Impact of Macroeconomic Conditions on Interest Rate Pass-Through A Case Study of Pakistan

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<u>CERTIFICATE</u>

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Abstract

The thesis seeks to examine the impact of macro-economic conditions, namely GDP and inflation on interest rate pass-through (IRPT) for Pakistan. For this purpose, three sets of analysis are carried out by using monthly time series observations over the period of 2004 to 2015. The impulse response function show that a shock 6 months' treasury bill rate do not completely transmit to the weighted average lending Hence, there is incomplete interest rate pass-through in Pakistan. Time varying IRPT coefficients are derived by employing recursive analysis to examine the effects of macroeconomic variables on them. VAR result indicates that inflation indeed has positive impact on IRPT because in higher inflationary environment, banks tend to settle their lending rates more to increase their margins. GDP do not significantly affect interest rate pass-through. Pakistan financial market is in developing stage so it often experiences volatility due to market imperfections, this volatility introduces uncertainty in the market.

Chapter 1

Introduction

Monetary policy is presented by the central bank of a nation. The basic objective is to manage supply of money and interest rate. Monetary policy is used by the government of a country to attain macroeconomic stability regarding inflation, consumption, growth and liquidity.

An effective application of monetary policy demands a thorough review of how quicker the effects of policy shock travel towards other parts of the economy and what is the magnitude of these effects. The magnitude of these effects must be great to impact the economy by altering investment, consumption and aggregate demand (Aziakpono and Wilson 2010).

Across the world, different countries are on different scale of economic development at any given time. These differences have profound impact on their monetary policy stance because macroeconomic conditions are country-specific, these specifications consider the history of country`s growth, political environment, financial markets etc.

The process through which monetary policy propagate to other parts of the economy is termed as Monetary Policy Transmission Mechanism (MPTM). MPTM convey the policies executed by central bank across to the other parts of the economy and allows the central bank to drive economy in forward direction. Different channels of monetary policy transmission are used to achieve the desired execution of the policies and the effectiveness of these channels is determined by their strength and speed. MPTM is regarded to be a "black box" as explained by Bernanke and Gertler 1995. Nevertheless, the analysis of relative importance of these transmission channels is important for an

effective monetary policy. Different channels of monetary policy transmission are contrasting in their strength and speed, and their importance also differ across different countries because of varying structural economic characteristics, financial intermediation and the level of advancement of financial markets. (Checetti 1999).

Monetary Policy Transmission Mechanism concurs into four main channels (Mishkin 1996), Interest rate channel, Exchange rate channel, Credit channel and Asset price channel. Among these channels of monetary transmission, the primary focus of this study is the interest rate channel.

Interest rate channel alter the money market rate by inducing changes in official policy rate. This alteration in money market rate is than propagate to retail bank interest rate (Deposit and Lending rate), inducing changes in investment and saving decisions. The adjustments in real interest rate influence the investment and consumption decision by changing the cost of capital, which in turn changes the level of real income and prices (Mishkin 1996).

According to Aydin (2007), pass-through is the central feature of monetary policy transmission. Pass-through is explained as the degree and rate of modification with which a shift in official policy rate is passed on to retail interest rate in the economy. In order to achieve the goal of monetary policy, interest rate pass-through is the pivotal gateway for the central bank. In a complete pass-through, shocks which are induced by altering the policies are transmitted completely to the retail rates during the time of impact while the pass-through which fails to transmit the desired change at given time can result in the inefficiency of monetary policy to steady the shock (Tai, Sek and Har, 2012). A Pass-through considers being complete if the coefficient of the pass-through is equal to one. The greater the interest rate pass-through the more advance and efficient

the financial system of a nation. An incomplete pass-through is less than one and points in the direction of developing or emerging economies (Aydin 2007; Aziakpono and Wilson 2010).

Over the years' extensive research has been carried out to examine the strength with which monetary policy passed-through to retail rates. These studies reveal, interest rate pass-through differ from country to country. This variation can be enunciated by diversified macroeconomic conditions or other structural characteristics which opt to be country specific. When same monetary policy is applied to different economies, most take contrasting path from one another largely due to different stages of their development.

The strength and stability of the relationship between policy rate and retail rate is of great importance for an individual country. As a country, may be at different stages of development at different times, the IRPT may be different in that country at different times. If the pass-through turns out to have been weak over the years, then the macroeconomic conditions of a country could be the reason for the irresponsiveness of monetary policy.

Pakistan is a developing economy. In case of developing economies, it is important to grasp the significance of the mechanism through which monetary policy propagate and to comprehend the effectiveness of transmission mechanism for the growth of the nation. Those countries where financial markets are in developing stages are important in terms of understanding the process of transmission from early on (Ramlogan 2004, Scholnick 1996). The reason is that the transmission mechanism helps policymakers in determining the amount of shocks, those that stimulates change in monetary policy and those that do not. Also, the clear understanding of the transmission mechanism

encourages elevated levels of investment and a quicker path toward the economic growth.

In Pakistan, during early 1990s the transition from regulated economy to Market based economy started to take place. This transition includes reforms like privatization of commercial banks and the replacement of credit ceiling with open market operations. The treasury bills were used increasingly as an instrument for the conduction of monetary policy. If the degree of pass-through is higher and the time taken is smaller, the impact of pass-through would be greater. Given that the policy rate, State Bank of Pakistan, influence the yield on T-bills and these changes in it are then transmit to money market interest rate and the retail rates. If the alterations in T-Bill are not travelled to retail rates, then there is no point of using interest rate channel to influence the level of output and prices. T-bill rate fluctuate a great deal, so it is vital to estimate the official rate pass-through. Different studies in relevance to Pakistan show that there exists an inefficient pass-through of interest rate. The empirical information reports that money market rates respond readily to monetary policy shock but pass-through of official interest rate appears to be incomplete (Qayyum et al. 2005, Fazal and Salam 2013). The question arise that what are the causes of the retail rates stickiness.

