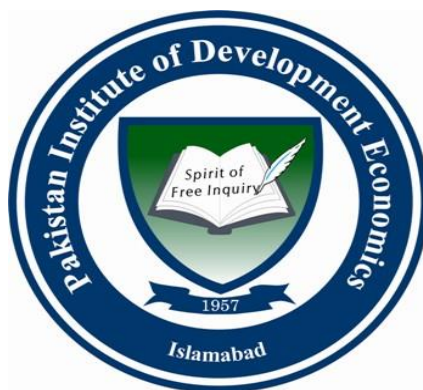# Maturity wise Interest Rate Pass Through in Pakistan: Econometric Analysis
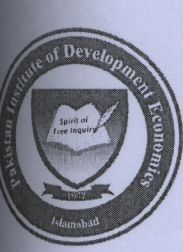

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A dissertation submitted to the Department of Economics & Finance; Pakistan Institute of Development Economics Islamabad, in partial fulfillment of the requirements for the degree of Master of Philosophy in Economics & Finance**.**

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CERTIFICATE

This is to certify that this thesis entitled **"Maturity wise Interest Rate Pass Through in Pakistan: Econometric Analysis"** submitted by **Ms. Samaira Batool** is accepted in its present form by the Department of Economics and Finance, Pakistan Institute of Development Economics (PIDE) Islamabad as satisfying the requirements for partial fulfillment of the Degree of Master of Philosophy in Economics and Finance.

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بسم الله الرحمن الرحيم

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<u>DEDICATION</u>

I DEDICATE MY DISSERTATION WORK TO MY FAMILY. SPECIAL FEELING OF GRATITUDE TO MY FATHER **SYED NAZEER HUSSAIN SHAH**, MY MOTHER **SYEDA IHSAN ILAHI** AND MY BROTHERS; **SYED IMRAN HUSSAIN, SYED ABRAR HUSSAIN** AND **SYED MAZHER HUSSAIN**

Table of Contents

LIST OF TABLES

ABSTRACT

This study examines the degree of pass through and adjustment speed of maturity wise deposit rates in response to changes in the discount rate in Pakistan, using the time series data from 1975 to 2016. The study finds evidence of a long run relationship among maturity wise deposit rates and discount rate. However, the estimates of long run model proposed by Philips & Loretan (1990) and short run Error Correction Model indicate that pass through is incomplete and slow. This study confirms asymmetric adjustment of pass through and upward rigidity in deposit rates. Overall, the finding of less than complete and asymmetric pass through suggests limited efficiency of monetary policy in Pakistan.

Keywords: *Monetary policy, Deposit rates, Asymmetric adjustment.*

CHAPTER 1

INTRODUCTION

Monetary policy is the main instrument of macroeconomic management. Monetary decisions influence aggregate demand, interest rates, the amount of money and credit to affect the overall economic performance. The nature of monetary policy-the tight or loose, increases or decreases the policy rate, and in response, the other financial institutions increase or decrease the deposit and lending rates. The efficiency of monetary policy depends on the reaction of financial institutions, that is, how fast and how much policy changes are transmitted.[1] The transmission mechanism of policy rate to retail rates differs amongst countries due to different type of monetary policy and extent of control.

Mishkin (1995) and Taylor (1995) explored various monetary policy transmission mechanism channels such as Interest Rate Channel, Asset Price Channel, Exchange Rate Channel and Credit Channel. Among these, the interest rate channel is considered most important channel of monetary policy transmission mechanism, which is expected to have certain impact on macroeconomic aggregates. Bernanke and Blinder (1992) suggested using the policy rate (discount rate in case of Pakistan) as a best indicator of monetary policy.

The process of transmission of changes in monetary policy to retail rate, for instance, bank lending and deposit rates is termed interest rate pass through. Interest rate pass through has two main aspects; the loan rate pass through and deposit rate pass through. Interest rate Pass through has generally three types, complete interest rate pass through, less than complete pass through and over pass through. If one to one relationship hold between policy rate and bank lending or deposit rates, then pass

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[1] The transmission mechanism of monetary policy is strictly conditional to the underlying institutional structure (Horvath and Maino, 2006).

through is called complete pass through. Complete pass through is desired state of all countries. When any change in policy rate is passed on retail bank rates immediately, then interest rate pass through is called complete pass through (Bernanke and Blinder, 1992; Romer and Romer, 1989). If transmission of the policy rate to retail rates takes time, it is theorized the incomplete pass through (Hannan & Berger 1991; Cottarelli and Kourelis, 1994; Mojon, 2000 and Bondt, 2002).There is also possibility of over pass through, which arises due to possibility of monopoly power commercial banks, by transferring more than their total cost to their consumers.

The Nature of the pass through that whether it is complete, incomplete, symmetric or asymmetric give indication of the degree of competiveness and soundness of banking sector. Symmetric and complete pass through signals well-functioning financial system. Asymmetric and incomplete interest rate pass through leads to the contradicting scenario.

Complete and incomplete nature of pass through remains an active discoursed in literature. Previous studies in large supported that pass through is incomplete in short run (Hannan and Berger, 1991; Cottarelli and Kourelis, 1994 and Mojon, 2000). However, in the long run analysis the studies documented mixed finding (Bondt, 2002; Mojon, 2000; Hofmann, 2003; Sander & Kleimeier, 2002 and Toolsema et al., 2002).[2]The completeness and incompleteness of pass through usually depends on the transmission process and financial market structure of a country.

Generally, pass through in any nature is perceived holding long run relationship with various types of interest rates, which confirms efficiency of monetary policy. Though, the speed of adjustment of pass through is influenced by several factors. The asymmetric adjustment of pass through exists due to menu cost

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[2]Toolsema et al., (2002) confirmed incomplete pass through in long run, while the remaining studies observed the complete pass through.

(Hannan and Berger, 1991),type of monetary policy that is regulated monetary policy (Egert at al., 2007),asymmetric information (Stiglitz and Weiss, 1998), bank-concentration that is monopoly power of banking sector and political pressure (Cottarelli &Kourelis,1994) and existence of switching cost (Hafferman,1997). Asymmetric and incomplete pass through give signal of lag in monetary policy implementation and less-developed financial system of economy.

Monetary policy in Pakistan is formulated with an aim to boost the growth and avoid the undesirable price hike. Various changes in financial system of Pakistan have been made. The financial system transmitted from regulated economy to market based economy in the 1990s. The system is also witnessed of regime shift, for instance monetary regime remained from 1945 to 1995, which is followed by transitory regime of 1995 to 2009 and then from 2009 to 2015 interest rate regime started. Recently, after May 2015, State Bank of Pakistan (SBP) is using interest rate targeting instead of monetary targeting.

Presently, discount rate is considered an important instrument of monetary policy and SBP is implying discount rate as a policy instrument due to high level of public debt in Pakistan. The highest policy rate that remained 20 percent in October of 1996 and remained 5.75 in 2017and is considered lowest rate since 1992. However, the discount ceiling rate was changed with a new official interest rate i.e. the SBP policy rate on May, 2015. It is just recently in January 2018, the discount rate has been increased by 25 basis points to 6.00 percent due to PKR depreciation by around 5 percent, oil prices stickiness around USD 70 per barrel, a number of central banks have started to adjust their policy rates upward adversely affecting the PKR interest rate differentials vis- a -vis their currencies and due to significant narrowed output gap that indicates buildup of demand pressures.

Although, in case of Pakistan, many attempts have been made to find out speed of interest rate pass through from policy rate to retail rates (for instance, Qayyumet al., 2004; Khawja et al., 2008 and Mohsin 2011). This study intends to check the impact of monetary policy on maturity wise bank deposit rates. The main objective of study is to check the speed of interest rate pass through that is the speed of adjustment in reaction to changes in policy rates(discount rate) that how long it take banks to pass on it to their customers.

1.1   Research Gap

Although, numerous studies attempted to analyze various aspects of the monetary policy, yet, to the best of our knowledge, the previous studies ignored to inspect the maturity specific pass through in case of Pakistan. This study intends to find whether interest rate Pass through is maturity specific or not. This study is an attempt to estimate interest rate pass through from discount rate to various maturity wise un-weighed deposit rates (up to 6 months fixed rates, over 6 months to 1-year fixed rates, over 1-year to 2 years fixed rates, over 2 years to 3 years and over 3 years fixed rates).

1.2   Objectives of the Study

This study based on the following specific objectives:

1. To investigate the interest rate pass through to deposit rates in Pakistan.

2. To find whether interest rate pass through is maturity specific or not.

3. To check presence of asymmetric adjustment of interest rate pass through.

This study estimate transmission mechanism of discount rate to various maturity deposit rates by using annual time series data from 1975 to 2016. The study intends to check long run estimates of interest rate pass through by applying Philips and Loretan

(1990) methodology, which is extension of Engel and Granger (1987). The PL methodology removes asymptotic bias problems and permits for meaningful statistical inferences on the long-run coefficients. Furthermore, it incorporates the outcome of dynamics in the data generation process (DGP) and explains clearly for the role of past policy surprises and future expected policy settings in the association between deposit rates and policy instrument. Additionally, the study applies bivariate specification of Error Correction Mechanism (ECM) in order to capture the asymmetric adjustment of pass through.

1.3   Significance of Study

The study of interest rate pass through is important to perceive the interest rate pricing behavior in the financial markets. The literature from Pakistan is silent about impact of maturity wise interest rate pass through. This study will help domestic and international investors to estimate the cost and revenue of deposits due to change in monetary policy in Pakistan. The present study will help to understand maturity specific behavior of interest rate pass through.

1.4   Plan of Study

Chapter 1 is the introductory part of the study. The second chapter provides conceptual and empirical discussion of literature on interest rate pass through. The third chapter provides review of monetary policy in Pakistan. In the fourth chapter variables description and theoretical frame work of econometric methodology used under study is given. In fifth chapter empirical results of the study are discussed while chapter six provides summery and conclusion of study.

