***In the name of Allah, the most merciful, the most compassionate all praise is for Allah, the lord of the worlds; and prayers and peace be upon Muhammad, his servant and messenger.***

# Cyclical Behavior of Banks' Net Interest Rate Margins; A Case from Pakistan


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## AUTHORSHIP STATEMENT

*I Saud Ahmad solemnly declare and affirm on oath that I myself have authored this M.Phil. Thesis with my own work and means, and I have not used any further means except those I have explicitly mentioned in this report. All items copied from internet or other written sources have been properly mentioned in quotation marks and with a reference to the source of citation.*

**Saud Ahmad**

## *Dedication*

*I dedicate my dissertation work to my family and many friends. A special feeling of gratitude to my loving parents, Dr. Noor Ahmad and Tahira Deep whose words of encouragement and push for tenacity ring in my ears. My siblings Uwsa Ahmad, Bisma Ahmad, Shiza Ahmad and Hassan Abdullah have never left my side and are very special.*

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## Abstract

Existence of Cyclicality of NIMS in Pakistan's Banks have been explored by this study, by employing annual time series data from 1965-2013. Two stage least square (TSLS) is used for estimating the model. We not only detected the counter-cyclicality of NIMS but also present the responsible factors behind this behavior.

"Monetary policy (MP)", interest rate risk (IRR), the economy's financial depth (DFD), inflation and banks capital holdings have been documented as key factors behind cyclicality of margins over the period. These results sustain even after using three different business cycle indicators.

Furthermore, "bank lending channel" of MP has also been supported by the study.



**Key words:** NIMS, TSLS, Counter-Cyclicality, Financial accelerator.

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# Chapter 1

## Introduction

The development of financial sector has got significance, as a road map for economic progress. Through the financial sector development an economy can achieve its goals of capital accumulation, technological encroachment and of encouraging foreign capital inflows which leads toward economic growth.

The central part of any economy is the financial sector. In fact, no economy has ever grown continuously without a concurrent and similar growth in its financial sector. That is because the financial sector performs a very important function: it transfers money from those who have an excess (i.e. savers) to those who need that capital (i.e. borrowers). And that has multiple advantages for the economy. The most obvious of those, is that money can flow into investment projects, such as roads and bridges, hospitals, schools and other public sector infrastructure. Similarly, private sector projects, such as factories and other industries, can also be established using money that has been channeled through the financial system. Investment increases the productive capacity of the economy and sets the course for faster economic growth, and contained inflation.

In an economy, industrial development is meant to be an engine of growth and financial markets provide capital to the industrial sector and therefore are important for the growth of economy. Without the consistent availability of long term funds, neither an industry nor an economy can sustain its growth. These funds can be only provided by

the financial sector. The size and nature of country's financial sector is based upon the saving rate of the nation. People save money and financial sector distributes these deposits to different economic groups. In this way saving of nations build an economy on higher pillars. According to Harod Domar growth model savings are one of the factors of economic growth.

In addition, it empowers the poor and broadens their access to capital to eradicate the inequality and poverty. Revenues of vulnerable groups are also increased by reducing their exposure to shocks by facilitating risk management and by helping them to raise their investments and hence productivity.

At the same time, the presence of large financial intermediaries, i.e. those entities that shuttle money between savers and borrowers, also pools risks. Since these intermediaries have a wide and diverse group of savers and borrowers, the chance that all of them will be in trouble, and at the risk of default, is relatively low. However, it is not zero and that is something that happened in the recent global financial crisis. Large financial intermediaries manage to pool risks and that keeps the economy stable. Simultaneously, these institutions, by virtue of their size, can also reduce their costs of intermediation (commonly referred to economies of scale). The reduced costs mean better efficiency and a more transparent financial sector.

Additionally, financial system provides a payments system. This, in essence, encourages the exchange of goods and services, since banks provide a variety of instruments that eliminate the need to carry cash. Without an efficient payments system, the costs of transactions may, at times, be too high to even merit an exchange of goods.

Economists differ on whether financial development causes economic growth or if economic growth leads to greater financial development. However, most empirical studies have concluded that financial development and a more efficient banking system accelerate economic growth.

## 1.1: Banking Sector of Pakistan:

Financial sector in Pakistan has an extensive range of institutions. They put forward a numerous kind of items and services related to both assets and liabilities. Banks are financial intermediaries. The role of an agent is to sell its own obligation at higher price and acquire other's obligations at lower price. This is done by equipping its obligations with appealing features. Or to say the same thing in a different manner, intermediaries do not sell their obligations at less than what they pay for others' obligations. Then the net profit is earned by deducting the expenses of doing business from the spread between the prices they paid and received and in the end profit is distributed between the participants of financial intermediary.

In the history of Pakistan Banking sector has been assisting the economy in achieving the goal of growth. When Pakistan got independence there was very less amount of capital available. But from 1948 to 1954 61 percent raise in banks deposits was followed by amplification of overall economy. State bank of Pakistan gave five reasons for the economic growth. (i) The renewal of economic activity across the country, which had come to a sudden halt immediately, following partition. (ii) The remedy and consolidation of banking sector. (iii) The inflow of Muslim capital from other countries following the birth of Muslim Pakistan. (iv) The increase in development

activities, especially in the industrial sector, which resulted in the growth of money income, especially in urban areas where banking facilities were better developed. (v) A generally favorable balance of payments on the private account.

Later in 1960s and 1970s baking sector start advancing larger portion of its available capital to manufacturing sectors. In 1953 only 82.5 millon rs out of 514.7 millon were recieved by manufacturing sector. Then in 1963 manufacturing consume the 37 percent of total credit, while, in 1972 the share of manufacturing sector grew to 50 percent and in manufacturing sector textile industry gained the largest share. Credit to comerce were relativily decline from 55 percent to 26 percent in 1972 As shown in table 1.1, till 1977 share of manufacturing sector was grew to 12,576.9 millon which was about 54 percent of total advances by banking sector. In this way banking sector of Pakistan played important part in the expansion of industrail sector and hence in expansion of economy aswell.

Pakistan banking sector has gone through the different scenarios. In early 1970s, involvement of government in banking sector was drastically increased. That was in line with the government's broader vision of greater control over resources to promote a more equitable distribution of capital and wealth. So the major sources of deposits in banks were public corporations, and the major users of banks' funds were also government run entities. Therefore, the financial system of the 80s was made up of just the banking sector, which was largely government controlled. Interest rates were set by the government, which also decided how much credit was to be extended to which sectors. Although the system was consciously implemented to allocate capital judiciously, it was soon evident that it had not achieved its objectives. Economic growth

had started stalling and one of the key reasons for that was the repressed financial system, which could not properly allocate resources into the best possible investment projects.

Afterward in the early 90s authorities focused on more private sector participation as financial intermediaries; developing more robust regulatory frameworks; restructuring banks; and developing non-bank financial institutions (also known has NBFIs), as well as equity and bond markets, as alternatives to the banking system for both investors and borrowers. The financial sector was essentially given a completely new look during the course of that decade. The purpose of all these changes was to enhance competition and efficiency in the financial sector. That would mean that capital gets allocated into productive investment, which can further drive growth. Simultaneously, as banks became more efficient, savers could receive a better return on their deposits and borrowers could finance themselves at lower rates. After these reforms, banks have gone from receiving government funding to contributing to the national exchequer in taxes. Non-performing loans, which are loans that are overdue and have been defaulted upon, have fallen manifold since then.

Pakistan's banking industry was seemed to be stuck due to the global financial crises of 2008. Although the Pakistan's financial industry wasn't big enough to be affected by the global meltdown, the increasing fiscal and external deficits, gave an opportunity for banks to narrow down the choice of banking assets to government borrowing. With the wiping out of some of the credit extended to big corporations and a virtual downfall of consumer lending in its emerging stage, banks successfully converted into branchless banking and mobile banking in collaboration with telecommunication

technologies. However, the shocks in assets, especially in SMEs and consumer sector, were too much to be absorbed by technologically advanced ways of banking. To ensure steady profits, banks were forced to become efficient by both reducing the markup and administrative costs. However, in the process they lost the prime focus of financial intermediation. The NIMS increases from December 2008 to September 2013. The obvious reason behind this raise was the government's borrowing, that results in crowded out private credit and NIMS (primarily due to T-Bills) raises from 34 percent to 52 percent in the past five years. The government's borrowing stock from the central bank increased almost six times, from Rs476 billion as of June 2008 to Rs2.77 trillion by January 2014. This increase of Rs2.3 trillion explains a two-third increase in bank deposits. From Rs73 billion in FY07, commercial banks' profits declined to Rs43 billion in FY08 before hitting Rs178 billion in FY12. Despite the increase in profits from 2008 to 2013, number of accounts remains less than 15 percent of people and those who have access to credit are even smaller in number. Even among those who have bank accounts, there are many who have no incentive to maintain their accounts as such. A majority of bank account holders are getting low return on their savings and the fact is that the trend has worsened over the past five years. Banks maintained their high spreads by investing in government papers and by government lending. Higher spreads may have gotten bankers good profits, but the approach has long term disadvantage for bankers as well as consumers. The banks and consumers are going to face an asset-liability mismatch, once the fiscal deficit reduces and the government has no need of financing from the banking system. On the other side, if the depositor is not getting enough return on its savings then banks will face serious consequences. That partially

explains the fall of investment to GDP from 19 percent in FY07 to 14 percent in FY13 and domestic savings to GDP from 12 percent to 8.7 percent in the past six years.