Over the years, Pakistan experiences the transition to market based monetary management, trade liberalization and the advancement in banking. These are all the reasons that justify the belief that the structure of Pakistan economy has been changing over time. These variations in the core of the economy are probable to have had impact on monetary transmission mechanism.

Macroeconomic conditions of Pakistan have been subject to ups and downs over the years. The fluctuations of macroeconomic conditions are the growing pains and

hallmark of a developing economy. Pakistan`s inflation rate over the years has been an enigma to most analyst.

Historically it has been rather low, 3.3% across 1960`s, it roses to 11.9% on average in 1970`s. It was particularly high during the 1990`s ranged between 9.25% and 12.9%, and fell to very low levels in 1998-99. Inflation in last two decades had an erratic trend, ranging as high as 20% with 1.7% GDP growth rate in 2008-09 and as low as 2.4% with 14.5% GDP growth in 2010-11 (Pakistan Inflation Index Monitoring Cell, 2012).

Fig1.1 GDP
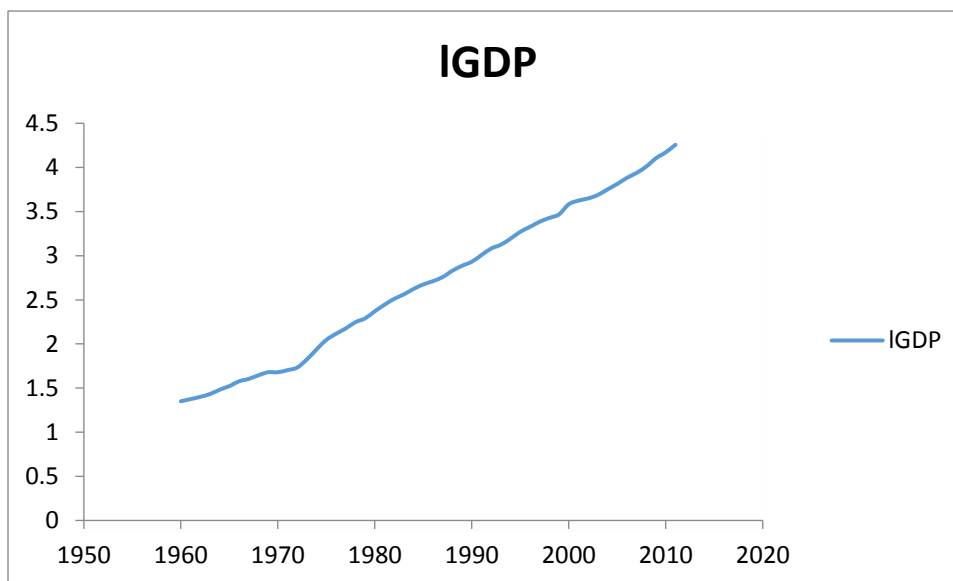
Structural characteristics of a nation tend to affect the interest rate pass-through especially macroeconomic conditions exhibit a vital role in successful forwarding of monetary policy so, it is critical to analyse the relationship between Pakistan`s macroeconomic conditions and its interest rate pass-through over the years. In this thesis, we will evaluate whether macroeconomic conditions act a part in the

transmission mechanism of monetary policy. Do Macroeconomic conditions over the years somehow affect the pass through?

1.1 Motivation of the study

Most monetary policy decisions initiate with the State Bank of Pakistan, by setting the official policy rate. The reason for alteration of the official rate is to stabilize the economy by influencing the macroeconomic variables. A bulk of research seeks to examine the pass-through of interest rate. These studies report that alteration in policy rate do not transfer to retail rates in short run hence the pass-through is incomplete (SBP 2005; Hanif and Khan 2012; Qayyum et al. 2006 and Khawaja and Khan 2008). This slow adjustment of lending and deposit rates tends to undermine the conduct of monetary policy. Weth (2002) explained that in short run the pass-through has inclination to remain sluggish but it is not necessary that pass-through stay incomplete in the long-run. One justification for this sluggishness could be the macroeconomic condition of the country. Several studies factors in the macroeconomic variables as significant cause for varying transmission of monetary policy. Gigineishvili (2011) explored the role of macroeconomic variables, in determining the effectiveness of pass-through. He reported that per capita GDP, inflation rate, interest rates and competition between banks assist the pass-through. The positive relationship between per capita GDP and interest rate pass-through imply that more developed countries have strengthen pass-through because in wealthier countries financial markets are more advanced hence, the monetary transmission mechanism works relatively fine. In high inflationary environment and elevated interest rates, banks set their lending rates more and broaden their margins. As uncertainty is the hallmark of high inflationary environment and high interest rate, banks in these economies transmit the risk to borrowers at elevated rate to increase risk adjusted returns and safeguard profitability

Pakistan as an emerging economy faces the problem of implementation of monetary policy in its intended spirit this has been acknowledged by SBP in the monetary policy statement of July 2011. Over years, a great deal of research been subject to analyse IRPT in Pakistan but the analysis of its structural determinants has received considerably less attention. Studies explaining the determinants of interest rate pass-through are mostly cross-sectional in nature, therefore, there is a need to analyse how country`s structural determinants especially macroeconomic conditions influence its interest rate pass-through over the years. In order to examine the relationship time varying interest rate pass-through should be studied. However, no empirical study has been carried out regarding time varying interest rate pass-through and macroeconomic conditions in Pakistan. To fill this gap the current study attempts to answer the following questions. First, to what extant policy rate and retail rate move together in Pakistan. The answer of this question also shows the response and the relevance of retail rate to monetary policy decisions. Second, to examine whether macroeconomic conditions of Pakistan affect the strength of interest rate pass through.

1.2 Objective of Study

Following are the specific objectives of the study:

- To estimate the time varying interest rate pass-through coefficients.
- To relate time varying IRPT coefficients to macroeconomic conditions such as inflation and GDP.

1.3 HYPOTHESES

H10: IRPT from policy rate to market retail rate is complete.

H11: IRPT from policy rate to market retail rate is incomplete.

H20: Macroeconomic conditions have no relation to IRPT.

H21: Macroeconomic conditions have significant effect on IRPT.