CHAPTER 2

REVIEW OF LITERATURE

In this chapter, we discuss the conceptual and empirical literature on interest rate pass through. In the first part of the chapter we briefly explains transmission mechanism channels, the second part explain the interest rate adjustment theoretical framework, the third part discuss about monetary policy orientation and other factors, the last section discuss about empirical framework of interest rate pass-through in the context of international and national.

2.1   Transmission Mechanism Channels

Mishkin (1995) and Taylor (1995) identified various channels of monetary policy transmission. These channels are; asset price channel, interest rate channel, exchange rate channel and credit channel. Among these channels, interest rate process of transmission is the most important channel of monetary policy transmission mechanism.

In Keynesian models, the primary channel of monetary transmission is interest rate channel. According to Mishkin (1995), the loose monetary policy shrinks interest rate, which in turn reduces capital's cost and stimulates output. Understanding the importance of issue, the focus of the present study is the transmission of monetary policy from discount rate to maturity wise deposit rates.

There are two drives to understand the working of depositary institutions in the transmission of monetary policy. First is examined through credit channel and second is examined through administrative rate channel. Credit channel considers lending and balance sheet channels. Balance sheet process works through balance sheet of potential borrowers. Bernanke and Gertler (1995) explored that balance sheet channel works through net worth of business firms. Thetight monetary policy

6

increases interest ratethat worsen net value and credit worth of private sector andbanks raise the lending ratethat increases external finance premium on new bank loans. Balance sheet channel can also be applied to consumer spending (see, Bernanke and Gertler, 1995).

The other part of credit channel, Bank lending channel considers asset side of the balance sheets and mainly supply of credit. Under bank lending channel, the assumption is, tight monetary policy transfers liquidity position of banks and forces some banks to lessen their supply of credit. According to Ireland (2005) tight monetary policy decreases bank reserves' supply which leads to a decline in bank lending especially those banks which heavily depend on deposits followed by a decline in investment spending and output of firms due to financial market imperfections especially those firms whose principal source of funds for investment depends on bank loans. According to Horvath and Maino (2006), the response of various channels of monetary transmission mechanism depends on institutional factors i.e. reaction of economic agents, organization and structure of financial markets.

2.2   Interest Rate Adjustment: Theoretical Framework

After brief discussion on transmission mechanism channels, in this section the study provides conceptual framework of interest rate adjustment.

The market interest rate adjustment can be explained by the response of market interest rates due to any change in official interest rates. If the change in official rates is large and the reaction of market rates is significantly small then market interest rates are called sticky rates. There are many factors that affect the speed of adjustment in interest rates. These are monetary policy orientation, financial market structure, the size of the bank, menu cost, Switching cost, and asymmetric

information. We briefly discuss above-mentioned factors that affect the adjustment of market interest rates.

2.1.1 Menu Cost Hypothesis

Under menu cost hypothesis, menu costs are involved in changing the retail rates and banks react slowly when there are temporary changes in monetary policy rate but in case of stable changes in policy rates banks response quickly. Duta et al., (1999) examined the menu cost hypothesis and resulted that costs are involved in changing the bank lending and deposit rates that is why banks are unwilling to change their rates if changes in monetary policy rate are very small or provisional in nature.

2.1.2 Switching Cost Hypothesis

Under switching cost hypothesis bank impose higher switching costs to keep their customers within the bank (Hefferman, 1997). In case of higher switching cost, only a small percentage of bank customers switch bank and their financial position. Banks impose higher switching cost in a way of increasing the fee of re- imbursement of loans and early taking out time deposits. Higher switching costs make a group of bank customer that is highly static within the bank. Such behavior of bank customers to keep customers within the bank even in presence of best possible choice for customers creates the rigidity in interest rate. Banks may exploit the bank customers' stagnation in this process. The selective pricing of banks create upward rigidity of deposits rates and downward rigidity of loan rates and thus asymmetry in interest rate adjustment.

2.1.3 Imperfect Competition Hypothesis: Collusion Behavior of Banks and Adverse Customer Reaction Hypothesis

The financialstructureof the country affects the responsiveness of market interest rates. Financial structure comprehends the degree of competition among the banks and also between banks and other intermediaries. Under high concentrated banking market the oligopolistic structure of banking system creates asymmetric adjustment of pass through. When there is imperfect competition in banking sector due to collusive price agreement among the banks then adjustment process is asymmetric (Hannan and Berger, 1991). Hannan &Berger (1991) inquired the setting of deposit rate by bank and test for asymmetry in pass through due to changes inthe policy rate. The study revealed asymmetric pass through to deposit rate both upward and downward adjustment while pass through for upward adjustment showed more rigidity. The study indicated that if deposit rate shows upward rigidity then the bank should decrease interest rate on deposits in an immediate short run rather than increasing the interest rate on these deposits. The study revealed that pass through hasa positive association with depositor's base and negative relation with adegree of market concentration.

2.1.4 Asymmetric Information Hypothesis

Asymmetric information in baking sector creates the problem of unfavorable choice and moral hazard when banks are required to raise the loan rate in response to increasein market interest rates (Stiglitz and Weiss, 1981). Under asymmetric information situation those borrowers who select higher rate than that of best possible rate face the problem of adverse selection of projects. The increase in loan rate above the optimal rate decreases the expected return of banks. Retail rates have higher maturity than money market rate. Banks and banks' customers keep an implicit risk

sharing planning of more fixed retail rates as compare to money market rates and for such insurance, the banks' customers pay markup (Heinemann & Schuler, 2002).Under the asymmetric information hypothesis when there is upward pressure on loan rates then banks are more likely to extend the portion of credit amount instead of raising the loan rate. Asymmetric information creates the problem of rigidity in loan rates adjustment.

2.2   Monetary Policy Orientation and Other Factors

The type of monetary policy influence market rates' responsiveness due to any change in official rates. De-regulated monetary policy allows market forces to determine interest rates. The speed of adjustment of market interest rate is high in deregulated monetary policy environment as compared to regulated monetary policy environment while the adjustment of market rate is slow in the regulated monetary policy environment (Gidlow, 1998). The ownership structure of banking system also affects the speed of adjustment of pass through. The monopoly of banking system creates rigidity in interest rates. According to Cottarelli and Kourelis (1994), political pressure also creates rigid interest rate pass through. The less developed financial system among all other factors influences the degree of interest rate adjustment. In developing countries saving rate is already low it can be further lower by decreasing the deposit rate. Low interest earning on deposits can further increase the habit of the lowersaving ratio in developing countries. Depositors should be protected against the exploitation of banks (Aziakpono and Wilson, 2010).

The aformentioned,discussedfactors have a different role in interest rate's adjustment. Manu cost controls the short-run interest rate adjustment speed. Similarly switching cost is considered main factor that affect the adjustment speed of interest rate pass through in short run. While asymmetric information and imperfect

competition are mainfactors which affect the long-run adjustment of interest rate pass through (Bondt, 2002). So, different combination of hypothesis about interest rate pass through process put the different impact on the short-run and long-term adjustment of deposit and lending rates.

2.3   Empirical Studies on Interest Rate Pass Through

After discussing conceptual framework of interest rate Pass through adjustment which is provided by different researchers, now we discuss empirical frameworkof interest rate pass through.

2.3.1   International Studies

The stickiness of deposit rates was firstly studied by Hannan and Berger (1991) and Neumark and Sharpe (1992).Hannan and Berger (1991) examined the setting of deposit rate by bank asymmetryin adjustment process from policy rate (Treasury bill rate) to deposit rate in United States. The study explored asymmetric pass through to deposit rate both in case of upward and downward adjustment of pass through. The study found pass through for upward adjustment showed more rigidity. The study suggested when deposit rates show upward rigidity then the bank should decrease interest rate on deposits in an immediate short run rather than increasing the interest rate on these deposits. The finding of paper revealed that pass through has positive relation with depositor's base and negative relation with the degree of market concentration. Neumark & Sharpe (1992) revealed market concentration affect the level of deposits. Deposits that are more in a concentrated market and adverse reaction consumers of showed more asymmetric adjustment of deposit rates and lending rates. The author also found upward rigidity of deposit rates.

Cottarelli and Kourelis (1994) estimated the impact of changes in money market rate to lending rates for 31 industrial and developing countries. They perceived that degree of stickiness in loan rate due to changes in money market rate varied across countries. They also observed the strong relation between degree of interest rate stickiness and structure of a financial system. Certain factors as private ownership structure of banking system, regulation of random movements in money market rates and absence of control on capital mobility increased the speed of pass through while lack of restrictions on competition among banks and presence of market for negotiable instruments have no impact on degree of pass through. Additionally, the complete pass through in occur in the long run while in short run they found incomplete pass through. The authors suggested that lending rate' adjustment increases inflationary situation and degree of pass through influenced by financial market structure and regulatory environment.

Scholnick (1996) estimated the asymmetric adjustment retail rates in Malaysia and Singapore. The author used monthly data and applied asymmetric error correction method to diagnose the mean adjustment lag of retail rates in case of their upward and downward movement from equilibrium level. The findings of paper were in favor of hypothesis of collusion. The paper found upward rigidity ofdeposit rates both in Malaysia and Singapore. The study resulted that bank in both countries adjust deposit rates downward more quickly than upward.

Hefferman (1997) examined in the study the interest rate adjustment and checked the association between retail rates and market rates in the United Kingdom. The study applied ECM on monthly series of interest ratetaken over the period 1986-1993. The findings of the study indicated less than complete pass through for saving and current accounts in British banks and building societies and found acomplete pass

through in repayment mortgages. The results of the study showed that imperfect competition in banking market and the difference in adjustment process between and within banks and products disturb the speed of money transmission mechanism. The author resulted in asymmetric adjustment of interestrates from LIBOR to deposit and lending rate.

