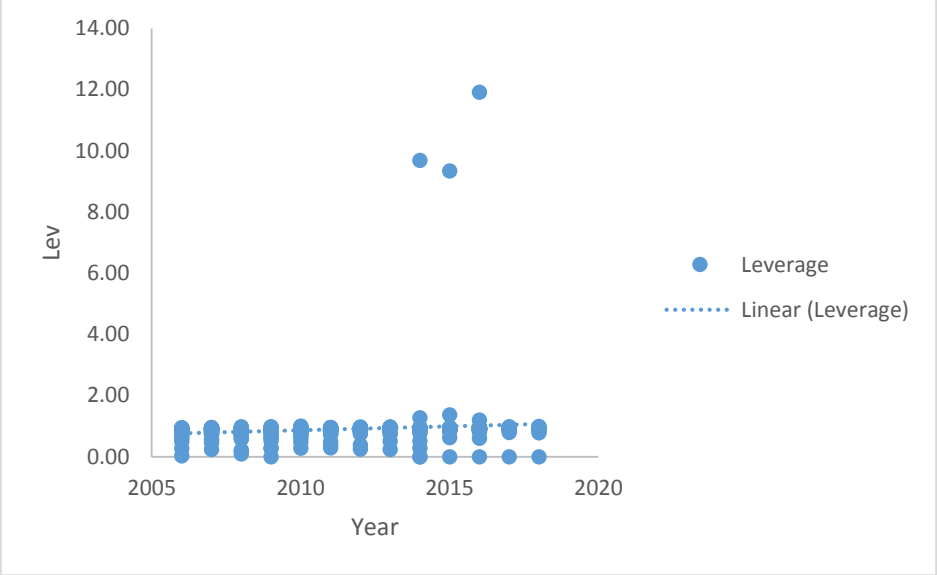

***Fig.7*: Scatter Plot of Leverage**

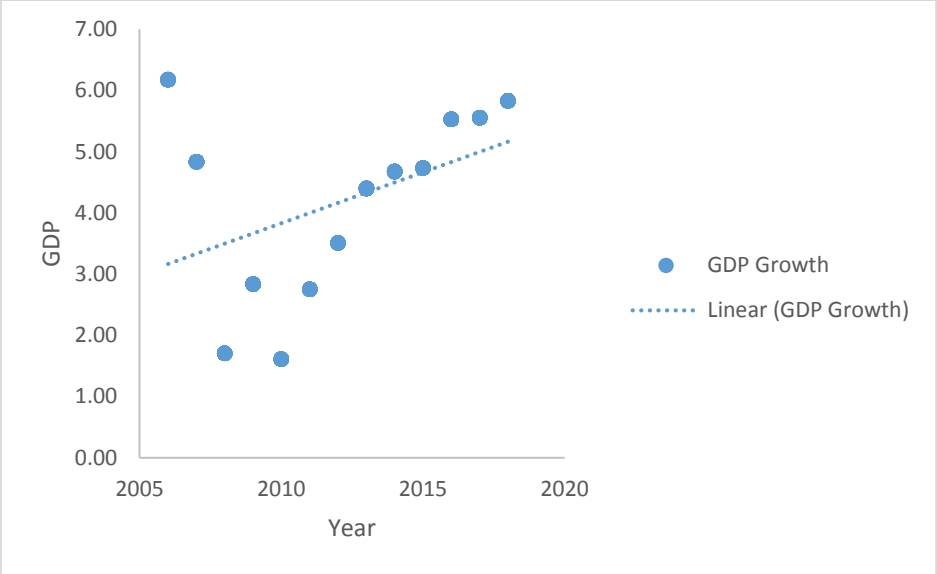

Fig.8: Scatter Plot of GDP Growth

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