Recognizing this, the central bank had been regulating the banks to focus on long-term deposits and to increase the return on demand deposits. For this purpose SBP fixed the minimum deposit rate 5 percent, regardless of the fact policy rate reached as high as 15 percent. Later the SBP increased the minimum rate on saving accounts from 5 to 6 percent in 2007 but that was not enough as well. Finally, the central bank linked the deposit rates to the interest rates. The linking of deposit rate is likely to compel commercial banks to look for riskier high return assets to maintain spreads.

However, much more is needed to be done to boast up private sector lending. The government has to gradually move away from banking system to give room to private sector. Besides, macroeconomic conditions need to be improved to encourage bankers to lend to private sector. For this purpose central bank of Pakistan has been playing its important part as regulator. State bank of Pakistan is regulating and monitoring the banking sector to achieve the goal of its efficiency and to make banking sector more effective for the development of the economy. In strategy of SBP focuses on the following ten points; (i) to implement a financial inclusion program for underserved economic sectors; (ii) to strengthen consumer protection through legislation and codes of conduct; (iii) to strengthen competition and efficiency with greater transparency; (iv) to consolidate the banking sector's corporate governance and risk management practices; (v) to strength prudential regulation and supervision of banks; (vi) to introduce consolidated supervision frameworks that supervise financial groups and conglomerates; (vii) to develop a safety nets for small depositors, unviable

institutions and unforeseen market crises; (viii) to strengthen the Bank's powers to maintain monetary and financial stability by updating the SBP Act regularly; (ix) to deepen the financial sector by developing debt markets, stock markets and NBFIs; and finally (x) to develop the financial infrastructure, including payment systems and credit information systems to facilitate transactions.

## 1.2: Significance of the Study:

In Pakistan Banks are the leading part of financial industry therefore overall efficiency of financial sector would be affected by banks performance. Banks have also a major role in money formation. Banks could multiply the money issued by Government by taking deposits and lending money. Therefore banks are considered as a fundamental component of the MP. CB must have to know the behavior of banks for the sake of judgment of the efficiency of the policy.

Additionally, banks relocate funds from lenders to borrowers and also have an effect on the rate of investment. In this regards banks posse a crucial impact on economic expansion. The role of intermediation by the bank is linked with social loss. So, it is required to reduce the social cost connected with the financial intermediation (FIM) for attaining the goal of social welfare. Lower the cost greater the social welfare will be. This is only achievable by reducing the interest margin of the banks. NIMS is a main element of bank revenue and thought to be the price of the intermediation service of banks, thus the study of interest margin is of great importance.

Beside this, for development and growth of the economy NIMS are very vital. A significant relationship between work of intermediation by banks and economic growth

is suggested by various researchers. According to Quaden, (2004), not only higher expected return on savings can be provided to savers but by efficient intermediation, funds can be availed by investors at lower cost. Higher gap between lending and deposit rate lead to shrink the saving and also discourage the investor to lend the capital from banks. Effectual mobilization of funds depends upon the cost of intermediating between a saver and an investor, so, inefficiency of financial intermediary causes high intermediation cost and increases loss of productive funds in intermediary process. This leads to a reduction in lending, investment and economic growth.

Lack of efficiency in financial sector in a developing country has prompted debates among researchers about the determinants of NIMS. Most of the researchers attributed high interest rate margins to internal characteristics of banks while others believe that NIMS is compelled by macroeconomic and industry specific factors. Maudos and Guevarra, (2004), Claeys and Vennet, (2004), Kasman et al, (2010), argue that the degree and cost of FIM and ED has a strong correlation. And according to Herrero et al, (2009), the cost of funding has a great influence on the investment level as well on the allocation of the resources, in this way it determines the direction of the economic activity. The Funding Cost also affects the profitability of the banking sector and also its stability and ability to support the real economy.

Since NIMS is used as a proxy of banks efficiency, one of the purposes of the study is to explore the determining factors of the interest margin. In literature many researchers explore this topic, i.e. Saunders and Ho, (1981), argued that pure NIMS is based upon four factors: (i) the capability of bank to manage risk (ii) the composition of market in which the bank operates; (iii) the average transaction sizes of bank; and (iv)

the volatility in interest rates .He also argued that liability and asset structures had to be analyzed together since they were directly interrelated through transactions uncertainty. Extensions in the model of NIMS have been made in literature in numerous ways. Allen, (1988), extends it by allowing the presence of diverse types of credits and deposits. Sharpe and Mcshane, (1985), used the source of interest rate risk, he take into account the ambiguity of the money markets despite of Saunders and Ho, (1981), who took interest rate risk of deposits and credits. Angbanzo, (1997), extends the model by considering both IRR and credit risk.

Monetary policy aims to stabilize the economy. If the economy is slowing down, then monetary policy can provide the necessary stimulus and if the economy is expanding too fast, then monetary policy can act as a necessary tool. When an economy grows too fast then there is consequence of high inflation as well. So, in order to keep the inflation in control we have to stabilize our monetary policy.

The study of NIMS is important for designing monetary policy in a way that if interest margin changes endogenously by the aggregate shocks, then these shocks create another channel through which they affect the economic activities. This effect is known as financial accelerator in the literatures. After Rotemberg and Saloner, (1986), and Rotemberg and Woodford, (1991 and 1992), many researchers estimated the change of price-cost margins due to aggregate shocks but they only focused on the goods markets. For financial markets (FM), Bernanke and Gertler, (1989), and Bernanke, Gertler and Gilchrist, (1996 and 1998), discuss the function of an endogenous “external finance premium as an accelerator of business fluctuations”.

So far, the cyclicality of NIMS in FM has not been studied. The cyclicality has not been taken into account as a sign of the “financial accelerator (FAR)”. The presence of FAR has an important monetary implication. When counter-cyclicality exists, loan becomes more costly in recession; leading to the possibility of delay in investment and hence postpones the production decisions. This results in worsening off the depression. Therefore, in presence of counter cyclical behavior, policy makers need to make stabilization policies more effective. Due to the important monetary implication this study is therefore, crucial for the development of an economy.

## 1.3: Aims and objectives of the study:

Keeping in view the significance of the study our main objectives are to:

I. Explore the existence of financial accelerator (counter-cyclicality) in the financial markets of Pakistan.
II. Explore the potential factors, explaining the counter-cyclicality of NIMS in Pakistan.

## 1.4: Organization of the study:

In chapter 2 brief literature review has been offered. Chapter 3 is followed by the Theoretical framework. Econometric methodology and the data used are described in chapter 4. Section 5 and 6 provides estimated results and concluding remarks respectively.

# Chapter 2

## Literature Review

So far, researchers emphasizes on the determinants of NIMS. There are only few studies that consider the impact of business cycles in the credit markets. With the fluctuations in the economy behavior of NIMS can be changed and this study intended to enlighten the important issue, related to the behavior of NIMS, which was ignored so far. Existing studies can be categorizes on the basis of behavior of interest margins as follow:

### 2.1- Pro-cyclical: [1]

Saunder and Ho, (1981), and Saunders and Schumacher, (2000), anticipated that NIMS[2] are pro-cyclical in banks credit market. They assumed that Banks are risk adverse dealer and in NIMS monopoly rent of producer along with a risk adjustment term is included. Their models focused on the impact of formation of the market and of interest rate fluctuation on the margins. However, due to the limitation in evaluation of the risk aversion and the magnitude of transaction, they do not take into account the impacts of these two on margins. Saunder and Ho, (1981), show that bigger banks have less spread as compare to smaller banks. And they made an argument that this is due to the conditions of market structure rather than due to the differences in the size of transaction.

[1] In business cycle theory and finance, any economic quantity that is positively correlated with the overall state of the economy is said to be procyclical.

[2] Word "NIMS" is used as abbreviation of net interest margins.

Extension of the model of Saunder and Ho, (1981), has been made by Allen, (1988), who estimated the impact of banks portfolio on NIMS. She shows that the consideration of the cross price elasticities of demand among various bank products reduce the NIMS. Wong, (1997), determines optimal bank NIMS by developing a hypothetical model in which both credit risk and Interest rate risk are included. He estimated the positive relationship between optimal margins, market power, operating costs and the level of both IRR and credit risk.

## 2.2- Counter-cyclical[3]:

After the contribution of Rotemberg and Saloner, a lot of literature on the counter-cyclicality has been evolved. Domowitz et al, (1986), Lebow, (1992), Scharfstein and Chevalier, (1995 and 1996), Schiantarelli and Galeotti, (1998), Olive and Baloch, (2001) and Campello, (2003), analyzed the cyclical behavior of markups in industrial sectors. There are only few studies in which cyclicality in financial markets has been discussed. Thornton and Dueker, (1997), found indication of counter-cyclical spread over the "marginal cost" of funds for banks. Based on Klemperer, (1995), they developed a model including switching costs for customers and risk averse banks, both lead to counter-cyclical markups in the pricing of bank loans.