Mojon (2000) examined in the study the difference in the financial structure of six Euro area countries (Netherlands, Germany, France, Belgium, Spain and Italy) and estimated the interest rates pass through to deposit rates, lending rates and balance sheet structure of the non financial private sector. The authors used quarterly sample data. The paper found that level of pass through was different in different countries. The findings of the paper indicated justifications about empirical conclusion of rigidity of retail rates. The justifications showed that First the banks not increase the rates because higher rates put more burden on borrowers and weaken the credit worthinessof borrowers. The study found that small menu cost created the rigidity of retail rates. Additionally, retail rates have longer maturity than money market rates so the interest rate pass through is incomplete in case of retail rates and maturity mismatch problem is created, also the study provided justificationthat instability creates uncertain situation that is why banks not provide prompt reaction to changing money market rates. Finally, result of study showed that competition among banking sector reduces the asymmetry of interest rate pass through.

Hofmann and Mizen (2001) investigated interest rate pass through and monetary transmission process by using seventeen year of monthly data (1985-2001) on thirteen deposit and mortgage products in financial institutions in UK and applied nonlinear econometric model. The findings of study showed the adjustment speed of retail rates confided in perceived gap between retail and bottom rates. The study

concluded incomplete pass through to mortgage rates but complete pass through from policy rate to deposit and lending rates. However, Hofmann and Mizen (2001) study contradicted the findings of Paisley about pass through to Mortgage rates (Paisley, 1994).

Lim (2001) estimated the asymmetry in adjustment of Australian bank interest rates. The paper contained sample data from 1991 to 2001 and applied multivariate Error correction model. The author confirmed asymmetric interest rate pass through in short run but in long run the author not found any asymmetric pass through. The author indicated faster adjustment of retail rates during easy monetary policy than tight monetary policy. The author suggested to measure interest rate pass through or association in money market rates and retail rates, speed of adjustment of interest rate during positive and negative shocks and the nature of asymmetric affect should be considered.

De Bondt (2002) examined in the study the retail interest rate pass through and checked association between retail rates and government bond yields by using comparable maturities of bank and money market rates in the Euro area. The study covered time span of five years (1996-2001) and applied many empirical methods. The adoption of comparable maturities eliminated the problem of maturity mismatch which was created in previous studies. The result of study indicated complete immediate interest rate pass through in the Euro area and incomplete pass through to deposit rates while complete pass through to lending rate.

Toolsema et al., (2002) investigated the differences of pass through across six European countries and checked whether these differences increased or decreased over the passage of time. The sample period of study started from1980 to 2002. The author applied Error correction model and found that differences in pass through

happened due to differences of sample data of countries. The study not found any strong evidence in favor of convergence of monetary policy transmission.

Kleimeier and Sander (2005) estimated in the study the impact of expected and unexpected changes in monetary policy in Euro zone area. The study suggested predictable interest rate and translucent monetary policy positively impacted completion of interest rate pass through process in the loan market while deposit rates indicated rigid behavior. The study suggested that proper communicated monetary policy increase the speed of interest rate pass through and creates homogenous pass through in the Euro zone area. The difference in pass through in different countries happened due to differences of financial products. However (Bondt, 2002; Mojon, 2000 and Kleimeier and Sander, 2005) explored deposits rates offered on saving and overnight deposits showed stickier behavior than rates on time.

Chong et al., (2006) examined the deposit rates of different maturities and changes in interest rates due to changes in policy rate across various financial institutions and various financial products in Singapore. The result of study signified asymmetric adjustment of administrative rates due to change in the policy rate. The findings of study indicated finance companies deposit rates not as rigid as deposit rates in the banking sector but lending rates in finance companies showed more rigidity as compared to lending rates in the banking sector. The deposit rates showed more rigid when below the equilibrium level than above the equilibrium level. The authors found that large financial institutes reacted more through the administrative channel while small financial institutes reacted more through bank lending channel. Thus the study resulted in incomplete and asymmetric pass through in Singapore. The study suggested that monetary policy put different impact on different sectors of

economy; further contractionary monetary policy has slow transmission process then expansionary monetary policy.

Gropp et al., (2007) investigated price setting process of banks and impact of innovations on banks spreads in Euro area. The study applied panel econometric technique and discovered sluggish pass from policy rate to deposit rates, further rates on demand and saving deposits showed higher degree of rigidity. The study found asymmetric adjustment of pass through in Euro area. The authors found upward rigidity in case of loan rates and downward rigidity of deposit rates. The study discovered that, the competition among banks and the competition faced by banks by other non-banking sectors increase the speed of adjustment of retail rates. Financial innovations not affected the banks spread. Fuertes and Hefferman (2008) discovered that presence of sunk costs in financial markets could result the sluggish pass through.

De Greave et al., (2007) estimated pass through of market interest rates to retail rates in Belgium. The authors used monthly interest rate data of thirteen banks for six loans products and seven deposits of different maturity including long run and short run maturity. The study covered time span of 10 years (1993-2002). The study applied heterogeneous approach in Belgium banking market. The study found incomplete pass through in long run however found no influential evidence about asymmetry in retail rates.

Liu et al., (2008) investigated the degree of interest rate pass through from whole salerates to retail rates and mortgage rates of different maturities and speed of adjustment of retail interest rates in New Zealand. The authorstaken sample data from 1994 to 2004 and applied Philips and Loretan and Error Correction econometric methodology. The authors discovered complete pass through for some retail rates. The study reported symmetric adjustment of pass through.

Wang and Thai (2008) estimated in the study the asymmetry of pass through in case of Taiwan and Hong Kong. The study applied asymmetric threshold cointegration (TAR) to check the long run relationship between retail rates and money market rates. Further, the authors applied EC EGARCH model and found incomplete pass through in both Taiwan and Hong Kong. The paper found upward rigidity of deposit markets and downward rigidity of lending rate in both markets.

Betancourt et al., (2008) explored incomplete adjustment of pass through from policy rate to deposit rate in short run and complete pass through in long run in Colombia. Havranek et al., (2016) discovered the pass throughprocess in Czech banking sector. The study resulted; before financial crisis of 2008 pass through remained complete while after the financial crisis pass through remained incomplete. Further, the authors found that difference of pass through among different countries depend on sample data, time period and country's bank structure. Hristrov et al., (2014) also documented that pass through process slowed in Euro area after the financial crisis.

Ozdemir (2009) anticipated pass through between the money market rate and the bank retail rates for Turkey for period of April 2001 to June 2007. The study applied symmetrical and asymmetrical Error Correction model. This study concluded that marketrate pass through to deposit rate and lending rate is complete in long run and in short run lending rate showed more suppleness relative to deposit rate.

Jamilov and Egert (2013) examined in the study interest rate pass through for Caucasus region. The study applied autoregressive distributed lag model (ARDL) to monthly data. The study resulted in less than complete pass through in Caucasus region in response to low banking competition and macroeconomic instability. The study found sluggish pass through in short-run. The study discovered variation in the

size of pass through across countries. The paper suggested long run pass through and short run adjustment process differed across maturity and currency value of country.

Ahmed et al., (2013) examined policy rate (LIBOR) transmission to four retail rates in United Kingdom. The study applied ECM and found incomplete pass through in short run and complete pass through in Long run. Further, the authors found asymmetric pass through in case of deposit rate, lending rate and mortgage rate while symmetric adjustment of pass through to time rate.

2.4   National Studies on Interest Rate Pass Through

Qayyum et al., (2005) examined pass through process of the changes in policy rate (Treasury bill rate) to Call money rate and retail rates. The study used Six-month Treasury bill rate, Call money rate, Saving Deposit rate, Six-Month deposit rate and Lending rate, covered the time span from 1991 to 2004 and applied Transfer function approach. Results of the study indicated that pass through of the changes in Treasury bill to call money is completed in one month while pass through from Treasury bill to retail rates took much time. Furthermore, study confirmed less than complete pass through both in long and short run.

Khawja and khan (2008) anticipated the pass through from 6 month Treasury bill rate to 6 month KIBOR rate. The study used the monthly data (2001-2009) and applied Transfer function approach. The study documented complete pass through to lending rate and incomplete pass through to deposit rate. The study suggested that incomplete pass through in case of lending rates made it more difficult to apply the Taylor rules in case of Pakistan.

Mohsin (2011) has estimated the impact of monetary policy on retail rates. The study applied panel data of discount rate and retail rates (deposit and lending rates) for period of November 2001 to March 2011 and applied panel cointegration

and Philips and Loretan methodology. The author applied long-run analysis for lending but in case of deposits short- run analysis is applied in the study. Key findings of the study indicated incomplete pass through to deposit rates. Further, the study indicated asymmetry in interest rate pass through among different banks. The study suggested significant lags to complete the pass through process.

Hanif and Khan (2012) estimated the impact of policy rate on money market rate and deposits and lending rates. The study used monthly time series data (2001-2011) and applied unrestricted autoregressive distributed lag model (ARDL). The study found asymmetric interest rate pass through of money market rate to retail rates. The paper found almost complete interest rate pass through to landing specially in case of fresh loans while incomplete and sluggish pass through to deposit rates.

Fazal and Salam (2013) empirically examined interest rate pass through in Pakistan. The study coveredtime span of six years (2005-2011) and applied error correction method. The study found incomplete pass through to retail rates and higher ratio of pass through in case of lending and lower rate of pass through in case of deposits. The study revealed lending rates showhigher speed of adjustment than deposit rates.

Mirza (2014) estimated in the study the effects of change in policy rate on retail rates and time span the retail rates take to converge to their long run equilibrium level. The study used monthly data and covered time span of 10 years (2003-2013).The author applied Engel and Granger co-integration method and error correction framework. The study found sluggish passthrough in case of deposit rates(WARD) and lending rates(WALR) and higher the degree of pass through higher in case of lending rates (WALR).