The above-mentioned hypotheses are tested by utilizing time series monthly data for the time-period 2004-M1 to 2015-M12. In this thesis, analysis has been done in three steps. The error correction model checks the first hypothesis of the thesis. Then, through vector error correction mechanism, we document the time varying IRPT. The second hypothesis is tested by employing Vector error correction model to analyse the impact of GDP and inflation rate on IRPT.

1.4 Plan of Study

Chapter 1 gives an introduction of the thesis. Chapter 2 includes the prior researches conducted on the subject under discussion. Chapter 3 introduces a methodology, estimation procedure and variables description. Chapter 4 comprises of estimation results and discussion. Chapter 5 is the last chapter and gives the summary and conclusion of the entire thesis.

Chapter 2

Literature review

There is a large amount of literature examining the effects of Monetary Policy. Buiguit (2009) explains that central bank take monetary decisions in the economy through monetary transmission channels. Four different monetary policy channels are described by Miskin (1996).

- Exchange rate channel,

- Interest rate channel,

- Asset price channel

- Credit channel.

Faure (2006) pinpointed six different levels of process of monetary policy.

Stage I: Alteration in official rate is conveyed to interbank market.

Stage II: Interbank market transfer the change to market retail rate (lending rate and Deposit rate).

Stage III: The change in retail bank rates alters the exchange rate and asset prices.

Stage IV: The change in exchange rate and asset prices are than transmit to aggregate demand.

Stage V: Adjustments in aggregate demand is conveyed to money supply.

Stage VI: In final stage, impact of alteration in official policy rate is finally put across to prices and output.

Among the channels of MPTM, interest rate channel of transmission is the focus of this study. Interest rate is the fundamental channel of transmission mechanism. Through interest rate channel, central bank of a country alters the short-term market interest rates which are then passed through to retail lending and deposit rate. Bario (1997) explained that central banks across countries direct monetary policies by employing market oriented instruments devised to affect short term rates of interest. Policy rates designed by central bank can be described as a lever that stimulates change in long-term rate by altering short-term rate, which finally affect aggregate demand (Goodfriend, 1991). Theoretically, revision in policy rates are expected to be pass on to retail and money market rates in the period of impact but the change in policy rate may not amply and instantly passed on to retail bank rate (Misati, Nyamongo, and Kaman, 2001).

Numerous studies analysed the IRPT over the years, great amount of work has already been done in advanced economies. Emerging market economies recently have been subjected to growing research. Examination of interest rate pass-through can be carried out in long run as well as in short run. The empirical evidence suggests that it is not very common to find pass-through which is complete in the short run. Theoretically, it is expected that pass-through may be closer to one in long run, however in some cases, long run adjustment is also sluggish. The work studies in case of IRPT diverge in accordance with the fact that whether they consider individual or cross country behaviour. However, their definitive aim is to carried out the analysis to consider the adjustment patterns of pass-through.

Regarding the cross-country studies, the empirical results suggest that there exist incomplete pass-through of policy changes. A variety of retail bank rate such as deposit rate, lending rate etc responds contrastingly to policy changes. Cottarelli and Kourelis (1994) estimated the pass through of 31 industrial and developing countries and found

that in short run, these countries exhibit varied degrees of stickiness, whereas, in long run for most countries adjustment seems close to unity. OECD countries were examined by Borio and Fritz (1995), the results are in accordance with Cottarelli and Kourelis (1994).

Debondt (2002) used the framework of marginal cost pricing to inspect the IRPT for EURO nations. The result establishes the case that the behaviour of IRPT varies, being incomplete in short run and exhibiting relatively higher pass-through in long run. This study also point out the fact that after the introduction of Euro, pass-through across these nations became relatively quicker.

Haan (2002) reported pronounced differences in pass-through and document the evolution of IRPT over the years to check the convergence in Transmission mechanism for six EMU nations. The result of this study indicates no indication of convergence among these countries.

Kleimier and Sander (2003) investigated the interest rate pass-through by incorporating diverse specifications of IRPT such as, the characterization of interest rate expectations and asymmetric adjustments. The result suggests that in case of lending rate, the pass-through tends to be relatively fast when the changes in monetary policy are perfectly presumed.

Sudo and Teranishi (2008) estimated the pass-through by employing error correction method for the time-period 2003 to 2008, the result of this study suggest that all 12 Euro countries possessed varied pass-through with the inclination of stickiness.

Hulsewig et al. (2009) investigated the pass-through of short term Euro interbank offer rate and reported that these offer rates do not completely passed on to the lending rates. Other studies in the same region report the same results.

The variations in pass-through have been examined in case of Euro area, and between Euro area and other nations. Kwapil and Scharlar (2009) analysed data from 1995 to 2003 for different retail lending and deposit rates of Euro area and USA. The comparison between both economies reported that USA tend to have greater long run pass-through of both retail lending and deposit rate than Euro area. Marotta (2009) also examined pass-through for nine Euro countries and United Kingdom, found that there exist incomplete pass-through and persistent cross-country heterogeneity.

The result of empirical verification of pass-through in case of Asian countries against USA suggest that pass-through for Asian countries is incomplete where as in USA it seem to be complete for deposit rate (Wang and lee, 2009). Recently, Chiristian and Sebastian (2013) considered the pass-through patterns of developing countries and found out that most developing economies tend to suffer incomplete pass-through, especially Central Asia possess the lowest speed of pass-through.

A host of studies regarding individual countries were conducted to fathom the process of IRPT because complete knowledge of process assists the policy makers to devise accurate policies. Some of these studies include Aydin (2007) for Turkey, Das for India and Makambi et al (2013) for Kenya.

Al-mashat and Billlmeier (2007) reported that in Egypt market rate moves in the same direction as policy rate. Aziakpono et al (2007) and De Angelis et al (2005) discovered that long run pass-through in South Africa is almost accomplished and speed of adjustment is high. Yildrim (2012) justified that the less than complete IRPT to lending rate in Turkey is attributed to downward rigor in lending rates.