Olivero and Aliaga-Diaz, (2005), provides support to the bank lending channel of MP. They argue that the effects of MP are minor in more concentrated banking sectors. Moreover, they show the counter-cyclicality of NIMS and argue that the monetary policy does explain the reason of this counter-cyclical behavior. Olivero and Aliaga-Diaz, (2005), estimated the Counter-cyclicality of NIMS for the case of United States. Smith

[3]A economic quantity is said to be countercyclical if it moves in the opposite direction of the overall economic cycle: rising when the economy is weakening, and falling when the economy is strengthening.

and Nikitin, (2009), explore the counter-cyclicality of loan rate in many countries that is consistent with FAR theories of the business-cycle. Moreover they argue that in all countries NIMS and overall market interest rates are counter-cyclical.

## 2.3- Determinants of Net Interest Margins:

Previous literature focuses on the factors that determine NIMs in general. Saunders and HO (1981), gave rise to a model known as the “dealership model” to explore the determinants of NIMS. . Saunders and Ho, (1981), argued that pure NIMS is based upon four factors: (i) the capability of bank to manage risk (ii) the composition of market in which the bank operates; (iii) the average transaction sizes of bank; and (iv) the volatility in interest rates .He also argued that liability and asset structures had to be analyzed together since they were directly interrelated through transactions uncertainty. Many researchers have extended their work. Following their study in 1985, McShane and Sharpe used the risk of money market rates instead of deposit and loan returns. Further Carbó and Rodrígue (2007), focus on the impact of cross selling behavior and specialization among assets on spreads of banks.

Angbazo (1997) analyzes the relation of net interest margins, default and interest rate risk and the effects of credit market cycles on net interest margins. He gave two reasons why credit contraction influences the margins, deposit rate stickiness and loans. He also analyzed the influence of off-balance sheet instruments on portfolio risk of banking organizations, the size and volatility of margins. Though results varied across bank sizes, but they show that the bank interest margins are affected by the interest rate risk premium and default off balance sheet activities generate higher margins to compensate for the increased interest-rate and liquidity risks that they imply. “To study

the impact of credit cycles on margins, he evaluates the coefficient on a dummy variable for a particular sub period characterized by an increase in charge-offs rates and by a credit. Hence spread proves to be meaningful for the economic activity.

Kunt and Huizinga (2000) study the relationship between financial development and bank performance, profitability and margins. They use bank level data for a large cross-section and analyze the net interest margins. They find no statistically significant impact of macroeconomic variables, except for inflation. Williams (2007) tested application of the dealer model using Australian data. He found that bank market power increased the net interest margins and operating costs had an important role in determining the net interest margins.

Angelini and Cetorelli (2003) estimate the impact of regulatory reforms, large scale consolidation and competitive pressure on the structure of the Italian banking industry. They include the growth rate of GDP in their estimation and show the negative relationship between GDP growth rate, price-cost margins and Lerner index. Brock and Suarez (2000) reported that bank spreads in the 1990s are influenced by liquidity and capital risk at the bank level, and by interest rate volatility, inflation and GDP growth at the macroeconomic level, although the results differ across countries. Maudos and Solís (2009) combine the independently derived two-asset-type models and all other extensions into a single integrated model.

Kunt and Huizinga (1999) used bank-level data for 80 developed and developing countries over the period 1988-95 to analyze the determinants of bank interest margins and bank portability. Their evidence suggests a role for a large number of indicators next to bank-specific variables, such as macroeconomic conditions, bank taxation,

deposit insurance regulation, overall financial structure, and several legal and institutional indicators. Kunt, Laeven and Levine (2004), assess the impact of bank regulation, bank market concentration and inflation on bank margins, as well as the role of national institutions in regulation and market structure. Maudos and Guevara (2004) include operating costs as a determinant of net interest income and estimate the model for the main European banking sectors (Germany, France, UK, Italy and Spain) over the 1993 2000 period. They also substitute the structural measure of market power (market concentration indicators) with a more direct measure (Lerner index, LI). Martinez and Mody (2004) examine the impact of foreign participation and concentration on Latin American bank (Argentina, Chile, Colombia, Mexico and Peru) spreads and find both the spread and the cost of operation of foreign banks to be lower than that of domestic banks. Moreover, the spreads of foreign banks which acquired domestic institutions were higher than those that started anew. Results also show spreads are influenced positively and significantly by the degree of concentration.

Hawtrey and Liang (2008) examine the determinants of NIM in 14 OECD countries over the period from 1987 to 2001. Results show that national industry margins are influenced by market power and operating cost. Gelos (2006) examines the NIM of Latin American (14 countries) and other emerging economies (71 countries). Results show a positive relationship with deposit rate, OCRR, legal structure and taxes and a negative one with GDP and foreign ownership. Khediri and Khedhiri (2011) employ random– and fixed effect techniques and panel data to examine the determinants of bank NIM in Tunisia. Results show that OC, OCRR, IIP and BC significantly and positively influence NIM, and QM, significantly but negatively. Abreu

and Mendes (2002) examined the factors determining the banks' interest margins and profitability for some European countries. They reported that the banks with a high capital ratio had lower expected bankruptcy costs, which provided them with better profitability. Barajas et al. (1999) examined the effect of financial liberalization on the banks' interest margins of Colombia. They reported that financial liberalization hadn't decreased the net interest margins of Colombian banks. Afanasieff et al. (2002) studied the Brazilian case with a panel data technique to find the macro and micro determinants of the interest margins. They determined that macroeconomic variables were the most significant factors to explain bank interest margins in Brazil.

The second model is the firm theoretic model developed by Klein (1971) and Monti (1972). This model features a risk-averse bank facing both credit risk and interest rate risk. Credit risk is present because loans are subject to non-performance and the bank does not know ex ante what proportion of its loans will perform. Interest rate risk arises because the bank funds part of its fixed rate loans via variable rate deposits (i.e., there is a mismatching of rate sensitivities of assets and liabilities). According to this model, banks are in a static setting in which demands and supplies of deposits and loans simultaneously clear both markets. The firm-theoretic approach with deposit-rate setting is employed to analyze the effect of risk aversion and regulation on bank margins when the bank faces uncertainty about deposit quantity (but not loans). Zarruk (1989) presents an alternative theoretical model of net interest margins for a banking firm that maximizes an expected utility of profits that relies on the "cost of goods sold" approach. Uncertainty is introduced to the model through the deposit supply function that contains a random element. He posits that under a reasonable assumption of

decreasing absolute risk aversion, the bank's spread increases with the amount of equity capital and decreases with deposit variability. Risk-averse firms lower the risk of profit variability by increasing the deposit rate. Zarruk and Madura (1992) show that when uncertainty arises from loan losses, deposit insurance, and capital regulations, a higher uncertainty of loan losses will have a negative effect on net interest margins. Madura and Zarruk (1995) find that bank interest rate risk varies among countries, a finding that supports the need to capture interest-rate risk differentials in the risk-based capital requirements.

Khan and Khan, (2010), using 28 banks from the period of 1997 to 2009 in Pakistan examined the determinants of the spreads of interest rate for the commercial banks. They analyzed the macroeconomics as well as industry and bank specific effect on the spreads of banks. They show that there is a positive correlation between the banking spreads and the share of non-remunerative deposits in total deposits and administration expense in total expense. On the other hand the banking spread is negatively correlated with the share of non-interest income in total income. Furthermore, there is a positive impact of macroeconomics variables like interest rates and real GDP as well as market concentration and macroeconomic variables, such as real GDP and interest rates on the spreads of Pakistani commercial bank. They also analyzed the how the banking spreads are influenced by the obligation of regulatory floor on saving deposit returns. They argued that policy measure results in lower spreads when there is absence of monetary policy tightening.

Khawaja, (2011), inspects the factors determining interest margins of banks in case of Pakistan. Their study reveals that the main factors that determine the interest

rate margin are the floating debt i.e. short-term government bonds and the huge share of bank's interest-insensitive deposits. His results are not consistent with the perception of interest margins of banks being high due to the market power caused by oligopoly.

This paper contributes to the existing literature by estimating the determinants of net interest margins for the case of Pakistan. Furthermore, this study includes Counter-cyclicality indicating the existence of financial accelerator, which has been ignored so far. Finally, this study uses the annual data from 1965 to 2013 based on banking sector of Pakistan. The period of analysis has been extended considerably compared with earlier studies.

## Chapter 3

# Theoretical Framework:

In this section description of variables included in the model is given. Suppose a reduced form of the model for NIMS as shown in the equation (1) :

$$Y = \alpha + \beta log X + \sum \gamma Z + \varepsilon \qquad (1)$$

Where:

Y = NIMS.

X = Business cycle indicator.

Z = Macroeconomics and bank-level controls.

Ɛ = Error Term.

Description of the Variables is followed by the sub-sections given below:

## 3.1- Business Cycle Indicators:

We are using three different business cycle measures in our study:

(i) GDP

(ii) GDP per capita

(iii) Money growth

Both GDP and GDP per capita are Counter-cyclical indicators whereas; money growth is pro-cyclical. In order for NIMS to be counter- cyclical GDP and GDP per capita should have negative relationship with NIMS and money growth must have positive relationship with NIMS in order to NIMS being counter-cyclical.

## 3.2- Macroeconomic Determinants:

### 3.2.1: Monetary Policy:

In the literature several measures as a proxy of monetary policy have been suggested. Romer and Romer, (1990) and Boschen and Mills, (1991) use the monetary authority decisions through its Federal Open Market Committee minutes. However, according to Kashyap, Stein and Wilcox (1993), by using it may results in loss of valuable information. Alternatively, Bernanke and Blinder (199 2) suggested the federal funds rate (which is discount rate in case of Pakistan) as a good indicator of monetary policy. Thus, this last measure is used here.