Omer et al., (2014) estimated the impact of excess liquidity on pass throughof discount rate and required reserves to lending and deposit rates and exchange rate. The study used monthly data from June 2004 to December 2011 and applied VAR methodology. Lending and deposit rates used in the paper weighted average of rates offered by banks. The study found complete transmission mechanism of discount rate to lending while incomplete transmission mechanism of discount rate to requires reserves. The study found no pass through of discount rate to deposit rate. The study resulted that presence of excess liquidity discretionary impact on transmission mechanism ofdiscount rate to deposit rates.

Hussain and Khan (2016) estimated in the study the speed and level of pass through and checked distinction in interest rate pass through across 31 banks incontext of banks' ownership structure and market power in Pakistan. The authors used bank wise monthly data (2005-2015) of retail rates in case of 31 Pakistani banks and applied unrestricted autoregressive distributed lag model (ARDL).The study found complete interest pass through of lending and incomplete pass through in case of deposits. The paper indicated that market power and ownership structure of banks have positive impact on level of interest rate pass through. Large banks have higher level of market power and asset share as compared to small banks and these banks have different level of pass through as compared to small banks. The study found that private sector banks have the higher level of pass through as compared to public sector commercial banks. Further findings of paper indicated higher level of pass through in conventional banks as compared to level of pass through in Islamic banks.

2.5 Conclusion

There are differences in consent of researchers about interest rate pass through. However, most of researchers agreed on short run incompleteness of pass through. While about long term completeness of pass through, literature showed

mixed suggestion. The existence of imperfect competition hypothesis, switching cost hypothesis and adjustment cost hypothesis, Political pressure and less developed financial markets in Pakistan give indicationof presence of asymmetry in interest rate pass through. The maturity specification of interest rate pass through is missing in case of Pakistan. This study is an attempt to fill this gap on maturity specification of pass through by estimating the interest rate pass through from discount rate to various maturity wise un-weighed deposit rates.

Summary of International Review

Authors	Variables	Estimation Technique	Main findings
Hannan and Berger(1992)	Deposit rates,T bill rate(united states)	Multinomial Logit Model	The study reported asymmetric pass through to deposit rate both in case of upward and downward adjustment The pass through for upward adjustment showed more rigidity
Scholnick(1996)	Policy rate ,Lending and deposit rates	Asymmetric Error correction Model	The study documented asymmetric pass through and upward rigidity of deposit rates both in case of Malaysia and Singapore
Hefferman (1997)	LIBOR,Deposit and lending rate	Error Correction Model	Asymmetric adjustment of interest rate pass through
Mojon(200)	Money market rate Lending rates and Deposit rates(various retail rates)	Error Correction Model	The study reported that rigidity of retail rates and level of pass through is different in different countries. Retail rates have longer maturity than money market rates so interest rate pass through is incomplete and maturity mismatch problem is created Competition among banks reduces the asymmetry of pass through.
Hofmann and Mizen(2001)	Official base rate, Deposit rate and mortgage rate	VAR	Incomplete pass through to mortgage rate But complete pass through from policy rate to retail rates
Lim(2001)	Policy rate and retail rates	Multivariate Error Correction Model	Asymmetric adjustment of pass through in short run but not in case of long run
De Bondt(2002)	Retail rates and comparable maturity market rates	Many econometric methods (Error correction model, VAR models)	Complete pass through to lending rates and incomplete pass through to deposit rate.

Chong et al.,(2006)	Monetary policy rate and deposit rates of different maturities	Error Correction Model	Incomplete and Asymmetric pass through in Singapore and contractionary monetary policy has slow transmission process than expansionary monetary policy.
Gropp et al.,(2007)	Policy rate Deposit rate	Panel Econometric Technique	Asymmetric pass through in Euro area and Innovations not affected bank spread.
De Greave et al.,(2007)	Market interest rates and retail rates(7 deposits of different maturities)	Heterogeneous Approach	Incomplete pass through in long run and no influential evidence about asymmetric interest rate pass through in Belgium.
Liu et al.,(2008)	Whole sale retail rates and mortgage rates of different maturities	Philips and Loretan methodology and Error Correction Methodology	Complete pass through in case of some retail rates and symmetric adjustment of pass through in New Zealand.
Wang and Thai(2008)	Money market rates and retail rates	TAR and EC EGARCH Model	Upward rigidity of deposit rate and downward rigidity of lending rate in Taiwan and Hong Kong.
Ozdemir(2009)	Money market rate and bank retail rates	Symmetric and Asymmetric Error Correction Mechanism	Market rate pass through to retail rates is complete in long run while in short run lending rate showed more flexibility.
Jamilov and Egert(2013)	Policy rate and Retail rates	ARDL	Incomplete pass through in Caucasus region and long run and short run adjustment differs across maturity and currency value of country.
Ahmed et al.,(2013)	LIBOR and retail rates(lending rate, deposit rate, Mortgage rate and time rate)	Error Correction Model	Asymmetric adjustment of pass through in case of all rates while symmetric adjustment to time rate

Havranek et.,(2016)	Bank Product data and Money market data(Interbank interest rate, interest rate swaps, Government bond yield)	Error correction Model	The study reported that Pass through remained complete before Global financial crisis 2008 and incomplete afterwards.

Summary of National Review:

Authors	Variables	Estimation Technique	Main findings
Qayyum et al., (2005)	T bill rate, Call money rate and retail rates	Transfer function approach.	The study reported almost complete pass through from T bill rate to call money rate while incomplete interest rate pass through to retail rates.
Khawja and khan(2008)	T Bill rate, KIBOR, retail rates	Transfer Function Approach	The study documented Incomplete and slow interest rate pass through
Mohsin(2011)	Discount rate and retail rates	Panel Cointegration and Philips and Loretan Methodology	The study reported incomplete and slow pass through and asymmetric adjustment of pass through among different banks.
Hanif and Khan(2012)	1- wk. KIBOR and retail rates	ARDL	Asymmetric adjustment in interest rate pass through
Omer et al.,(2014)	Discount rate, exchange rate, required reserves and retail rates	VAR	The study reported the presence of excess liquidity has discretionary impact on transmission mechanism of discount rate to deposit rate

CHAPTER 3

MONETARY POLICY REVIEW

This chapter reviews history of the banking sector, monetary policy, monetary management and the structureof financial markets in Pakistan from 1948 to 2016.

State bank of Pakistan was established in July 1948. The SBP act 1956 rules the foundation of its all operations today. The SBP act 1956 states that regulation of monetary and credit system of Pakistan and achievement of target rates of growth that are set by the federal government are targets of monetary policy. SBP requires stability of monetary policy and promotion of economic growth. It requires the banks to finance their loans through the acquiring deposits instead of incredibly large loans from the State bank. In early years of Pakistan' history, the private sector was small and banks were much conservative in lending. So, in such a critical situation, major task was to make stronger the banking system[3]. In this phase, asset side of monetary policy was given much importance.

3.1 Policy Instruments for Monetary Management 1948-1972

In the early phase in the history of Pakistan,financial market system was under-developed. SBP took many measures to makebetterfinancial system and to widen the useof credit through banks and other financial institutions. In the early phase of monetary management, use of right instrument to conduct monetary policy was a big issue. SBP selected policy instruments from possible available instruments to obtain the targets of monetary policy (Janjua, 2005; Zaidi, 2006).

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[3] In this chapter we make liberal use of Meenai(1984); Khan(1995);Janjua(2005);Zaidi(2007);Qayyum(2008) and State Bank of Pakistan Annual Reports.

Interest rateis considered main instrument of monetary policy as a policy tool was rarely used during 1948-1972. During the time period the credit was small percentage of gross domestic product (GDP). Market imperfections prevailed in early phases thus interest rate and other policy instruments were not much effective. The bank rate was 3 percent in 1948 while in 1959, it remained 4 percent. During that time period increase in money supply was not due to increase in credit creation rather due to balance of payment surplus and increased government expenditures. During 1956-1958 the economy of Pakistan experienced inflationary pressure due to monetary expansion. Selective credit controls and deposit and advance rates were used during the period for smooth working of financial system. The Quota system was introduced by SBP for credit expansion; however, it remained ineffective during this period. Commercial banks were allowed to borrow from SBP against government securities.

3.2   The expansionary Phase: 1973 to 1990

SBP used the monetarist approach in 1970s, after the collapse of Breton Wood System in early 1970s (Ashraf and Janjua, 2005). During the period (1970-1990) monetary policy focused on development of financial sector and economic growth. Before the1970s, monetary policy was conducted through indirect controls on interest rates and credit rationing. While in reform phase, SBP conducted its monetary and credit operations through direct methods of credit controls. On basis of direct controls, credit ceiling was introduced in October1973. The National Credit Consultative Council (NCCC) and Annual Credit Plan (ACP) were created in 1972. NCCC was created for distribution of credit especially to less developed areas of the economy. Monetary and credit policies were operated within the framework of annual credit plan and credit expansion was calculated on the basis of growth and expansion target set by government and forecast of balance of payment. Bhutto Government

introduced inclusive monetary reforms in 1972 to decrease income inequality. The monetary reforms of 1972 focused on two aspects, endinginterlink of banks and industries and to widen the distribution of capital.

During the time period, SBP revised the policy about interest rate as an instrument of monetary intervention and increased the interest rate from 5 percent to 6 percent and then to 10 percent. Banks follow the suit in the policy rate, thus deposit and lending rates were also raised. The monetary expansion and rates of credit increased in the period.

Selective credit controls were used throughout the period. The main purpose of these credit controls was; to direct the flow of credit to selected sectors and subsectors of the economy, to prevent inventories of daily use commodities, to act as an adjunct to import policy.