There are substantial variations in IRPT across countries and within a country over years. Monetary policy shocks alter the retail lending and deposit rate differently across

countries, implying that IRPT differ across country. As IRPT varies across countries, the question that comes into the mind is why. These cross-country differences in long run pass-through are explained by structural characteristics of country specifically by macroeconomic conditions and financial market structure. As structural characteristics of a nation vary over time, these variations tend to have an impact on the execution of monetary transmission mechanism. Aziakpono and Wilson (2013) compare three United Kingdom studies (Heffernan 1997; Mizen and Hofmann 2002; Hofmannn and Mizen 2004) and infer that IRPT in United Kingdom has been elevating over time.

Tiema (2004) after studying distinguishable time periods in Romania report that, most current period give quicker long run pass-through coefficient because of more competitive and specialized financial system. During those periods in which policies are more market-oriented, the speed of adjustment is rather higher than other periods (Aziakpono et al, 2007).

Blot and Labondane (2011) determine different pass-throughs for the period before the finanacial crisis of 2007 and after it. The result indicated that post financial crisis IRPT tend to be relatively lower than the pre-crisis period. Chionis and leon (2006) investigate the pass-through before and after joining the EMU and deduce that pass-through were more complete before joining the EMU than after.

After canvassing a few literatures on the patterns of IRPT in different countries, it is evident that there exist a range of differences among the economies across the world; these differences are attributed to the varied levels financial economies. Economies with advanced capital and financial market enjoy relatively higher pass-through than emerging economies.

2.1 Determinants of Interest Rate Pass-Through

IRPT has the tendency to remain sluggish. It is due to interest rate stickiness. *Interest rate stickiness* can be defined in two different ways. Firstly, an alteration in demand for lending and deposits does not necessarily affect the bank rates. Secondly, an alteration in money market rate alter the bank rate, but amount of change in bank rate is smaller in short run and also probably in long run Cottarelli and Kourelis (1994).

Interest rate adjustment can be affected by number of factors. Stiglitz and Weiss (1981) reported that agency cost increases because asymmetric information may result in adverse selection and possibly moral hazard problem. In this case banks opt to settle their lending rates at a rate, which is beneath market clearing rates. Cottarelli and Kourelis (1994) explained that as interest rate changes, the banking sector face adjustment or menu costs. The banks will only alter their rate of lending, if the adjustment cost is lower than cost of not changing the lending rate.

Some of other factors affecting stickiness of interest rate include: menu cost (Hannan and Berger 1991), level of the financial system and banking competition (Cottarelli and Kourrlis 1994), types of ownership of banks, openness of financial markets (Borio and Fritz 1995), different regimes of monetary policy (Gidsow 1998; Egert et al 2007), economic policy and regulation (Wang and lee 2009). These are the prominent factors influencing the strength and effectiveness of the transmission of monetary policy.

The sluggish adjustment of retail rates undermines the conduct of monetary policy in most countries. Medina Cas, Carrion-Menedez and Frantisek (2011) investigates that the interest rate transmission mechanism is lower in Central America against the benchmark economies. Through panel data analysis variety of potential factors were examined to strengthen the transmission mechanism. By increasing exchange rate

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flexibility, by adopting measures toward reducing bank concentration transmission mechanism can be strengthens.

Tai, sek and Har (2012) examined that in case of south Asian countries there was slow and sluggish transmission of interest rate across the countries, while exhibiting high level of stickiness of interest rate.

Cotterelli and Kourelis(1994) finds that higher inflationary environment and money market development result in stronger pass-through. Similar results were obtained for different groups of European countries by Mojon (2000).

Gigineishvili (2011) found that an environment where per capita GDP and inflation are on the rise, tend to strengthen the pass-through.

2.2 Interest Rate Pass-Through in Case of Pakistan

The aim of central bank is to sustain price stability and to promote economic growth. To do that, it steers the economy in desired direction by implementing monetary policy and it mainly uses the channel of interest rate.

Mohanty and Turner (2008) are of the view that the central bank of emerging and developing economies tend to acknowledge interest rate as the vital medium for the conveyance of a policy shock.

Mishra and Montiel (2012) studied the developing and emerging economies to understand the working of transmission process of monetary policy. The results implied that these developing economies fail to fully achieve the goals of monetary policy. Mishra et al (2014) also found that among different countries at different stages of development; respond varyingly to monetary policy shock. Among these countries, developing economies exhibit weaker transmission of policy shock. Wong and lee

(2009) explain that in different Asian countries, there is diversification in economic systems due to which the monetary authorities in these countries adopt contrasting monetary policies that give rise to different type of settlement of retail interest rate.

As regard Pakistan, several notable attempts suggest that the IRPT in the long run is essentially complete for the lending rate but in case of deposit rate, it is sticky and often incomplete. Qayyum et al (2005), Khawaja and Khan (2008) incorporate transfer function approach and reported that treasury bills pass-through to call market rate is complete during the time of impact but its transmission to retail rates shows rigidity. Same results were found in other studies SBP (2015).

Hanif and Khan (2012) estimated the speed and degree of IRPT in two steps. In first step, the effect of fluctuation in policy rate to money market rate is estimated through ARDL and found that there exists immediate pass-through from policy rate to money market rate. In next step, the impact of change in money market rate to retail bank rate is assessed and found that the pass-through is incomplete.

Fazal and Salam (2013) provided evidence that even in long run a policy shock pass-through is incomplete. This study found that the pass-through for both channels (lending and deposit) is incomplete. Among these two channels, the impact of change in policy rate to lending rate is greater than that to deposit rate and apparently, the speed of adjustment is relatively higher for lending rate than for deposit rate.

In case of Pakistan, as far as determinants of interest rate pass-through are concerned only one study has been conducted to the best of my knowledge.

Omer et al (2014) inspected the impact of excess liquidity on IPRT for Pakistan. The study analyzed the impact of change in discount rate and required reserve on retail bank

rate by using data from 2004-2011. The findings of this study revealed that excess liquidity affects the pass-through significantly

2.3 Conclusion

Economist agrees on the conclusion that in short run IRPT is not complete, a brief survey of literature in case Pakistan strengthens the above notion. The thesis attempts to test the strength of IRPT and pin down the causes and consequences of incomplete pass-through. So far, limited attention has been paid to the effects of macroeconomic conditions on IRPT in case of Pakistan. The current research is an attempt to fill the vacuum by estimating the time varying pass-through and to understand the implications of macroeconomic variables on interest rate pass-through.