Angelini and Cetorelli (2003), suggest that the interest rates on banks liabilities are characterized by more inertia than those on assets, so that monetary policy shocks to interest rates should be associated with increased margins. Kashyap, Stein and Wilcox, (1993), Kashyap and Stein (1997) and Kashyap and Stein (2000) also estimate positive relationship between federal funds rate and NIMs. Banks can react to a fall in reserves due to a contractionary monetary policy by relying more on non-reservable liabilities, such as certificate of deposits, to finance loans. However, these alternative funds are not covered by deposit insurance[4] and thus, banks may choose to not fully offset the effects of the policy, and they may let lending fall as a result. This effect occurs on top of the contraction in loans derived from a lower demand for credit. Spreads can be expected to increase with lending falling.

[4] Leaving the bank exposed to credit risk.

Next, with this positive effect of the federal funds rate on NIMs in mind, the role played by monetary policy in determining the cyclicality of NIMs has to be considered. Changes to the quantity of money and hence to the interest rate exert two opposing forces on the cyclical behavior of spreads. On the one hand, the level of economic activity is partly the result of monetary policy. When output is high (low) as a result of an expansionary (contractionary) monetary policy, the federal funds rate and NIMs are low (high), and monetary policy explains the counter cyclicality of the spreads. On the other hand, with monetary policy playing a stabilization role, an increase (a fall) in the federal funds rate during a boom (recession) will cause NIMs to increase (decrease). In this case, the counter cyclicality of NIMs should be explained with the help of factors other than monetary policy, as it would imply pro-cyclical NIMs.

While the level of economic activity is expected to respond with lags to monetary changes, the federal funds rate is likely to react instantaneously to the cyclical movements of the economy. Thus, to thoroughly account for the effects of monetary policy, both the current and the lagged values of the federal funds rate are used as controls.

### 3.2.2: Interest Rate Risk:

Previous studies have shown both theoretically and empirically the importance of accounting for interest rate risk (Ho and Saunders (1981), Saunders and Schumacher (2000) and Kunt, Laeven, and Levine (2004)). The idea is that banks may charge a premium to hedge against this type of risk. Thus, the volatility of short-term interest rates is included among the regressors as a proxy for the interest rate risk faced by banks. The measure used is the standard deviation of the government bond yield. If the

risk measure and NIMs are positively correlated, a countercyclical risk measure can explain the counter cyclicality of margins. Both the contemporaneous and the lagged values are included based on the fact that the lagged measure is the one that is negatively correlated at business cycle frequencies with our business cycle indicators[5]. The volatility of interest rates has been suggested as a useful leading indicator of economic activity. Interest rate volatility hampers investment and lowers consumer confidence, exerting a negative effect on GDP levels. Thus, high volatility increases the probability of a future recession. This explains the counter cyclicality of the volatility measure.

### 3.2.3: The Economy's Financial Deepening:

An indicator of the degree of financial depth in the economy is included among the controls. A negative sign is expected for the coefficient on this regressor because a deeper financial sector should imply a bigger availability of substitutes to bank credit. Banks should therefore need to charge lower spreads. Kunt and Huizinga (2000) show evidence that countries with underdeveloped financial systems that move towards more development see bank profitability and margins fall. However, once they control for bank and market development, they cannot find independent effects on margins of financial structure.

This degree is measured as the total deposit by the GDP. The lagged value of the variable is used, based on this measure being more pro-cyclical than the contemporaneous counterpart. With this pro-cyclicality and with a negative expected

[5] The volatility of the government bond yield is negatively correlated with GDP.

coefficient, the inclusion of financial depth as a control should help in explaining the counter cyclicality of NIMs.

One explanation for the pro-cyclicality can be found in Kashyap, Stein and Wilcox (1993). They show that a monetary contraction makes this financial deepening indicator increase as bank lending decreases. Thus, high discount rates in periods of high output levels (i.e. a countercyclical monetary policy) can explain the cyclical pattern of this variable.

### 3.2.4: Supply of Funds:

The supply of deposits available to banks is used as a proxy for their marginal cost of funds. Given that deposits are pro-cyclical, the marginal cost can be expected to be counter cyclical. If costs and margins are positively related, this can provide an explanation for countercyclical NIMs.

### 3.2.5: Inflation:

Banks might require higher risk premium when inflation or nominal interest rates are high. Huybens and Smith (1999) argue that inflation may make informational asymmetries stronger and lead to higher NIMs. Boyd, Levine and Smith (2001) find a significant, economically important and negative relationship between inflation and banking sector development. In turn, lower development can be conjectured to derive in increased net interest margins.

Saunders and Schumacher (2000) present evidence for margins increasing with higher interest rate volatility, which can be associated with high and variable inflation. Kunt and Huizinga (2000) provide support to the fact that banks profits increase in inflationary

environments. Kunt, Laeven and Levine (2004) show that inflation has a robust, positive impact on bank margins and overhead costs. For Italy, Angelini and Cetorelli (2003) document a negative effect of inflation on price-cost margins, though. Therefore, change in the consumer price index (CPI inflation) is included as a regressor. Given the negative correlation between economic activity and inflation at business cycle frequencies, a direct relationship between inflation and margins might provide another explanation for the countercyclical behavior of the NIMs.

## 3.3- Bank specific determinants:

### 3.3.1: Liquidity:

The total liquid assets are introduced as a measure of aggregate liquidity for banks. Kunt, Laeven and Levine (2004) find evidence that banks with more liquid assets have lower net interest margins. The intuition there is that banks with high levels of liquid assets in cash and government securities may receive lower interest income than banks with less liquid assets. If the market for deposits is reasonably competitive, then greater liquidity will tend to be negatively associated with interest margins. Angbazo (1997) finds that as the proportion of funds invested in cash or cash equivalents increases, banks liquidity risk declines and leads to a lower liquidity premium in net interest margins. On the contrary, it could also be argued that when banks choose to hold more liquid portfolios, they pay for the cost of that liquidity by raising their margins. Ho and Saunders (1981) and Saunders and Schumacher (2000) develop a model where banks charge spreads that are mainly fees in order to provide what they call “immediacy services”. Theirs is a dealership framework where risk-averse banks charge

a cost for the immediate provision of deposits and loans. In their model banks have to temporarily invest funds in the money market whenever a deposit arrives at a time different from a new loan demand, and they face a reinvestment risk if the short term rate falls. If banks face a demand for a new loan without a contemporaneous supply of new deposits, they need to borrow temporarily in the money market, facing a refinancing risk should the short term interest rate go up. The spread compensates banks for bearing this risk. Holding more liquid assets can be viewed as an alternative to having to resort to the money market to provide these “immediacy services”. Therefore, this model provides a rationale for a positive relationship between margins and banks liquidity. If the positive effect of liquidity on NIMs is stronger, cyclical changes in liquidity can provide another explanation for the counter-cyclicality of margins. This is because all our measures of economic activity and our liquidity measure are negatively correlated. Therefore, more economic activity which is related to lower liquidity lowers the cost of it for banks and allows NIMs to shrink. The counter-cyclicality of balance sheet liquidity can be easily explained by the fact that, in recessions, credit risk increases more for risky and illiquid assets, such as loans, than for more liquid assets such as government securities. It is natural then to think that these risk-return considerations result in banks shifting their asset portfolio toward more liquid assets during bad times.

### 3.3.2: Banks Capital Holdings:

Another control is the bank capital holding. Paid up capital and reserves is used. The goal here is to control for the effect of capital holding for banks. Given that due mainly to taxation issues, holding equity is costly relative to debt; banks may need to

charge higher margins to finance this extra cost. Hellman, Murdock and Stiglitz (2000) present a context that provides an alternative story for capital holdings to increase margins. They show that when capital holdings increase banks cost of funding, they lower the franchise value of banks and this increases the incentives to excessive risk-taking. Last, Kunt, Laeven and Levine (2004) argue that highly capitalized banks have lower bankruptcy risks and lower funding costs and that they therefore charge higher NIMs when interest rates on loans are insensitive to equity. The capital holding is counter-cyclical in our sample period. Thus, if as expected an increase in the holding implies an increase in margins, the inclusion of this regressor in our set of controls can explain the counter-cyclicality of margins.

The cyclical pattern of capital holding is the result of two opposing forces. On the one hand, since loan default and delinquency rates tend to increase during recessions, and since they both negatively affect banks equity.

# Chapter 4

## Data and Empirical Methodology:

### 4.1- Data:

Annual time series Data from 1965 to 2013 is used in the study for estimation. Data of GDP, GDP per capita, money growth and CPI inflation is collected from WDI. Data of Net interest rate margins, total deposits, capital holdings and liquid assets is collected from Statistics on Scheduled Banks in Pakistan**. I**nterest rate risk is measured by the standard deviation of government bond yield and data of Government bond yield and degree of financial depth is taken from Global Financial Development Data and finally data of discount rate is collected from Statistical Bulletin of state bank of Pakistan,

### 4.2- Empirical Methodology:

The empirical methodology consists of two steps. In a first step, the paper tests whether there is negative and significant correlation between interest rate margins and business cycle indicators. If the Results show it is, then there seems to be other channels through which fluctuations in the economy give rise to the observed counter-cyclicality of margins. In a second step, this study looks for these channels and offers alternative explanations for the observed behavior.