Statutory liquidity ratio (SLR) was raised at some stage in the phase to control the volume of credit. It was raised from 25 percent,on September 1st, 1967 to 30 percent, on 6 june,1973 and further raised to 35 percent on August 16, 1973. The increased SLR could not control the volume of credit because it could only affect the distribution of credit between public and private sector.

Credit budgeting is another instrument of monetary policy to provide adequate liquidity for development purpose. The Credit budgeting provided liquidity of bank credit to previously ignored sectors of the economy. On the other hand, credit ceiling adversely affected the commercial banks' incentive to mobilize deposits. All through the phase (1970-1990) Reserve Money was broadly used as an operational target of monetary policy.

3.3   The Monetary Reforms 1991-2010

Direct credit controls of 1970s created many problems as, unsecured financial system due to increase in size of nonperforming loans in National Commercial Banks (NCBS), reduction in size of banking system relative to size of non-banking system, credit excess liquidity problem due to credit ceiling, decline in efficiency of financial markets and short-term maturity distribution of outstanding government debt (Khan, 1995 and Zaidi, 2007).

Financial reforms started in the 1990s to move the economy towards market based structure and this phase is considered a liberalization phase of monetary management. In 1992,SBP introduced auction of government treasury bills (6 month T bills) and credit ceiling system was replaced with credit to deposit ratio. Open market operation (OMO) started in 1992, the operations have become an important instrument of monetary policy since 1995(SBP, 2000).Credit to deposit ratio was abolished by SBP in 1995 to make market based structure of credit availability in economy. Credit to deposit ratio system was against the liberalization of financial markets. During that era, annual targets of monetary aggregates were introduced. To maintain the credit expansion, monetary policy instruments as, open market operations OMO, and cash in reserve requirement (CRL), statutory liquidity requirements (SLR) and discount rate were adopted. In 1995, another reform was taken to remove higher lending ratecharged by the banks. This step is considered important towards the creation of moremarket -oriented monetary policy.

SBP started to utilize the discount rate as aninstrument of monetary policy in the early 2000s. SBP much rely on discount rate and it is most important monetary policy instrument. Inflation is checked through changes in discount rate. Since 2000s SBP targets monetary aggregate M2 to achieve the objectives of monetary policy and

federal government fix the target rate of inflation and growth and SBP combines these targets to attain target rate of money supply (Janjua, 2005; Zaidi, 2007 and Qayyum, 2008).

Monetary andcredit policies operated through annual credit plan during 1983-2003. SBP abolished the annual credit plan in 2006. In 2006, SBP implicitly started to target short term money market rates, while in 2009, SBP explicitly announced it. In FY 2008-09 inflation rate remained 20.8 percent which was the highest level of inflation. Inflation remained in double digits from FY1990-91 to FY 1996-97. It gradually slowed down in FY 2002-03. whereas after the lowest level of inflation during FY 2002-03 it started to raise and remained again in double digits from FY 2007-08 to FY 2009-10. M2 growth rate remained highest in FY 1991-92 and then it gradually slowed down to its lowest level of 6.2 percent in FY 1998-99.During the FY 2009-10, it remained 12.5 percent. The monetary aggregate M2 has problems of controllability and instability. Real GDP growth rate showed fluctuations. Real GDP growth rate remained more than targeted in FY2009-2010.

3.4   Monetary Management 2011-2016

SBP adopted accommodative monetary policy during the FY2012.The inflation during the FY2011 remained less than target rate of inflation and brought modest improvement in economic activities but the economy remained unable to move from a low growth and high inflation environment. The change in base year from 1999-2000 to 2004-05 adjusted the increase and showed a lower levelof inflation. Growth in Broad money supply (M2) slightly went slower in FY 2012 for the first time since 2009.This decline happened because of reductionin Net Foreign Assetof banking system while net domestic assets experienced an expansion of 20.3

percent in the FY2012. However, there was modest improvement in FY2012 and real GDP grew by 3.7 percent within that time.

In FY2013 inflation remained in single digit (7.4 percent) owing to decline in administrative prices and soft global commodity prices and GDP remained 3.6 percent due to accommodating monetary and expansionary fiscal policy.

The Discount rate is considered an important instrument of monetary policy and SBP is currently using discount rate as a policy instrument due to the high level of public debt in Pakistan. Any change in policy rate e.g. discount rate potentially affects the budget constraint as the debt servicing is largest part of the federal budget. In FY2016, policy rate was brought down to 5.75 percent which is lowest level of policy rate since 1970s. In FY2016,the staggered easy monetary policy is adopted to gain the economic recovery. Due to improvement in macroeconomic stability and improvement in security situation real GDP growth rate remained 4.7 percent. Broad money supply showed to some extent higher rate of growth of 13.7 percent.

The above discussion suggests monetary policy framework varied over time. Money as an instrument of monetary policy played a significant role, while now, interest rate is in practice. There is regime shift that is monetary (1947-95) and transitory (1995-09) and then interest rate regime (2009-2015).However, the discount ceiling rate was changed with a new official interest rate i.e. the SBP policy rate on May 2015.

After May 2015,SBP is using interest rate targeting instead of monetary targeting. It is just recently in January 2018, the discount rate has been increased by 25 basis points to 6.00 percent due to PKR depreciation by around 5 percent, oil prices stickiness around USD 70 per barrel, a number of central banks have started to adjust their policy rates upward adversely affecting the PKR interest rate differentials

vis- a -vis their currencies and due to significant narrowed output gap that indicates

buildup of demand pressures.

CHAPTER4

METHODOLOGY AND DATA

This chapter deals with the collection of data, variables structure and review of methodology to estimate maturity wise interest rate pass through.

This study is conducted to estimate interest rate pass through by using the discount rate and the maturity wise data of deposits from 1975 to 2016. The Nature of data is annual. In this study, discount rate is taken as the independent variable and different maturity wise un-weighted deposit rates are taken as dependent variables. The data is taken from State Bank of Pakistan and Ministry of Finance.

4.1 Discount Rate

In this study, the discount rate is taken as an independent variable. It is main policy tool of SBP. Discount rate is the minimum interest rate which is charged by the SBP to give loans to commercial banks and other depository institutions follow the suit to their lending and deposit rates. The policy rate (discount rate) is an important indicator of conditions of credit in the economy. Bernanke and Blinder (1992) suggested using policy rate (discount rate in case of Pakistan) as a best indicator of monetary policy.

When SBP change deposit rate whether increases or decreases, it affects borrowing cost of banks and banks change their deposit and lending rate. Adjustment of the discount rate is considered an important tool to handle recession or inflation.

4.2   Deposit Rate

The Banking sector is considered main sector of economy in almost all countries and bank deposits are one of most important tools of success for banking sector. Bank deposits are considered a major part of any country's savings and these deposits affect economic performance of the country. Bank deposits are defined as the amount of money that a customer of bank deposits in his account and bank pays to account holder some amount of interest according to bank rate. This study uses fixed deposit rates of different maturities. Maturity wise deposit rates are:

    a. six Months fixed deposit rate

    b. Over 6 month to 1- year fixed deposit rate

    c. Over 1 year to 2 years fixed deposit rate

    d. Over 2 years to 3 years fixed deposit rate

    e. Over 3 year fixed deposit rate.

4.3   EmpiricalMethodology

The Methodology consists of three steps. In the first step, the study verifies long run relationship among maturity wise deposit rates and discount rate. For this purpose, the study applies Engle and Granger (1987). Further, the study applies Philips &Loretan (1990) methodology to check the long run nature of interest rate pass through. That is, whether pass-through is complete or incomplete in long run and slow or fast. In the second step, the study applies error correction methodology to check short-run transmission of discount rate changes to maturity wise deposit rates. In third and last step, the study introduces dummy variable to ECM to capture asymmetry in pass-through process. For the purpose of checking time series properties of unit root the study applies access for stationary data.

4.4 Unit Root Tests

First we check the stationarity properties of the all variables.. For this purpose we apply (ADF) augmented dickey fuller (Dickey and Fuller, 1979 and 1981) unit root tests. Dickey and Fuller (1981) developed a method to test for non-stationarity. Under the ADF process the main thing is testing for non-stationarity is equal to testing for the process of a unit root.

Under the Dickey and Fuller tests assumption is that errors are statistically independent and contain a constant variance. Phillips & Perron (1988) modified the assumptions about the distribution of the errors. According to Peron(1988), most macroeconomic time series are not characterized by the presence of a unit root, fluctuations are stationary around a deterministic trend function and only shocks which had determined effects are the 1929 crash and the 1973 oil price shock. Peron (1988) customized the ADF test and allowed structural break in the estimation of unit root process. In this method, the lagged difference terms are not incorporated instead the values are estimated by using ordinary least squares and then t statistics are corrected for serial correlation.

4.5 Engle and Granger (1987) Technique

To check cointegration among maturity wise deposit rates and policy rate we use the Engle and Granger (1987) as an alternative methodology to check the long run relationship of variables According to Engle and Granger (1987) series hold long-run relationship in the case when series are non-stationary and contain same order of integration.

$$y_t = a_o + \beta_1 x_t + \varepsilon_t \quad \text{.. (1)}$$

Where;

y_t = maturity wise deposit rates

x_t = Discount rate

a_0 = Mark up

β_1 = Slope of pass through

ε_t = Error term

In Engle and Granger (1987) methodology the order of integration is checked. For the application of EG Model,it is necessary that order of integration of non-stationary series should be sameand after that verifying the stationary of the error term. If Residual series estimated through the process follow the stationary process then, long-run relationship hold among series.

4.6   Philips and Loretan (1990) Methodology

We use the Philips & Loretan (PL) technique to estimate the long run relationship among integrated series. PL is an extension of Engle & Granger (1987). This method is best to estimate long-runrelationship among series that include integrated variables in the model. Dynamics have important role in data generation process (DGP) in PL method.