Chapter 3

Methodology

3.1. Theoretical background

The definite goal of monetary actions taken by central bank is to influence macroeconomic variables which include output, price and employment. The theoretical explanation to explain the behaviour of monetary policy conducted through interest rate derivates from the appropriate choice of instrument problem (Poole 1970). As financial and capital markets became more advance because of increasing financial inventions which in turn vacillate the demand for money. Due to this reason targeting of money become more and more unreasonable and interest rate targeting become logical. In most economies, the policy rate of interest plays a vital role as a monetary policy tool. The traditional view of interest rate transmission prescribed that the alteration in real interest rate has the tendency to affect the cost of capital. As the cost of capital fluctuates, it tends to influence the level of consumption and investment. This variation in investment and consumption finally transmits to the price level and real income (Mishkin 1995).

The responsiveness of retail interest rate to changes in official policy rate can be explained in three different ways. First, if a policy shock transmits a significantly larger change in retail interest rate than the ratio of pass-through is greater than one. It usually happens in case of monopoly, where commercial banks charge more than adjustment costs. Second, the condition where the policy shock is completely passed on to the retail interest rate. Third, a situation, where a change in official interest rate does not completely passed on to the retail interest rates. If IRPT is incomplete, then it means

that the market interest rates are sticky. The literature also explains interest rate pass-through in short and long run separately (Cottarelli and Kourelis, 1994). In the long run the responsiveness of market interest rate to official rate is almost complete in long run. But in the short run, the possibility of completion of pass-through is minimal. In short run market imperfections come in to play specially in developing economies where financial sector is dominated by banking system with limited alternative financing and investment sources. So, the banks do not hold themselves obligated to settle the rates in the short run (Cottarelli and Kourelis, 1994). Long dated relationship among the commercial bank and the consumer may also be the reason for the sluggish adjustment of market interest rate because banks want to smooth the process of change for their consumer (Egert et al 2007). The spread between the short run and long run IRPT defines the evidence of interest rate rigidity. The rigor of interest rate brings about a gap between the policy action taken by the central bank and its consequences being felt on the economy.

Most of the theoretical literature on IRPT concentrates on short term money market interest rate. The central bank makes changes in the bank liquidity and interest rate in money market to mortmain the general lending policies of banks and demand for money and credit in the economy (Mboweni, 2000). Expectation theory of yield curve suggests that fluctuations in money market interest rate are than pass along to the long-term rates of capital market. However, yield curve of liquidity preference theory indicated that long term interest rates may not perfectly show the change in short term rate due to the risk factor of long term debts so it is more probable that adjustments in long term interest rate are weaker than that in short term money market interest rate in reaction to alteration in official policy rate.

Michel and Yan, (2010) explained that IRPT divide into two basic stages. The first one explained the transmission of policy shock to the shorter and longer term market rates. This stage is based upon the steadiness of the yield curve. The magnitude of pass-through is greatly affected the changes in the yield curve (Tai, Sek and Har, 2012). Debondt, (2005) discussed the second stage of IRPT, which is explained by utilizing cost of funds approach. In this stage the changes in money market are transmitted to retail bank rates. The concept of mark-up theory provide basis for this stage. Banks provide loans and deposit opportunities to their customers; the interest rate on these products is the price which the banks charge. By offering these financial products, banks gain the cost in terms of wage cost. That is why it is called cost of fund approach. Central bank rate is considered as the proxy for cost of funds.

3.2. Factors affecting interest rate pass-through

Theoretically, there are varieties of factors which influence the settlement of interest rate. Most importantly, the orientation monetary policy matters. In an environment of deregulation in monetary policy, the forces of market are free to set the interest rate. In such environment market rates are quite flexible and they promptly adjust to the changes in official rate (Gidlow, 1998).

In concentrated banking sector, banks tend to adjust interest rate asymmetrically. There are two hypotheses that explain the asymmetric adjustment of interest rate. First hypothesis is the collusive behaviour of banks, when official rate increases deposit rate move rigidly upward and when official rate decreases lending rate move rigidly downward. Second hypothesis is adverse customer reaction, in this hypothesis when official rate decreases, lending rate move rigidly upward and when increases, deposit

rate move rigidly downward (Hannan and Berger 1991; Debondt 2005; Scholnick 1996).

A well-developed financial system renders alternative financial institutions and intermediaries. If a financial system has relatively free market forces than due to competitive market, banks readily adjust their rates to maximize profits (Cottareli and Kourelis 1994; Thompson 2006).

3.3. Variables` Description

6-months Treasury bill Rate

6 months' market Treasury bill rate (TB6M) is used as proxy for the state bank`s discount rate for estimating the MPTM in Pakistan. TB6M weighted average yield is derived by State Bank Pakistan itself while executing OMO`s fortnightly.

Lending Rate

Lending rate is explained as the mark-up which is paid to the bank by the borrower for the provision of credit. The lending rates which are to be used are the weighted average of rates (WALR) extended by the banks on new loans.

Quantum Index of Manufacturing

The monthly series on GDP is not available so we use the Quantum Index of Manufacturing as proxy for GDP. Quantum Index of Manufacturing measures the change in production of large scale manufacturing.

Inflation Rate

Inflation rate is the growth rate of general price level i.e., Consumer Price Index (CPI). CPI measures the change in average retail prices of a fixed basket of goods and services representing household consumption. CPI basket contains 487 consumer goods.

In this study, we are proceeding by examining the time varying interest rate pass-through from TB6M to lending rate. Here we are using TB6M as an exogenous variable; it is the proxy for interest rate policy. Many studies prefer to use TB6M as proxy for policy rate for the estimation of monetary policy transmission mechanism in Pakistan such as Agha et al (2005), Qayyum et al (2005) and Fazal and Salam (2013).