Augmented Dickey-Fuller (ADF) tests will be run for all the variables included in the model to test for the presence of unit roots. Following the methodology put forth by Dolado, Jenkinson and Sosvilla-Rivero (1990), this study will start from the most unrestricted model that include a constant and a time trend like in equation(2).

$$Yt - Yt-1 = \alpha + \beta t + \gamma Yt-1 + \sum_{t=1}^{j=0} \phi j \, \Delta Yt-J \qquad (2)$$

Then it will test for the joint significance of α, β and ɣ using the critical values tabulated by Dickey and Fuller. The optimal lag length for the ADF regressions will base on the Akaike Information Criterion and the Schwartz Bayesian criterion. If this model will not be rejected, then the hypothesis of a unit roots (i.e. ɣ = 0) will tested using critical values from the t distribution. The advantage of this method is that once the "true" model is known under the null, the power of the unit root test can be increased by using the usual critical values from the t distribution instead of the critical values tabulated by Dickey and Fuller. If the model in equation (2) will be rejected, then the methodology continue in the same fashion with the more restricted model of difference stationary (DS) with drift.

There are two types of the nature of stationarity. One is trend stationary (TS). Suppose that;

$$\Delta Y = \alpha_o$$

The linear difference equation is;

$$Y = y_o + \alpha_o t$$

Where $y_o$ is the initial condition for period zero. And t is trend.

Add the stationary component to the trend to obtain;

$$Y = y_o + \alpha_o t + A(L)\varepsilon \qquad (3)$$

In (3), y can differ from its trend value by the amount of A(L)ε. Since this deviation is stationary, the y sequence will exhibit only temporary departure from the trend. This type of model is called trend stationary (TS) model. And if the y sequence

will not exhibit stationary deviation from its trend but its first or second difference shows the properties of stationary series, then it is known as difference stationary (DS).

If detected, non-stationarity will deal with by transforming the original series into stationary processes. Trend stationary (TS) variables will be detrended by regressing them on a constant and a polynomial of time. Difference stationary (DS) variables will also be detrended using the Hodrick- Prescott filter. This method has been developed by Hodrick and Prescott (1997). Consider the sum of squares;

$$\frac{1}{T}\sum_{T}^{t=1}(y_t - \mu_t)^2 + \frac{\lambda}{T}\sum_{T-1}^{t=2}[(\mu_{t+1} - \mu_t) - (\mu_t - \mu_{t-1})]^2 \qquad \textbf{(4)}$$

Where T is number of usable observations and λ is a constant. λ is set equal to 1600 as suggested by Hodrick and Prescott (1984) and Farmer (1993).

The specification includes lags of some of the independent variables. Lagged dependent variables are not included because this study considers they do not belong to the econometric model. In order to take possible autocorrelation and hetroskedasticity, we obtain standard errors by using the Newey-West robust, consistent estimator, which can be estimated as;

Suppose that we have to correct the standard error for possible autocorrelation and hetroskadasticity of the following model;

$$\boldsymbol{Y = \beta_o + \beta_1 X + \mathcal{E}} \qquad \textbf{(5)}$$

*Variance of estimated 'β' is given by;*

$$Var(\hat{\beta}) = \sum_{t=1}^{T}\sum_{t=1}^{T} w_t w_{t-} \sigma_{\nu\ t1}$$

Where 'w' is;

$$w_{\hat{\beta}_1} = \frac{x_t}{\sum_{s=1}^{T} x_s^2}$$

Computing the value of "w' to obtain;

$$Var(\hat{\beta}_1) = \sum_{t=1}^{T}\sum_{t'=1}^{T} \frac{x_t x_{t'}}{\left(\sum_{s=1}^{T} x_s^2\right)} \sigma_{|t-t'|}$$

If the time period is short then there is more possibility of correlation. According to Newey and West (1997), as |t-t'| grows $\sigma_{|t-t'|}$ approaches to zero. In first step in estimating Newey-west standard errors is to choose lag length (L). Which has been chosen, using and then we assume $\sigma_{|t-t'|}$ is approximately equal to zero for all |t-t'| > L. then replace $\sigma_{|t-t'|}$ with $e_t e_{t'}$ if | t-t'| is less than or equal to L. and replace $\sigma_{|t-t'|}$ with zero if | t-t'| is greater than L to obtain the estimated standard error (e.s.e) corrected for serial correlation as;

$$e.s.e.(\hat{\beta}_1) = \sqrt{\sum_{t=1}^{T}\sum_{t'=t\pm L}^{t\pm L} \frac{x_t x_{t'}}{\left(\sum_{s=1}^{T} x_s^2\right)} e_t e_{t'}}$$

And for hetroskedasticity as below;

$$e.s.e.(\hat{\beta}_1) = \sqrt{\frac{\Sigma x_t^2 e_t^2}{\left(\Sigma x_t^2\right)^2}}$$

For correcting autocorrelation and hetroskedastisity we have a single equation (4) as given below;

$$e.s.e.(\hat{\beta}_1) = \sqrt{\sum_{t=1}^{T}\sum_{t'=t}^{t+L}\frac{x_t x_{t'}}{\left(\sum_{s}^{T} x_s^2\right)} e_t e_{t'}} = \sqrt{\sum_{t=1}^{T}\sum_{t'=t}^{t}\frac{x_t x_{t'}}{\left(\sum_{s}^{T} x_s^2\right)} e_t e_{t'}}$$

$$= \sqrt{\sum_{t}^{T}\frac{x_t^2 e_t^2}{\left(\sum_{s}^{T} x_s^2\right)^2}} \qquad \textbf{(6)}$$

Moreover, the specification of the model is expected to have potential endogeneity problems. If some of the explanatory variables in the basic specification are simultaneously determined with the dependent variable then it may affect the results. To account for endogeneity, the model will be estimated by two-stage least squares (2SLS). This study will use the 2SLS estimator developed by Bollen (1996). Consider a simple regression model:

$$Y = \alpha + \beta x + u \qquad \textbf{(7)}$$

Where;

y is the dependent variable

x is the independent variable

α and β are estimable parameters

u is the error term

If x and u are correlated then this violates an assumption of the regression framework. Applying standard ordinary least squares (OLS) to equation (7) under these circumstances results in inconsistent estimates, that is, even as the sample size approaches infinity the estimates of the parameters on average will not equal the population estimates. To remedy this problem one can apply 2SLS, also called the

instrumental variables (IV) procedure. To implement 2SLS we need to identify one or more instruments for x. These instruments (call them z) must satisfy two conditions:

1. z must be uncorrelated with u.

2. z must be correlated with x.

This method will produce consistent parameter estimates even given the correlation between x and u. The only condition for identification is that the number of instruments is greater than or equal to the number of independent variables.

There are two ways to get 2SLS/IV estimates. The first is through a direct 2SLS/IV option available in packages such as SPSS and Eviews. These are based on a single IV expression which involves matrix algebra. This approach will produce consistent estimates and accurate standard errors. Consider a population model:

$$y_1 = \alpha_1 y_2 + \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_k x_k + u \qquad \textbf{(8)}$$

Where $y_2$ is an endogenous variable. Suppose that there are m instrumental variables.

Instruments, z = (1, $x_{1\ldots}$ $x_k$, $z_1 \ldots$ $z_m$) are correlated with $y_2$. From the reduced form equation of $y_2$ with all exogenous variables (exogenous independent variables plus instruments), we have

$$y_2 = \delta_0 + \delta_1 x_1 + \delta_2 x_2 + \ldots + \delta_k x_k + \delta_{k-1} z_1 + \ldots + \delta_{k+m} z_m + \varepsilon$$

$$y_2 = \hat{y}_2 + \varepsilon$$

$\hat{}y_2$ is a linear projection of $y_2$ with all exogenous variables. Because $\hat{}y_2$ is projected with all exogenous variables that are not correlated with the error term, u, in (8), $\hat{}y_2$ is not correlated with u, while ε is correlated with u. Thus, we can say that by

estimating $y_2$ with all exogenous variables, we have divided into two parts: one is correlated with u and the other is not.

The projection of $y_2$ with z can be written as:

$$\hat{y}_2 = Z\hat{\delta} = Z(Z'Z)^{-1}Z'y_2$$

Replace X to the $y_2$ and project X with Z as:

$$\hat{X} = Z\hat{\Pi} = Z(Z'Z)^{-1}Z'X = P_Z X$$

$\Pi\hat{}$ is k-matrix with coefficients, as shown below:

$$\hat{\Pi} = \begin{bmatrix} \delta_1 & 1\ 0 & 0 \\ \delta_2 & 0\ 1 & 0 \\ & & \\ \delta_{k+m-1} & 0\ 0 & 1 \end{bmatrix}.$$

Thus, $y_2$ in X should be expressed as a linear projection, and other independent variables in X should be expressed by itself. $P_z = Z\ (Z'Z)^{-1}\ Z'$ is a n-by-n symmetric matrix and idempotent (i.e., P′z Pz = Pz). We use X ˆ as instruments for X and apply the IV estimation to get;

$$\hat{\beta}_{2SLS} = (\hat{X}'X)^{-1}\hat{X}'Y$$

$$= (X'P_Z X)^{-1}X'P_Z Y$$

$$- (X'Z(Z'Z)^{-1}Z'X)^{-1}X'Z(Z'Z)^{-1}Z'Y \qquad \textbf{(9)}$$

This can be also written as;

$$\hat{\beta}_{2SLS} = (\hat{X}'\hat{X})^{-1}\hat{X}'Y$$

This is the 2SLS estimator. It is called as two-stage because it looks like we take two steps by creating projected *X* to estimate the 2SLS estimators. We do not need to take two steps as we show in (9). We can just estimate 2SLS estimators in one step by using *X* and *Z*.