Philips & Loretan suggest to include in the model the leads and lags of first difference series in x_t, independent variable and in Δx_t.

The equation of PL model is:

$$y_t = a + \beta' x_t + \sum_{k=1}^{k} d1_k \left(y_{t-k} - \beta' x_{t-k} \right) + \sum_{i=-1}^{L} d_{2i} \, \Delta x_{t-i} + v_{1t} \dots\dots\dots\dots\dots(2)$$

Two sided lag differences in the equation end the endogeneity problem. According to Philips and Loretan, parameters which are estimated through this method of single equation are approximately same to maximum likelihood estimates and are efficient. The parameters estimated through this method are normally

distributed and asymptotically unbiased. The PL considers structural changes and it tackle past policy surprise and expected future policy setting with regard deposit rate and policy rate e.g. discount rate. While, the OLS estimator of equation one are super consistent are not asymptotically unbiased or normally distributed and in its finite sample bias may be large and persistent. Further, PL method incorporates structural changes if they occur and role of past policy surprise and future policy settings in the relationship between deposit rate and discount rate.

4.7   Error Correction Methodology

The study applies ECM to examine the short-term dynamics of maturity wise deposit rates due to changes in discount rate. The ECM used in the study is the same as general ADL (p, q) model.

The equation of ECM model is following:

$$\Delta y_t = \beta_o \Delta x_t + \delta(y_{t-1} - a_o - \beta_1 x_{t-1}) + \sum_{i=1}^{q} \beta_i \, \Delta x_{t-i} + \sum_{i=1}^{p} \ulcorner_i \Delta y_{t-i} + v_t \ \ldots\ldots(3)$$

Where

Δ =First difference,

$\varepsilon\hat{}_{t-1} = (y_{t-1} - a_o - \beta_1 x_{t-1}) =$ disequilibrium at time $(t-1)$

$v_t =$ Error term

$\beta_o=$ Impact pass through

$\beta_i =$ dynamic adjustment coefficient

$\ulcorner_i =$ dynamic adjustment coefficient

$\delta =$ error correction adjustment speed.

The sign of δ should be negative, which indicates mean reverting behavior of rates. The equation as a result includes the dynamics of adjustment in discount rate (Δx_t). How much time rates take to adjust towards equilibrium can be estimated

through mean adjustment lag (MAL) of a complete pass through of ECM parameterization by applying the formula of MAL given in Hendry (1995).

For the simple case of ARDL (1, 1):

$$MAL = (\beta_o \_1)/ \delta \quad\text{..(4)}$$

MAL, take weighted average of all lags in the model and it computes speed of adjustment of deposit rates due to changes in policy rate.

Whether adjustment speed is asymmetric or not, a large number of studies specified that short term adjustment may be asymmetric that is it can differ in upward and downward adjustment of rates (Chong et al., (2006) and Scholnick (1996)).

To check the presence of asymmetric adjustment in deposit rates in Pakistan, this study includes a dummy variable λ to equation asymmetric ECM.

The dummy is taken as;

If the residual $\varepsilon^\wedge{}_{t-1}$ is positive then λ is equal to one and zero otherwise.

After including a dummy variable to the model, the asymmetric dynamic short -run equation is:

$$\Delta y_t = \beta_o \Delta x_t + \delta_2 \lambda \varepsilon^\wedge{}_{t-1} + \delta_3(1-\lambda)\varepsilon^{\hat{}}{}_{t-1} + \sum_{i=1}^{q} \beta_i \Delta x_{t-i} + \sum_{i=1}^{p} \ulcorner_i \Delta y_{t-i} + \eta_t \quad (5)$$

Where;

δ_2 = Error correction adjustment speed when rates are above equilibrium value.

δ_3 = Error correction adjustment speed when rates are below the equilibrium values.

Standard Wald test is mostly applied to determine significant difference between upward and downward ward adjustment of rates.

The asymmetric mean adjustment case is as following:

$$MAL^+ = (\beta_o - 1)/\delta_2 \quad\text{..(6)}$$

$$MAL^- = (\beta_o - 1)/\delta_3 \quad\text{..(7)}$$

Where,

MAL^+ = Mean adjustment lag when rates are above their equilibrium value.

MAL^- = Mean adjustment lag when   rates are below their equilibrium value.

CHAPTER 5

RESULTS AND DISCUSSION

After discussing an appropriate econometric methodology and specification of the model in detail in the previous chapter, this chapter provides detail discussion about summary statistics, correlation matrix and unit root process of all the variables, the later sections of the chapter provides different cointegration techniques and error correction models results.

5.1   Summary Statistics of All Variables

The following table 5.1 provides descriptive statistics of all variables used in this study. The mean of fixed deposit rates varies with respect to different maturity periods, where the minimum mean value is associated with up to 6 months fixed deposits the (6.99), followed by the mean value of over 6 months (7.90), over 1 year (8.20), over 2 years (9.19)and over 3 years (10.06).

Table 5.1: Descriptive Summary of the Variables (Discount Rate and Fixed Deposit Rate)

Series	Mean	Maximum	Minimum	Standard Deviation
Discount Rate	10.87	20.00	6.25	2.98
FD-Up to 6M	6.99	10.06	1.93	1.84
FD-Over 6M	7.90	11.63	2.44	2.01
FD-Over 1Y	8.20	11.28	2.64	1.97
FD-Over 2Y	9.19	14.69	2.870	2.46
FD-Over 3Y	10.06	15.74	3.10	2.64

Note: Author's own calculations.

The minimum fluctuation from mean value is associated with 6 months fixed deposits rate (1.84) followed by a higher standard deviation value of over 3 years fixed deposits rate (2.64). Furthermore, the mean value of discount rate is 10.87 with a standard deviation of 2.98. When we compare these results on the basis of standard

deviation, we perceive that there is slightly more deviation in discount rate than any other rate. Over all there is less variability in data set.

5.2   Correlation Matrix

The pairwise correlation coefficients between the discount rate and fixed deposit rates having different maturity periods are reported in table 5.2. There is a positive and significant correlation between discount rate and fixed deposit rates. As clear from the table the discount rate is highly correlated with 3 years fixed deposit rate, while the discount rate is less correlated with up to 6 months fixed rate.

Table 5.2: Correlation of Discount Rate with Fixed Deposit Rates

Series	Discount Rate	FD-Up to 6M	FD- over 6M	FD- Over 1Y	FD- Over 2Y	FD- Over 3Y
Discount Rate	1					
FD-Up to 6M	0.26	1				
FD- over 6M	0.29	0.97	1			
FD- Over 1Y	0.30	0.95	0.95	1		
FD- Over 2Y	0.37	0.90	0.94	0.87	1	
FD- Over 3Y	0.42	0.89	0.93	0.87	0.97	1

Note: Author's own calculations.

5.3   The Unit Root Tests

This section provides information about the unit process of the variables. To check the stationarity of the concerned variables, we apply Augmented Dickey- Fuller (ADF) and Phillips-Perron (PP) unit root tests. We test null hypothesis of unit root against the alternate hypothesis of stationarity. The results of ADF and PP are reported in table 5.3 and 5.4 respectively. All variables spectacle trend pattern, thus we incorporate trend in all unit root tests, additionally, we do add the constant term in both unit root tests. The ADF as well as the PP test results in table 5.3suggest that

discount rate and all fixed rates are stationary at their first difference at 5% level of significance.

Table 5.3: Augmented Dickey- Fuller(ADF) Test

Level Series				First Difference Series		
Series	Constant and Trend	ADF tau Statistics	Decision	Constant and Trend	ADF tau Statistics	Decision
FD-Up to 6M	C,T	-3.334	I(1)	C	-5.351*	I(0)
FD- over 6M	C,T	-2.678	I(1)	C	-5.648*	I(0)
FD- Over 1Y	C,T	-3.405	I(1)	C	-5.486*	I(0)
FD- Over 2Y	C,T	-2.743	I(1)	C	-6.528*	I(0)
FD- Over 3Y	C,T	-2.482	I(1)	C	-6.278*	I(0)
Discount Rate	C,T	-2.91	1(1)	C	-5.518*	I(0)

Note: The null hypothesis is presence of unit root.
* indicates significance at 5 percent level.
C and T indicate constant and trend respectively.

Table 5.4: Phillips Perron (PP) Test

Level Series				First difference series		
Series	**Constant and Trend**	**ADF tau Statistics**	**Decision**	**Constant and Trend**	**ADF tau Statistics**	**Decision**
FD-Up to 6M	C,T	-2.903	I(1)	C	-5.348*	I(0)
FD- over 6M	C,T	-2.678	I(1)	C	-5.626*	I(0)
FD- Over 1Y	C,T	-2.959	I(1)	C	-5.505*	I(0)
FD- Over 2Y	C,T	-2.772	I(1)	C	-6.531*	I(0)
FD- Over 3Y	C,T	-2.548	I(1)	C	-6.278*	I(0)
Discount Rate	C,T	-2.103	I(1)	C	-5.579*	I(0)

Note: The null hypothesis is the presence of unit root.
* indicates significance at 5 percent.
C and T indicate constant and trend respectively.

5.4 Engle-Granger (1987) Cointegration Test

After applying unit root tests, we apply Engle and Granger (1987) methodology to assess the presence of cointegration among the discount rate and various maturity wise deposit rates. The variables are integrated of order one, I (1) and residual series of regressing discount rate on various maturity fixed deposit rates are I (0) indicate that series are cointegrated. The residual series are stationary using ADF.[4] Table 5.5 Indicates long-run equilibrium relationship between discount rate and fixed rates.

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[4] The stationarity of error term suggests that there is long run relationship between the variables.