Although, pass-through can be affected by many macroeconomic and financial variables but in the thesis, our focus is on inflation rate and GDP. The reason for using inflation rate is to determine if pass-through is higher in high inflationary environment. Because in higher inflationary environment price changes are more frequent, thus making it more probable that fluctuation in official policy rate passed on to the market rates in time (Cottarelli and Kourelis 1994).

Second macroeconomic variable used in this study is GDP. A policy shock influence retail interest rate more effectively where financial markets are stronger and stronger financial markets are the attribute of developed economies and in these economies, the interest rate channel functions more efficiently.

3.4. Data Source

Monthly data on 6-month treasury bills and lending rate are taken from SBP Bulletin published by State Bank of Pakistan. Data of General Inflation Rate is taken from Inflation monitor published by State Bank of Pakistan. The Quantum index of Manufacturing is obtained from international financial statistics published by the International Monetary Fund (IMF).

3.5. Sample Selection

The analysis has been carried out for the period 2004-2015. Data is taken on monthly basis, including 180 observations.

3.6 The Model

The prime intent of this research is to inspect the impact of macroeconomic variables (GDP, Inflation rate) on interest rate pass-through in Pakistan. In this research, three sets of analysis are carried out. First, the assessment of interest rate pass-thorough has been carried out for the whole sample period (2004-2015). Second, we use recursive analysis to encompass the development of pass-through over time. Thirdly, we examine the impact of macroeconomic changes on interest rate pass-though. This research adopts the marginal cost pricing approach suggested by Debondt (2002), it explains the relation between policy rate and retail rate (Lending rate).

The primary model showing the link between policy rate and retail rate is represented as follows:

$$RR = \alpha + \beta\ MR + \varepsilon_t$$

Where,

RR is retail bank rate

MR is market rate

α is a constant mark-up

β is extent of pass-through in long run

A complete pass-through refers to β as equals to one, implying that there exists perfect competition in the financial market. If β opts a value which is less than one, means the IRPT is not complete, suggesting that there exist market imperfections like banks retain some extant of market efficacy (Tai, Sek & Har, 2012).

This study correspondingly delves to estimate the pass-through of policy rate (TB6M as proxy) into the bank lending rate.

$$LR = \alpha + \beta\ TB6M + \varepsilon_t \qquad\qquad (a)$$

Where,

LR denotes weighted average lending rate

TB6M is 6-month Treasury bill.

The econometric technique employed for estimating the equation (a) ground upon the properties of time series of the variables. First of all check, whether the variables are stationary or not and whether they exhibit co-integration or not. To check stationarity, Augmented Dickey Fuller is employed.

The hypothesis is as follows:

$$H_o : \text{Unit root}$$

$$H_1 : \text{No unit root}$$

At level, if H_o is rejected than equation (a) will be estimated by employing OLS technique. If series exhibit stationarity at first difference we employ Johansen co-integration test to investigate, if there exist a long run relationship among series or not.

After the confirmation of the co-integration, Error Correction Model is adopted to estimate the short run parameters, using the given regression.

$$\Delta LR = \alpha + \beta \, \Delta TB6M + \gamma \, U_{t-1} + \varepsilon_t \qquad \text{(b)}$$

Where,

Δ denotes the 1st difference among the present and lagged values of LR and TB6M. U_{t-1} is the first lag error value from equation (a).

γ represents the adjustment speed

ε_t is the residual from equation (b)

After estimating the immediate IRPT, the next step is to analyse the pass-through over time. For this, we use recursive analysis to trace out the time varying pass-through by utilizing accumulated Vector Error Correction Model Impulse response function.

As Policy rate (TB6M) has a long run pass-through relationship with weighted average lending rate, there is a need to investigate the extent of that pass-through.

This study examines the time varying interest rate pass-through coefficients. To see the impact of macroeconomic conditions on time varying IRPT, equation is given below:

$$\beta_t = \gamma_o + \gamma_1 Y_t + \gamma_2 inf_t + \theta_t \qquad \text{(c)}$$

Where,

β_t is time varying IRPT coefficient

Y_t is GDP

inf_t is CPI inflation rate.

Chapter 4

Model Estimation and Results

4.1. Interest Rate Pass-Through

Empirical exploration of the effectiveness with which the change in TB6M is passed on to the weighted average lending rate(WALR) in Pakistan, initiates with confirmation of the time series properties of variables in the model. By using the Augmented Dicky-Fuller (ADF) test, we check the stationarity of series whether they are stationary at level or 1st difference. From table 4.1, which exhibit of values of series at level and 1st difference, it is evident that both the variables are significant at first difference with p-values less than 0.05

Table 4.1: Results of ADF Test (H0: Unit Root)

	TB6M	**WALR**
In Level		
ADF Statistics	-2.5366	-1.8869
(prob.)	(0.1090)	(0.3377)
In 1st Difference		
ADF Statistics	-9.0343	-4.6760
(prob.)	(0.0000)	(0.0002)

Table 4.1 display that both the series are stationary at 1st difference, thus these series might be co-integrated. To check for co-integration, Johansen co-integration test is employed. The Johansen Co-integration test rejected the null hypothesis of no co-integration between TB6M and lending rate, implying a stable long run relationship.

Table 4.2: Johansen co-integration test

	TRACE (λtrace)	
No. of CE	**None***	**At most 1**
Eigen Value	0.102517	0.014297
Trace Statistics	17.03595	2.001576
Critical value	15.49471	3.841466

Trace test indicates 1 co integrating equation at the 0.05 level
* denotes rejection of hypothesis at the 0.05 level

After establishing that there is a long-run association among variables i.e., the relationship is co-integrated, the further the estimations, we investigate the interest rate pass-through from policy rate (TB6M) to retail bank rate (weighted average lending rate). At this point Error Correction Model is applying to figure out the short run pass-through.

The results in table 4.3 suggest a sluggish pass-through from TB6M to Retail lending rate.