The second method (as the 2SLS name suggests) to get the parameter estimates is to run two OLS regressions:

1. OLS regression x on z and get predictions for x, say xˆ

2. OLS regression y on xˆ.

By forming predictions for x in the 2nd stage through the instruments z we correct for the correlation between the error term and the independent variable. This will produce 2SLS parameter estimates, the same as the estimates produced by the direct 2SLS/IV option. However the standard errors from the two-step procedure will be incorrect. Effectively, employing in the second stage rather than x, inaccurately measures the standard error estimates. It is recommended therefore that the direct 2SLS/IV option be employed to get parameter and standard error estimates. In choosing the number of instruments to employ in 2SLS asymptotically (as n approaches infinity) the larger the no of instruments the better in terms of efficiency. However, the small sample bias of the estimator may get worse as the number of instruments increases. As more the number of instruments are used degree of freedom will be lost and this will weaken the power of statistical results.

The advantages of using 2SLS over the more conventional maximum likelihood (ML) method for SEM include:

- It does not require any distributional assumptions for RHS independent variables; they can be non-normal, binary, etc.
- In the context of a multi-equation non-recursive SEM it isolates specification errors to single equations, see Bollen (2001).
- It is computationally simple and does not require the use of numerical optimization algorithms.
- It easily caters for non-linear and interactions effects see Bollen and Paxton (1998).
- It permits the routine use of often ignored diagnostic testing procedures for problems such as heteroscedasticity and specification error; see Pesaran and Taylor (1999).
- Simulation evidence from econometrics suggests that 2SLS may perform better in small samples than ML, see Bollen (1996, pp120-121).

There are however some disadvantages in using 2SLS compared to ML, these include:

- The ML estimator is more efficient than 2SLS given its simultaneous estimation of all relationships, hence ML will dominate 2SLS always in sufficiently large samples if all assumptions are valid and the model specification is correct. Effectively ML is more efficient (if the model is valid) as it uses much more information than 2SLS.

- Unlike the ML method, the 2SLS estimator depends upon the choice of reference variable. The implication being that different 2SLS estimates result given different scaling variables.
- Programs with diagram facilities such as EQS do not exist for 2SLS. One needs to logically work through the structure of the model to specify individual equations for all the relationships for the 2SLS estimator.

Moreover 3SLS will give more efficient estimates, but it is expected that 2SLS estimates will still consistent. Moreover, 3SLS would pose the risk that wrongly specified equations for the instrumented variables bias the estimators of interest in the margin equation.

## Chapter 5

# Estimated Results

The results for the estimations obtained following the methodology outlined in Section above are presented in this section.

Table 5.1 presented the summary statistics of the dependent and independent variables along with the Business cycle indicators included as regressor in this study. Variables are in log form.

Table 5.1:- Summary statistics.

| Variables (in logs) | Obs | Mean | Median | Max | min | Std. dev |
|---|---|---|---|---|---|---|
| NIMs | 49 | 0.69 | 0.73 | 0.94 | -0.46 | 0.23 |
| GDP | 49 | 4.33 | 4.36 | 4.55 | 4.09 | 0.14 |
| GDP Per Capita | 49 | 4.28 | 4.29 | 4.52 | 3.99 | 0.15 |
| Money growth | 49 | 1.12 | 1.20 | 1.51 | 0.08 | 0.26 |
| Monetary policy | 49 | 0.98 | 1 | 1.30 | 0.70 | 0.15 |
| Interest rate risk | 49 | 0.45 | 0.52 | 0.61 | 0.69 | 0.29 |
| Financial depth | 49 | 3.10 | 3.09 | 3.34 | 2.87 | 0.12 |
| Inflation | 49 | 2.06 | 2.15 | 3.24 | 0.13 | 0.62 |
| Deposits | 49 | 1.35 | 1.36 | 1.45 | 1.24 | 0.05 |
| Liquidity | 49 | 0.87 | 0.89 | 1.43 | -0.77 | 0.33 |
| Capital holding | 49 | 4.95 | 5.04 | 6.49 | 3.38 | 0.90 |

All the variables are then transformed into detrended series. Again summary statistics of these transformed variables are obtained. Results are reported in table 5.2.

Table 5.2:- Summary statistics of detrended variables

| Variables (in logs) | Obs | Mean | Median | Max | Min | Std. dev |
|---|---|---|---|---|---|---|
| NIMs | 49 | -0.26 | -0.16 | 0.61 | -2.30 | 0.54 |
| GDP | 49 | -2.07 | -1.98 | -1.49 | -3.71 | 0.50 |
| GDP Per Capita | 49 | -2 | -1.85 | -1.48 | -3.80 | 0.46 |
| Money growth | 49 | 0.43 | 0.52 | 1.22 | -0.75 | 0.52 |
| Monitory policy | 49 | -2.99 | -2.84 | -1.50 | -6.47 | 1.01 |
| Interest rate risk | 49 | -3.37 | -3.25 | -1.21 | -7.82 | 1.31 |
| Financial depth | 49 | -2.87 | -2.49 | -1.47 | -6.33 | 1.17 |
| Inflation | 49 | 0.30 | 0.47 | 1.21 | -1.41 | 0.57 |
| Deposits | 49 | -3.67 | -3.36 | -2.30 | -7.70 | 1.13 |
| Liquidity | 49 | -2.15 | -1.90 | 0.37 | -6.82 | 1.29 |
| Capital holding | 49 | -3.21 | -2.86 | -1.77 | -8.43 | 1.28 |

In order to separate the cyclical component from the raw data, the variables are detrended according to their nature of Stationarity processes. For this purpose Augmented Dickey-Fuller (ADF) tests are run for all the variables in the sample to test for Stationarity. The optimal lag length for the ADF regressions is based on the Akaike Information Criterion and the Schwartz Bayesian criterion. When Non-Stationarity detected then the original series are transformed into detrended series. Trend stationary (TS) variables are regressed on time polynomial and differenced stationary (DS) variables are detrended using the hodrick-prescott filter with a smoothing parameter of 1600 to separate the cyclical component from trend. Cyclical components of the variables are given in figure 5.1.

Detrended series are then again transformed into log form. The negative values are treated by taking absolute values and then transformed them by taking log of the absolute values. In table 5.3 the results obtained from stationary checks are presented. Nature of stationarity process and its detrending method is also reported in the table 5.3. All of the detrended variables are proved to be stationary at level with no intercept and trend.

Table 5.3:- Stationarity Tests

| Variables | Lag length | t-stat | Cri-value (5%) | Prob | Stationarity | Process | Detrending method |
|---|---|---|---|---|---|---|---|
| NIMs | 0 | -8.20 | -3.51 | 0.00 | I(1) with drift and trend | TS | Time polynomial |
| GDP | 0 | -6.19 | -3.51 | 0.00 | I(1) with drift and trend | TS | Time polynomial |
| GDP Per Capita | 0 | -5.84 | -3.51 | 0.00 | I(1) with drift and trend | TS | Time polynomial |
| Money growth | 0 | -6.59 | -3.51 | 0.00 | I(0) with drift and trend | TS | Time polynomial |
| Monetary policy | 0 | -5.55 | -1.94 | 0.00 | I(0) | DS | HP |
| Interest rate risk | 9 | -2.71 | -1.95 | 0.00 | I(2) | DS | HP |
| Financial depth | 1 | -3.40 | -2.93 | 0.02 | I(0) with drift | TS | Time polynomial |
| Inflation | 0 | -3.40 | -2.93 | 0.02 | I(0) with drift | TS | Time polynomial |
| Deposits | 1 | -3.62 | -3.51 | 0.04 | I(0) with drift and trend | TS | Time polynomial |
| Liquidity | 0 | -4.34 | -3.51 | 0.00 | I(0) with drift and trend | TS | Time polynomial |
| Capital holding | 0 | -6.75 | -3.51 | 0.00 | I(1) with drift and trend | TS | Time polynomial |

Table 5.4:- Sample raw correlation.

| Variables | Correlation with NIMS | t-stat | Probability |
|---|---|---|---|
| GDP | -0.55*** | -4.45 | 0.0001 |
| GDP/capita | -0.17*** | -2.87 | 0.0063 |
| Money growth | 0.26*** | 3.81 | 0.0004 |
| Mont. Policy | 0.45*** | 3.38 | 0.0015 |
| Interest rate risk | 0.12 | 0.78 | 0.4386 |
| Financial depth | 0.22** | 1.98 | 0.0492 |
| Inflation | 0.08** | 2.09 | 0.0417 |
| Deposits | -0.05** | -2.58 | 0.0133 |
| Liquidity | -0.03*** | -2.87 | 0.0063 |
| Capital holding | -0.01* | -1.83 | 0.0729 |

***Significant at 1% level of confidence.
**Significant at 5% level of confidence.
*Significant at 10% level of confidence.