<div align="center">**Table 5.5: Estimates of Engle-Granger (1987)**</div>

Series	α	β	ADF t-test on residuals	Null of unit root	Decision
FD-Up to 6M	5.70 (5.43)*	0.20 (1.98)**	-2.09	rejected	Co- integration exist
FD- over 6M	5.23 (4.93)*	0.16 (1.82)**	-2.07	rejected	Co -integration exist
FD- Over 1Y	6.01 (5.34)*	0.20 (2.02)*	-2.14	rejected	Co- integration exist
FD- Over 2Y	5.80 (4.26)*	0.31 (2.58)*	-2.42	rejected	Co- integration exist
FD- Over 3Y	5.96 (4.17)*	0.37 (2.98)*	-2.40	rejected	Co -integration exist

Notes: Null hypothesis is presence of unit root.

* indicates significance at 5 percent level.

** reveals significance at 10 percent level

t- Values are reported in brackets.

5.5   Philips and Loretan (1990) Methodology

After establishing the cointegration among variables, we now estimate long-run parameters by applying Philips and Loretan (1990) methodology. Table 5.6 shows long-run parameters of fixed deposit rate model of pass through. As indicated in the table 5.6, α is intercept term that indicates margin of interest rate pass through, while β (slope term) indicates the impact pass through. In all case there is markup effect and it is statistically significant. The slope coefficients that indicate pass through are statistically significant and are in the range of 22 percent to 30 percent.

Table 5.6: Philips and Loretan (1991) Estimates

Series	Constant		Pass through					
	α	t-value	β	t-value	R2	D.W	F -stat	Prob (F-stat.)
Fixed-1Y	5.61	2.68*	0.22	1.94**	0.76	1.93	17.00	0.00
Fixed-2Y	6.29	2.71*	0.23	1.93**	0.78	1.92	16.14	0.00
Fixed-3Y	7.36	2.37*	0.26	1.92**	0.77	1.92	17.69	0.00
Fixed-6M	3.80	2.63*	0.30	2.63*	0.76	1.93	17.59	0.00
Fixed-0ver6m	5.55	2.70*	0.22	1.92**	0.77	1.97	19.28	0.00

Notes: * indicates significance at 5 percent level
  ** indicates significance at 10 percent level.

Table 5.6 also predicts that banks pass only 22 percent of the impact of the change in discount rate to 1 year fixed rate immediately (within one month). Similarly, Bank pass only 26 percent of impact of change in discount rate to 3 years fixed rate in the first month. The estimates of pass through indicate maturity wise deposit rates' variations. The estimate of 3 year rate reveals that, Although pass through is slow, longer maturity deposit rate of 3 years fixed rate indicate slightly higher adjustment than other long- run rates. The up to six month deposit rate also indicate slightly higher pass through. Pass through process differs even in same bank among different maturity wise deposit rates due to some degree of pricing power of banks. The goodness of fit explains 76 percent of the variation for 1 year fixed rate,78 percent of the variations for 2 years fixed rate,77 percent of variation for 3 year fixed rate, 76 percent of variation for over 6 months fixed rate and 77 percent of the variation for up to six month rate. The D.W statistics is 1.93 for 1 year fixed rates, 1.92 for 2 years fixed rate,1.92 for 3 year fixed rate,1.93 for 6 months fixed rate and 1.97 for over 6 months fixed rate. Table 5.6 shows that estimated long runpass through is incomplete and slow. So, there is incomplete and delayed interest rate Pass

through in Pakistan. Qayyum et al., (2005) and Khawja and Khan (2008) also reported incomplete pass through in long run.

5.6 Short-Term Pass-Through and Adjustment Speed: Error Correction Mechanism

After finding out the Nature of maturity wise pass through in Long run we apply bivariate specification of ECM to estimate dynamics of fixed deposits rate of different maturities in short run. The result of ECM is reported in table 5.7. The estimates of $\beta 1$ show impact pass through and all estimates are positive and are statistically significant. The parameters of ECM model have expected sign and are statistically significant. The impact pass through to fixed deposit over one year is 27%, to fixed deposits over two years is 28%, to fixed deposit rate over three year is 29%, to fixed deposits over six month is 22% and to fixed deposit rate up to six month maturity is 24%. Estimated pass through ranges from 22% for fixed deposits over month rate to 29% for 3 year fixed rate.

The parameter δ indicates speed of adjustment. The estimates of δ have negative sign and are statistically significant. The result of speed of adjustment reveals that deposit ratesare significantly mean reverting to long run equilibrium. That is, rates will adjust downwards when they are above their equilibrium value and adjust upward when they are below their equilibrium value. The short-term pass through is incomplete and it takes about three months for one year maturity deposit rate to adjust to the long run equilibrium, four months for over three years maturity deposit rates and five months for fixed deposit rates over six months to adjust to the long run equilibrium. The estimated pass through to different maturity wise depositratesin complete in short run. Mohsin (2011) found less than complete pass through from discount rate to deposit rate. Qayyum et al., (2005) also found

incomplete passthrough to saving deposit rate in short run. Our finding of incomplete pass through is consistent with finding of Qayyum et al., (2005), Mohsin(2011) and Hanif &Khan (2012).The result suggest that when SBP changes the policy rate, commercial banks not fully transform the cost to their customers

Table: 5.7Short TermPass Through and Adjustment Speed (EC estimates)

Series	α	β	δ	MAL	R2	D.W	F-stat.	Prob (F-stat)
Fixed-1Y	-0.10 (0.52)	0.27 (2.44)*	-0.20 (2.34)*	3.65	0.28	1.88	2.75	0.04
Fixed-2Y	-0.11 (0.48)	0.28 (2.18)*	-0.17 (1.89)**	4.23	0.27	2.07	2.71	0.04
Fixed-3y	-0.15 (0.56)	0.29 (1.87)**	-0.17 (1.82)**	4.45	0.30	2.23	2.94	0.03
Fixed-6M	-0.06 (0.03)	0.24 (2.71)*	-0.16 (2.15)*	4.75	0.28	1.93	3.00	0.03
Fixed-O6M	-0.12 (0.67)	0.22 (2.25)*	-0.14 (2.17)*	5.57	0.28	1.85	2.82	0.04

Notes: t values are reported in brackets.
* indicates significance at 5% level.
The mean adjustment lag$(MAL) = (\beta_o\_1)/\delta$.

5.7 Asymmetric Adjustment Model

The section provides estimates of asymmetric Error Correction Methodology. When deposit rates are away from their equilibrium value banks adjust these rates. $\delta 1$ is the coefficient of asymmetric downward adjustment in maturity wise deposit rates when rates are upwards their equilibrium value. Similarly $\delta 2$ is coefficient of upward adjustment in maturity wise deposit rates. The estimates of $\delta 1$ indicate significant and asymmetric downward adjustment of maturity wise deposit rates. While the estimates of $\delta 2$ show insignificant upward adjustment of deposit rates. MAL (mean adjustment lag) is applied to check the lags in adjustment process. The result of MAL indicates that mean adjustment of rates is shorter in case of downward adjustment as compare to upward adjustment of deposit rates. MAL for downward adjustment of deposit rates on average is about 3 months. The result

reveals that banks on the average take about 3 months to decrease deposit rate and about 5 months to increase deposit rates. Thus adjustment speed reveals more delayed process in upward adjustment of deposit rates.

Table 5.8: Estimates of Asymmetric Adjustment Model

Series	β	δ1	δ2	MAL+	MAL-	R2	D.W
Fixed-1Y	0.24 (2.10)*	-0.32 (2.41)*	-0.12 (1.09)	2.42	6.58	0.30	1.97
Fixed-2Y	0.25 (1.98)**	0.23 (2.00)*	-0.08 (0.58)	3.26	9.37	0.25	1.98
Fixed-3y	0.28 (2.12)*	-0.25 (2.11)*	-0.14 (1.04)	2.88	5.14	0.23	2.23
Fixed-6M	0.20 (2.19)*	-0.32 (2.05)*	-0.10 (1.06)	2.50	8.00	0.30	1.89
Fixed-O6M	0.21 (2.29)*	-0.23 (-2.07)*	-0.11 (1.07)	3.43	7.18	0.26	1.97

Notes: * indicates significance at 5% level.
 ** Significance at 10 percent level.
 MAL+ indicates the mean adjustment lags when deposit rates are above their equilibrium value.
 MAL- mean adjustment lag when rates are below their equilibrium values.

That is, banks decrease their deposit rates more quickly than increasing the deposit rates. The result of asymmetric pass through indicate that pass through estimate is slightly high when we move towards longer maturity pattern. Our results indicate Pass through over time increases as maturity increases. The long maturity fixed deposit rates are more sensitive to change in deposit rates because these are held for investment purpose, the result indicate asymmetry in adjustment of deposit rates. The present finding suggests upward rigidity in deposit rates. Our finding of the asymmetric model is in favor of switching cost and imperfect competition hypothesis. The deposits are subject to some switching cost. Banks have some power of pricing, as a consequence banks may exploit depositors by being quicker in reducing deposit rates in case of upward movement in deposit rates and the opposite is true for downward adjustment in deposit rates. Due to imperfect completion in the banking sector, banks may reduce deposit rates more rapidly than increasing the rates. Hannan

and Berger (1991) found upward rigidity in deposit rates in United States and Scholnick (1996) discovered similar result in Malaysia.