Table 4.3 Error Correction Mechanism Estimations

	WALR
Intercept	0.004872
T-Statistics	0.178240
(prob.)	(0.8588)
ΔTB6M	0.367892
T-statistics	5.547054
(prob.)	(0.0000)
Ut-1	-0.229907
t-Statistics	-4.931605
(prob.)	(0.0000)

Table 4.3 shows that the estimated coefficient of short run IRPT is 0.36. We can infer that pass-through is sluggish in short run as the value of β <1 and is highly significant. To test the hypothesis that whether there is complete pass-through or not, we reject the null hypothesis that there exist a complete pass-through (H0: β = 1). This means that in case of Pakistan the pass-through from TB6M to lending interest rate is incomplete. This result is consistent with Qayyum et al (2006), Mohsin (2011) and Fazal and Salam (2013). This result can be made clear as whenever the State Bank of Pakistan alters the monetary policy the commercial banks may not completely transfer the complete cost to their customers by raising the retail lending rate.

Next step is to use Vector Error Correction Model Impulse Response Function (VECM IRF) to analyze the speed of pass-through. The IRF traces out the effect over time on rates of a structural one standard deviation shock to the policy rate.

The Table 4.4 exhibits the response of weighted average lending rate (WALR) to a structural one standard deviation shock to TB6M. The result reveals that in short run, a 100pbs increase in TB6M induce 32bps increase in WALR over six months. The pass-through of TB6M to WALR is not complete; it seems that full impact of changes in TB6M is not completely spent by the WALR.

Table 4.4: Response of WALR

Period	WALR	TB6M
1	0.309501	0.000000
2	0.299918	0.132125
3	0.266787	0.237926
4	0.347643	0.271540
5	0.432744	0.309968
6	0.440418	0.321729
7	0.447112	0.325430
8	0.490427	0.326967
9	0.516251	0.328839
10	0.525487	0.320670
11	0.541273	0.309341
12	0.560807	0.301639

After estimating the immediate IRPT, the next step is to analyze the IRPT over time. For this, we use recursive analysis to trace out the time varying pass-through by utilizing accumulated Vector Error Correction Model Impulse response function.

As Policy rate (TB6M) has a long run relationship with weighted average lending rate, there is a need to investigate the extent of that pass-through. To do that, we examine the accumulated response of WALR to a structural one deviation shock to TB6M for time period2004M01 to 2008M12. The long run effect of this shock can be analyzed as we increase the horizon. Here we take the estimates of accumulated impulse responses of 6th and 12th month time horizon. We repeat this practice by adding month after month recursively and examining the estimates of responses of 6th and 12th month for whole data 2004M01 to 2015M12.

Table 4.5: Accumulated response of LR for time-period 2004M01-2008M12

Period	LR	TB
1	0.385466	0.000000
2	0.713227	0.094553
3	0.960997	0.297032
4	1.161280	0.580915
5	1.333163	0.920766
6	1.486082	1.299037
7	1.625738	1.703964
8	1.756089	2.127471
9	1.879939	2.563932
10	1.999259	3.009424
11	2.115423	3.461210
12	2.229387	3.917382

4.3 Impact of Macroeconomic Variables on Interest Rate Pass-Through

Estimated results of accumulated response impulses of 6 and 12 month are considered as the pass-through coefficients. These coefficients obtained in the previous section are regressed on macroeconomic variables to establish the meaningful relationship. The macroeconomic variables used are inflation and GDP. Regression of equation (c) for pass-through coefficients of 6th and 12th horizon is depicted in table 4.6 and table 4.7.

Table.4.6Estimated regression equation for pass through coefficients of 6th horizon

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.112049	0.500152	4.222812	0.0001
INF	0.007527	0.002266	3.322438	0.0013
LGDP	-0.171157	0.104759	-1.633810	0.1061

Table.4.7Estimated regression equation for pass through coefficients of 12th horizon

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.139759	1.878537	3.800701	0.0003
INF	0.047655	0.008510	5.600226	0.0000
LGDP	-0.823444	0.393469	-2.092782	0.0395

The result shows that inflationary environment has significant positive effect on interest rate pass-through and GDP has insignificant effect on interest rate pass-through.

The impulse response function exhibit the responses of interest rate pass-through of sixth and twelfth horizon to a positive one unit standard deviation shock in macroeconomic indicators (inflation and GDP).