Table 5.5 represents the result of first step of the estimation. Only business cycle indicators are regressed on NIMs. From two stage least square method, GDP and GDP per Capita shows negative sign on their coefficients and money growth has positive relationship with NIMs as expected. Coefficients of GDP and GDP per capita are statistically significant on 1% level of confidence and that of money growth has 5% significance level. Standard errors are obtained through HAC (Newey-west) standard errors and covariance.

For checking the efficiency and consistency of the results, the model is also regressed by ordinary least square method. The coefficients of included cycle indicators are still significantly correlated to NIMs and have same signs suggested by two stage least square method. This shows that results are consistent and efficient.

From the results of first step, it is clear that there is a channel through which business cycles' fluctuations effect NIMs. In the next section, we will explore the potential determinants of NIMs through which the counter-cyclical behavior of NIMs can be explained.

Table 5.5:- The cyclical behavior of NIMs

| Variables | Least Square method | Two stage least square method |
|---|---|---|
| GDP | -0.58*** | -0.55*** |
| | (0.085) | (0.085) |
| GDP/capita | -0.17** | -0.16** |
| | (0.06) | (0.057) |
| Money growth | 0.24** | 0.22** |
| | (0.11) | (0.106) |
| R-square | 0.41 | 0.32 |
| D-W Stat | 2.05 | 2.03 |
| J-Stat(probability) | - | 0.89 |

Standard errors (Newey-West robust standard errors) are in parentheses.
***Significant at 1% level of confidence.
**Significant at 5% level of confidence.
*Significant at 10% level of confidence

## 5.1: Regressions with basic controls:

The counter-cyclicality of NIMs is documented with a negative and significant coefficient on GDP and GDP per capita and similarly with significant positive sign on

money growth. This is true even after controlling for the effects of countercyclical monetary policy and interest rate risk.

The monetary policy is measured with the discount rate. Both the current and lagged values of monetary policy and interest rate risk are included in the regression. Table 5.6, table 5.7 and table 5.8 presented the results of regressions using three alternate business cycle indicators. Only monetary policy and interest rate risk is included as basic controls. The objective here is to find the actual candidate which explains the counter-cyclicality of NIMs.

A positive effect of the discount rate is obtained for all of the three alternate business cycle indicators. It is important to control for counter-cyclical monetary policy here. If expansionary policies help the economy and at the same time lower the Net interest Margins, then not including the discount rate among the controls may bias the coefficient on the cycle indicator downwards. The positive and significant coefficient on discount rate is an evidence of the bank lending channel of monetary policy in the Pakistan economy for the sample period of this study. However previous value of discount rate has negative and significant impact on NIMs. But overall, the discount rate retains its positive and significant impact on NIMs after introducing the additional lags or controls. And lag value of discount rate become insignificant, by this we can say that when the additional controls was not included then there was problem of omitted variable biasness. Results after including additional lags of discount rate are reported in table 5.9, table 5.10 and table 5.11.

Net Interest Margins are positively affected by the lagged term of interest rate risk. But there is no significant impact of current value of interest rate risk.

All regressions are also regressed by OLS as an alternate method and the results obtained are consistent. Business cycle indicators have still significant impact on NIMs.

Table 5.6:- Regression with Basic controls: GDP as Cycle indicator.

| Variables | Least square method | Two stage least square method |
|---|---|---|
| GDP | -0.41*** | -0.47*** |
| | (0.08) | (0.13) |
| Monetary Policy | 0.27** | 0.39*** |
| | (0.12) | (0.14) |
| Monetary Policy$_{t-1}$ | -0.21*** | -0.28*** |
| | (0.06) | (0.07) |
| Interest rate risk | -0.009 | 0.002 |
| | (0.02) | (0.03) |
| Interest rate risk$_{t-1}$ | 0.10*** | 0.10*** |
| | (0.02) | (0.03) |
| R-square | 0.40 | 0.50 |
| D-W stat | 1.61 | 1.74 |
| Probability(J-stat) | - | 0.16 |

Standard errors (Newey-West robust standard errors) are in parentheses.
***Significant at 1% level of confidence.
**Significant at 5% level of confidence.
*Significant at 10% level of confidence.

Table 5.7:- Regression with Basic controls: GDP per capita as Cycle indicator.

| Variables | Least square method | Two stage least square method |
|---|---|---|
| GDP Per Capita | -0.29** | -0.30** |
| | (0.13) | (0.13) |
| Monetary Policy | 0.35*** | 0.45*** |
| | (0.12) | (0.12) |
| Monetary Policy$_{t-1}$ | -0.17*** | -0.23*** |
| | (0.06) | (0.06) |
| Interest rate risk | -0.004 | -0.004 |
| | (0.04) | (0.03) |
| Interest rate risk$_{t-1}$ | 0.15*** | 0.15*** |
| | (0.03) | (0.03) |
| R-square | 0.38 | 0.45 |
| D-W stat | 1.77 | 1.83 |
| Probability(J-stat) | - | 0.36 |

Standard errors are in parentheses. Newey-West robust standard errors.
***Significant at 1% level of confidence.
**Significant at 5% level of confidence.
*Significant at 10% level of confidence.

Table 5.8:- Regression with Basic controls: Money growth as Cycle indicator.

| Variables | Least square method | Two stage least square method |
|---|---|---|
| Money Growth | 0.21** | 0.21** |
| | (0.10) | (0.10) |
| Monetary Policy | 0.34** | 0.34*** |
| | (0.14) | (0.12) |
| Monetary Policy$_{t-1}$ | -0.16* | -0.16*** |
| | (0.08) | (0.06) |
| Interest rate risk | -0.05 | -0.05** |
| | (0.04) | (0.02) |
| Interest rate risk$_{t-1}$ | 0.13*** | 0.13*** |
| | (0.03) | (0.02) |
| R-square | 0.35 | 0.35 |
| D-W stat | 1.57 | 1.57 |
| Probability(J-stat) | - | 0.23 |

Standard errors are in parentheses. Newey-West robust standard errors.
***Significant at 1% level of confidence.
**Significant at 5% level of confidence.
*Significant at 10% level of confidence.

Table 5.9:- Regression with additional lags: GDP as Cycle indicator.

| Variables | Least Square Method | Two stage Least Square Method |
|---|---|---|
| GDP | -0.46*** | -0.49*** |
| | (0.15) | (0.16) |
| Monetary Policy | 0.39** | 0.40** |
| | (0.15) | (0.22) |
| Monetary Policy$_{t-1}$ | -0.16*** | -0.17*** |
| | (0.05) | (0.06) |
| Monetary Policy$_{t-2}$ | 0.20* | 0.19* |
| | (0.11) | (0.10) |
| Monetary Policy$_{t-3}$ | 0.06 | 0.11 |
| | (0.04) | (0.11) |
| Monetary Policy$_{t-4}$ | 0.02 | -0.05 |
| | (0.04) | (0.04) |
| R-square | 0.47 | 0.49 |
| D-W Stat | 1.63 | 1.69 |
| Probability(J-Stat) | - | 0.60 |

Standard errors (Newey-West robust standard errors) are in parentheses.
***Significant at 1% level of confidence.
**Significant at 5% level of confidence.
*Significant at 10% level of confidence.

Table 5.10:- Regression with additional lags: GDP per capita as Cycle indicator.

| Variables | Least Square Method | Two stage Least Square Method |
|---|---|---|
| GDP Per Capita | -0.25* | -0.26** |
| | (0.13) | (0.10) |
| Monetary Policy | 0.47*** | 0.46*** |
| | (0.16) | (0.13) |
| Monetary Policy$_{t-1}$ | -0.13*** | -0.12*** |
| | (0.04) | (0.04) |
| Monetary Policy$_{t-2}$ | 0.23*** | 0.21** |
| | (0.07) | (0.09) |
| Monetary Policy$_{t-3}$ | 0.08 | 0.04 |
| | (0.08) | (0.10) |
| Monetary Policy$_{t-4}$ | 0.02 | 0.03 |
| | (0.06) | (0.03) |
| R-square | 0.41 | 0.42 |
| D-W Stat | 1.61 | 1.64 |
| Probability(J-Stat) | - | 0.21 |

Standard errors (Newey-West robust standard errors) are in parentheses.
***Significant at 1% level of confidence.
**Significant at 5% level of confidence.
*Significant at 10% level of confidence.

Table 5.11:- Regression with additional lags: money growth as Cycle indicator.

| Variables | Least Square Method | Two stage Least Square Method |
|---|---|---|
| Money Growth | 0.25** | 0.27*** |
| | (0.12) | (0.10) |
| Monetary Policy | 0.47** | 0.46** |
| | (0.21) | (0.22) |
| Monetary Policy$_{t-1}$ | -0.11** | -0.10 |
| | (0.05) | (0.10) |
| Monetary Policy$_{t-2}$ | 0.25* | 0.22 |
| | (0.13) | (0.15) |
| Monetary Policy$_{t-3}$ | 0.06 | -0.02 |
| | (0.04) | (0.09) |
| Monetary Policy$_{t-4}$ | -0.001 | 0.03 |
| | (0.04) | (0.03) |
| R-square | 0.42 | 0.44 |
| D-W Stat | 1.49 | 1.54 |
| Probability(J-Stat) | - | 0.78 |

Standard errors (Newey-West robust standard errors) are in parentheses.
***Significant at 1% level of confidence.
**Significant at 5% level of confidence.
*Significant at 10% level of confidence.