CHAPTER 6

SUMMARY AND CONCLUSION

The study has estimated the impact of the discount rate on various maturity wise deposit rates. We have used time series annual data from 1975 to 2016, which is taken from State bank of Pakistan and Ministry of Finance. The study found stationarity of all concerened variables at their first difference. The Engle and Granger (1987) cointegration technique is applied to estimate long run relationship and result reveals that discount rate is cointegrated to all maturity wise deposit rates used under study. Further, Philips and Loretan (1990) method is applied and result suggests slow and less than complete pass thorough in long run. The longer maturity fixed deposit rates are more sensitive to change in deposit rates as they are mostly held for investment purpose. Our finding suggest that although pass through is slow but longer maturity deposit rates are adjusted slightly more than other rates. The ECM is applied to check mean reverting behavior of pass through and result suggests incomplete pass through in short-run. The dummy variable is introduced to asymmetric ECM to capture speed of adjustment of pass through and result indicates asymmetric pass through to deposit rates. The issue of asymmetric adjustment speed is checked through MAL. The result of MAL suggests upward rigidity of interest rate pass through in case of all maturity wise deposit rates. The asymmetric and incomplete pass through in Pakistan may be due to existence of imperfect competition, adjustment costs, less developed financial markets and political pressure. The findings of our study indicate that time lag is involved in transmission process that reveals limited effectiveness of monetary policy in Pakistan.

REFERENCES

Aziakpono, M. J., & Wilson, M. K. (2010). Interest Rate Pass-Through and Monetary Policy Regimes in South Africa 12.

Ahmad, A. H., Aziz, N., & Rummun, S. (2013). Interest rate pass-through in the UK: has the transmission mechanism changed during the financial crisis?

Bernanke, B. S., & Gertler, M. (1995). *Inside the black box: the credit channel of monetary policy transmission* (No. w5146). National bureau of economic research.

Bernanke, B. S., & Blinder, A. S. (1992).Credit, money, and aggregate demand.

Betancourt, R., Vargas, H., & Rodríguez, N. (2008). Interest rate pass-through in Colombia: a micro-banking perspective. *Cuadernos de economía*, *45*(131), 28-58.

Cottarelli, C., & Kourelis, A. (1994).Financial structure, bank lending rates, and the transmission mechanism of monetary policy. *Staff Papers*, *41*(4), 587-623.

Chong, B. S., Liu, M. H., & Shrestha, K. (2006). Monetary transmission via the administered interest rates channel. *Journal of Banking & Finance*, *30*(5), 1467-1484.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American statistical association*, *74*(366a), 427-431.

Dutta, S., Bergen, M., Levy, D., & Venable, R. (1999). Menu costs, posted prices, and multiproduct retailers. *Journal of Money, Credit, and Banking*, 683-703.

De Bondt, G. (2002). Retail bank interest rate pass-through: new evidence at the euro area level.

De Bondt, G. J. (2005). Interest rate pass-through: empirical results for the Euro Area. *German Economic Review*, *6*(1), 37-78.

De Graeve, F., De Jonghe, O., & Vander Vennet, R. (2007). Competition, transmission and bank pricing policies: Evidence from Belgian loan and deposit markets. *Journal of Banking & Finance*, *31*(1), 259-278.

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. Econometrica: journal of the Econometric Society, 251-276.

Égert, B., Crespo-Cuaresma, J., & Reininger, T. (2007). Interest rate pass-through in central and Eastern Europe: Reborn from ashes merely to pass away?. *Journal of Policy Modeling*, *29*(2), 209-225.

Fazal, S. K., & Salam, M. A. (2013). Interest Rate Pass-Through: Empirical Evidence from Pakistan. *The Lahore Journal of Economics*, *18*(1), 39.

Gidlow, R. M. (1998). Instruments of monetary policy in South Africa. In *SA Financial Sector Forum: http://www. finforum. co. za/ecpolicy/impconts. htm*.

Gropp, R., Kok, C., & Lichtenberger, J. D. (2007).The dynamics of bank spreads and financial structure. *The Quarterly Journal of Finance*, *4*(04), 1450014.

Hannan, T., & Berger, A. (1991). The rigidity of prices: Evidence from the banking industry. *American Economic Review*, *81*(4), 938–945.

Hendry, D. F. (1995). *Dynamic econometrics*. Oxford University Press, Oxford. Hefferman, S. A. (1997). Modelling British interest rate adjustment: An error correction approach. *Economica*, *64*(254), 211-231.

Heinemann, F., & Schüler, M. (2002). Integration benefits on EU retail credit markets—evidence from interest rate pass-through. *The Incomplete European Market for Financial Services*, 105-128.

Hofmann, B. (2003). EMU and the transmission of monetary policy: evidence from business lending rates. *Empirica*, *33*(4), 209-229.

Horváth, B., & Maino, R. (2006). *Monetary transmission mechanisms in Belarus* (Vol. 6). International Monetary Fund.

Hanif, M. N. (2012). Pass-through of SBP policy rate to market interest rates: an empirical investigation.

Hussain, S. Z. (2016). *Do Ownership Structure and Market Power Matter in Interest Rate Pass-through? Evidence from Pakistan's Bank Level Data* (No. 82). State Bank of Pakistan, Research Department.

Ireland, Peter N. 2005. "The Monetary Transmission Mechanism." Federal Reserve Bank of Boston Working Papers No.06

Janjua, M. A. (2005). Money supply, inflation and economic growth: issues in monetary management in Pakistan. *The Lahore Journal of Economics*, 73-105.

Jamilov, R., & Égert, B. (2013). Interest rate pass-through and monetary policy asymmetry: a journey into the caucasian black box

King, M. (1995). The transmission mechanism of monetary policy. *Bank of England, Quarterly Bulletin, August*.

Khan, A. H. (1995). Need and Scope for Further Reforms in the Financial Sector in Pakistan. *Journal of the Institute of Bankers*.

Khawaja, M. I., & Khan, S. (2008). Pass-through of change in policy interest rate to market rates. *The Pakistan Development Review*, 661-674.

Kleimeier, S., & Sander, H. (2005). Expected versus unexpected monetary

policy impulses and interest rate pass-through in Eurozone retail banking. *Journal of Banking and Finance*, *30*, 1839–1870

Khawaja, M. I., & Khan, S. (2008). Pass-through of change in policy interest rate to market rates. *The Pakistan Development Review*, 661-674.

Lim, G. C. (2001). Bank interest rate adjustments: are they asymmetric?. *Economic Record*, *77*(237), 135-147.

Liu, M. H., Margaritis, D., & Tourani-Rad, A. (2008). Monetary policy transparency and pass-through of retail interest rates. *Journal of Banking & Finance*, *32*(4), 501-511.

Meenai, (1984) "Money and Baking in Pakistan" New Edition (1984), Oxford University Press.

Mishkin, F. S. (1995). "Symposium on the Monetary Transmission Mechanism. *The Journal of Economic Perspectives*, *9*(4), 3-10.

Mojon, B. (2000). *Financial structure and the interest rate channel of ECB monetary policy* (Working Paper No. 40). Frankfurt, Germany:European Central Bank.

Mohsin, H. M. (2011). The impact of monetary policy on lending and deposit rates in Pakistan: panel data analysis. *The Lahore Journal of Economics*, *16*, 199.

Neumark, D., & Sharpe, S. A. (1992). Market structure and the nature of price rigidity: evidence from the market for consumer deposits. *The Quarterly Journal of Economics*, *107*(2), 657-680.

Ozdamir, B. K. (2009). Retail bank interest rate pass-through: the Turkish experience. *International Research Journal of Finance and Economics*, *28*, 7-15.

Omer, M., De Haan, J., & Scholtens, B. (2015). An empirical analysis of excess interbank liquidity: a case study of Pakistan. *Applied Economics*, *47*(44), 4754-4776.

Paisley, J. (1994). A model of building society interest rate setting.Phillips, P. C., & Loretan, M. (1991).Estimating long-run economic equilibria. The Review of Economic Studies, 58(3), 407-436.

Qayyum, A., Khan, S., Khawaja, I., & Khalid, A. M. (2005). Interest Rate Pass-through in Pakistan: Evidence from Transfer Function Approach [with Comments]. The Pakistan Development Review, 975-1001.

Qayyum, A. (2008). Does monetary policy play effective role in controlling inflation in Pakistan.

Rousseas, S. (1985). A markup theory of bank loan rates. Journal of Post Keynesian Economics, 8(1), 135-144.

Romer, C. D., & Romer, D. H. (1989). Does monetary policy matter? A new test in the spirit of Friedman and Schwartz. *NBER macroeconomics annual*, *4*, 121-170. Stiglitz, J. and Weiss, A. (1981) 'Credit rationing in markets with imperfect information',

American Economic Review, 71, 393-410.

Scholnick, B. (1996). Asymmetric adjustment of commercial bank interest rates: evidence from Malaysia and Singapore. *Journal of International Money and Finance*, *15*(3), 485-496.

Sander, H., & Kleimeier, S. (2000, October). Asymmetric adjustment of commercial bank interest rates in the euro area: implications for monetary policy. In *University of Groningen's Conference on "Financial Structure, Bank Behaviour, and Monetary Policy in the EMU", Groningen*.

Taylor, John B. 1995. "The Monetary Transmission Process: An Empirical Framework." *The Journal of Economic Perspectives* 9(4): 11–26.

Toolsema, L. A., Sturm, J. E., & Haan, J. (2002). *Convergence of pass-through from money market to lending rates in EMU countries: New evidence*. University of Groningen.

Tieman, A. F. (2004). *Interest rate pass-through in Romania and other central European economies* (No. 4-211). International Monetary Fund.

Wang, K. M., & Thi, T. B. N. (2010). Asymmetric pass-through and risk of interest rate: an empirical exploration of Taiwan and Hong Kong. *Applied Economics*, *42*(5), 659-670.

Zaidi, S. Akbar (2007), "Issues in Pakistan's Economy", Second Edition, Oxford: Oxford University Press.

Appendix:

Relationship between discount rate & FD-over 1year

Relationship between discount rate & FD-over2Y

Relationship between discount rate & FD-over3Y

Relationship between discount rate and FD-up to 6M

Relationship between discount rate & FD-over 6M