Fig4.1Impulse Response Function of Pass-Through coefficients of 6th horizon

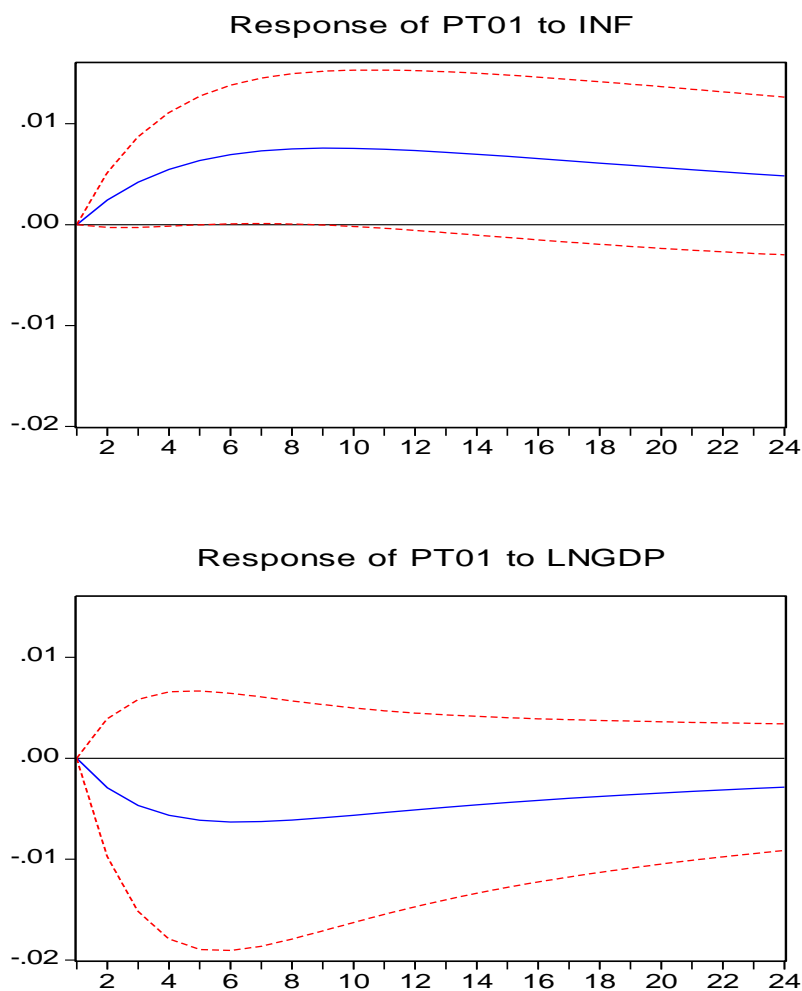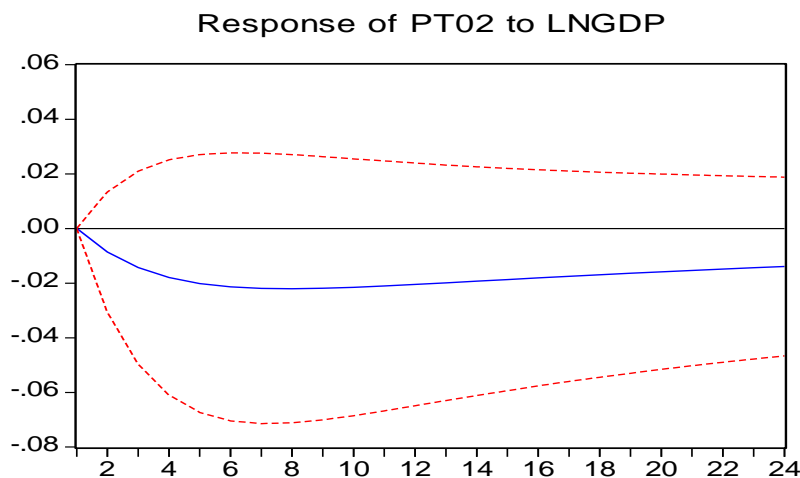
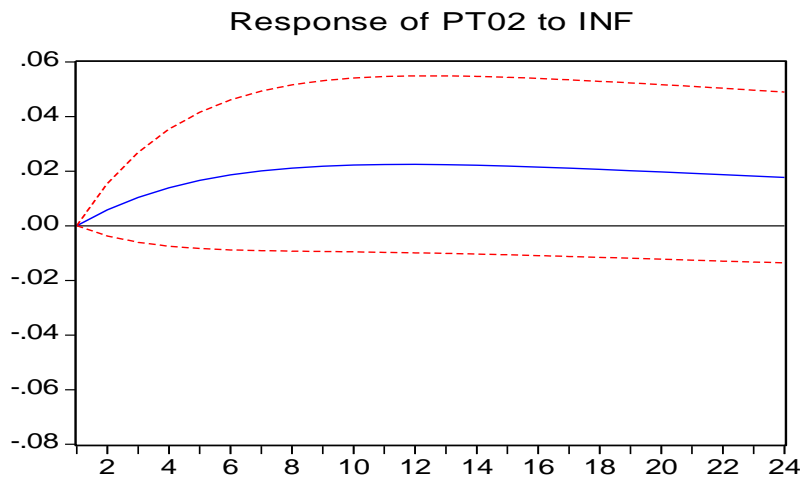Response to Cholesky One S.D. Innovations ± 2 S.E.

Fig4.2 Impulse Response Function of Pass-Through coefficients of 12th horizon

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response of PT02 to INF

Response of PT02 to LNGDP

Pass-through initially shoots up in response to inflation shock. Maximum impact can be seen at 6 months. Our result implies that in inflationary environment pass-through tend to be more responsive. This result is consistent with other studies Cotterelli and Kourelis(1994), Mojon (2000) andGigineishvili(2011).

Our result imply that GDP has no significant impact on interest rate pass-through. The underlying reason is that Pakistan's economy is developing so the financial markets are

not as developed as advanced economies. In developing economies, there exist markets imperfections, due to which banks wait to immediately pass the changes in money market rate to their customers and tend to profit from greater returns by investing in no risk bonds and securities rather than lending to risky private sector.

Chapter 5

Summary and Conclusion

5.1 Conclusion

The central goal of this thesis is to empirically analyse the relationship between interest rate pass-through and macroeconomic conditions of Pakistan. For this purpose, three sets of analysis are carried out by using monthly time series data. First, the error correction model assesses the short run impact of change in TB6M on weighted average lending rate. The impulse response function show that a shock in the official interest rate (TB6M) cannot completely carried out to the retail lending rate (WALR) and as the time horizon increases, the intensity of response decreases. Hence, there is incomplete IRPT in Pakistan. This incomplete pass-through implies that banks have low power to transmit the cost to their customers due to change in monetary policy. The incomplete pass-through for lending rate indicate that banks in Pakistan prefer to invest in low risk bonds and securities instead of advancing loans to high risk private sector, to earn high returns.

To study the impact of inflation and GDP on interest rate pass-through, we estimate the time varying interest rate pass-through by using vector error correction model impulse response function recursively. The pass-through coefficients are obtained for the time horizon 6th and 12th.

In the final part of the analysis, the results show that inflation indeed has positive impact on interest rate pass-through because in higher inflationary environment, banks tend to attune their lending rates more to raise their margins.

The VAR impulse response function results indicate that GDP do not significantly affect interest rate pass-through. As a developing economy, Pakistani financial markets are also in developing stage so they often experience volatility due to market imperfections, this volatility introduces uncertainty in the market and banks choose to wait for the problem to be filtered out so the immediate transmission of market rate to customers does not happens.

The study can be protracted by incorporating financial market variables, such as banking concentration, health of financial markets and exchange rate flexibility. The heterogeneity in pass-through across countries is also explained by financial variables.

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