## 5.2: Regression with additional controls:

Discount rate retains its positive and significant impact on NIMs after introducing the additional controls for all of the business cycle indicators respectively.

Current value of Interest rate risk has no significant impact on NIMs but its contemporaneous value shows significant positive impact. Therefore, somehow our results are consistent with Ho and Saunders (1981) theoretical model and with previous empirical studies that show positive relationship between NIMs and interest rate risk.

Counter-cyclicality of NIMs is also explained by degree of financial depth as it shows significant and negative impact as expected.

The supply of deposits faced by banks is used as a proxy for the marginal cost of funds for them does not have a consistently significant impact on margins. Future research could try to incorporate more accurate microeconomic measures of operative costs for banks.

Banks' net interest rate margins are also affected by inflation in the case of Pakistan. For each cycle indicator, inflation exerts positive and significant impact over the included sample period.

The increase in liquidity of banks was expected to increase margins as shown in the study of Angbazo (1997) and Kunt, Laeven and Levine (2004). However, no conclusive evidence can be found as the coefficient is insignificant for NIMs and it is even negative.

The coefficient on the capital holding is positive and significant across the different alternative business cycle indicators used. This seems to be true in general as banks often charge higher rate to cover the cost of capital holding.

Banks liquidity and capital holdings were expected to have same impact on margins. But on the contrast they show different sign and liquidity. Reason might be related to the possible availability to banks of cross-subsidizing some product mixes. This may affect the pricing of loans as suggested by Kunt, Laeven and Levine (2004).

Moreover our results cannot provide full support to the effect studied in Kashyap and Stein (2000) related to the relationship between monetary policy and banks liquidity. This hypothesis would imply a negative sign for the interaction between liquidity and the discount rate. But in this study Coefficient of liquidity is not significant in all possible combinations of NIMs and cycle indicators. The results of all considered combination of business cycle indicators and NIMs are represented in table 5.12, table 5.13 and table 5.14.

Table 5.12:- Additional controls: GDP as cycle indicator.

| Variables | Least Square Method | Two Stage Least Square Method |
|---|---|---|
| GDP | -0.45*** | -0.45*** |
| | (0.09) | (0.16) |
| Monetary Policy | 0.40*** | 0.40*** |
| | (0.13) | (0.11) |
| Monetary Policy$_{t-1}$ | -0.09 | -0.08 |
| | (0.08) | (0.07) |
| Interest rate risk | 0.02 | 0.02 |
| | (0.03) | (0.03) |
| Interest rate risk$_{t-1}$ | 0.13*** | 0.13*** |
| | (0.02) | (0.01) |
| Financial depth$_{t-1}$ | -0.06** | -0.06*** |
| | (0.03) | (0.02) |
| Supply of deposits | 0.05 | 0.05 |
| | (0.04) | (0.05) |
| Inflation | 0.05* | 0.05** |
| | (0.023) | (0.02) |
| Liquidity | -0.007 | -0.007 |
| | (0.02) | (0.02) |
| Capital holding | 0.18** | 0.16** |
| | (0.09) | (0.08) |
| R-square | 0.52 | 0.52 |
| D-W Stat | 1.79 | 1.79 |
| Probability(J-stat) | - | 0.87 |

Standard errors (Newey-West robust standard errors) are in parentheses.
***Significant at 1% level of confidence. **Significant at 5% level of confidence.
*Significant at 10% level of confidence.

Table 5.13:- Additional controls: GDP per capita as cycle indicator.

| Variables | Least Square Method | Two Stage Least Square Method |
|---|---|---|
| GDP Per Capita | -0.31** | -0.31*** |
| | (0.13) | (0.09) |
| Monetary Policy | 0.48*** | 0.48*** |
| | (0.11) | (0.11) |
| Monetary Policy$_{t-1}$ | -0.06 | -0.04 |
| | (0.05) | (0.03) |
| Interest rate risk | 0.05 | 0.05 |
| | (0.03) | (0.03) |
| Interest rate risk$_{t-1}$ | 0.19*** | 0.19*** |
| | (0.03) | (0.03) |
| Financial depth$_{t-1}$ | -0.07*** | -0.07*** |
| | (0.01) | (0.02) |
| Supply of deposits | 0.06 | 0.06 |
| | (0.04) | (0.05) |
| Inflation | 0.13** | 0.13* |
| | (0.05) | (0.06) |
| Liquidity | -0.03 | -0.03 |
| | (0.02) | (0.03) |
| Capital holding | 0.06*** | 0.05** |
| | (0.02) | (0.02) |
| R-square | 0.49 | 0.49 |
| D-W Stat | 1.97 | 1.97 |
| Probability(J-stat) | - | 0.15 |

Standard errors (Newey-West robust standard errors) are in parentheses
***Significant at 1% level of confidence.
**Significant at 5% level of confidence.
*Significant at 10% level of confidence.

Table 5.14:- Additional controls: money growth as cycle indicator.

| Variables | Least Square Method | Two Stage Least Square Method |
|---|---|---|
| Money Growth | 0.24** | 0.24** |
| | (0.09) | (0.09) |
| Monetary Policy | 0.46*** | 0.46*** |
| | (0.16) | (0.15) |
| Monetary Policy$_{t-1}$ | -0.03 | -0.01 |
| | (0.02) | (0.01) |
| Interest rate risk | 0.07 | 0.08 |
| | (0.05) | (0.07) |
| Interest rate risk$_{t-1}$ | 0.17*** | 0.17*** |
| | (0.04) | (0.03) |
| Financial depth$_{t-1}$ | -0.07** | -0.07** |
| | (0.03) | (0.03) |
| Supply of deposits | 0.09 | 0.09 |
| | (0.05) | (0.05) |
| Inflation | 0.08* | 0.08* |
| | (0.04) | (0.03) |
| Liquidity | -0.01 | -0.01 |
| | (0.05) | (0.04) |
| Capital holding | 0.09*** | 0.08** |
| | (0.04) | (0.04) |
| R-square | 0.46 | 0.46 |
| D-W Stat | 1.64 | 1.64 |
| Probability(J-stat) | - | 0.21 |

Standard errors (Newey-West robust standard errors) are in parentheses.
***Significant at 1% level of confidence. **Significant at 5% level of confidence.
*Significant at 10% level of confidence.

Summarizing the results, at the macroeconomic level, the best candidates to explain the counter-cyclicality of NIMs are monetary policy, contemporaneous interest rate risk, the degree financial deepening and inflation. At the bank-level, banks capital holding seems to exert a significant impact on margins.

## Chapter 6

# Conclusions:

This study documents the counter-cyclicality of banks NIMs for the Pakistan banking sector. A time series data from 1965 to 2013 is used for the analysis. For estimation purposes 2SLS along with OLS has been used to explore the existence of financial accelerator in the banking sector of Pakistan. The case of Pakistan is interesting due to its fluctuations in the economy and because of higher banks' interest rate margins. In developing countries like Pakistan high NIMS can effects the rate of investment, saving and efficiency of financial system. Evaluation of banking sector has been always a key of effective monetary policy and through NIMS authorities can check the profitability and competitiveness of banking sector, so this study realize the importance of estimating the behavior of NIMS in different business cycles and offer potential explanations for that behavior

First, the cyclical behavior of NIMs is also studied when not controlling for monetary policy and interest rate risk in the basic specification. NIMs are regressed against each of the three alternative business cycle indicators. The result is also robust by including four lags of the discount rate in the basic specification to control for the effect of monetary policy. Thus, it is checked whether the documented cyclicality of NIMs is robust to the inclusion of three more lags of the rate. We believe this should account for the major part of the effect of monetary policy.

Our results have interesting policy implications due to their macroeconomic impacts. With NIMs in the market for credit being counter-cyclical, a financial accelerator seems

to be operating in the Pakistan's economy. This may call for stabilization policies to be made more effective in economies where these spreads are more counter-cyclical.
Some potential explanations for this cyclical behavior of NIMs are offered; that are "at the macroeconomic level, the best candidates to explain the counter-cyclicality of NIMs are monetary policy, contemporaneous interest rate risk, the degree financial deepening and inflation. At the bank-level, banks capital holding seems to exert a significant positive impact on margins".

Moreover, our study supported the banks' lending channel of monetary policy. However, our study is not consistent with the study of Kashyap and Stein (2000). They explore that impact of monetary policy on lending for banks is stronger with less liquid assets.

Most of the other papers use panel data because they focus on the empirical determinants of NIMs in general and bank-level variables are important determinants in that case. Not in our case where we want to explain a macro fact, the cyclicality of NIMs. But one can extend this study to a panel setting by using the bank-level balance sheet data if available. One reason that makes this worth is that the time series is rather short, while the cross-sectional dimension is much larger. Thus, the use of this additional information could provide more efficient estimation. Panel data would also allow for richer specifications that include controls such as geographical region and type of banks.

Future work could also attempt to estimate both a pricing equation and a cost function in the market for bank credit. By jointly estimating the parameters of banks micro founded behavioral equations, the goal would be to separate the effects on banks

non competitive pricing of strategic interaction among firms in the industry from those of varying market demand elasticity.

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