NON-LINEARITIES IN INTEREST RATE PASS THROUGH:

EVIDENCE FROM PAKISTAN

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Abstract

This study examines the asymmetry of interest rate pass through between wholesale (KIBOR) and retail interest rates (deposit and lending rate), by using the asymmetric threshold co-integration proposed by Enders & Sikles (2001) and EC-EGARCH-M model proposed by Wong & Lee (2009) in case of Pakistan. In addition we also investigate volatility in interest rate. We find incomplete pass through among wholesale and retail interest rate. Threshold co-integration test result shows that then asymmetric co-integration relation exits in both the models i.e. deposit and lending interest rate model. There is upward adjustment in EC-EGARCH-M model and we found that there is downward rigidity in the adjustment parameters for the retail interest rate.

Acknowledgment

Interdependence is a higher value than independence.

I came up to this level to become a scholar with the help and support of my parents, teachers, friends, and colleagues.

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Dedicated to my beloved

Parents

Whose prayers for me, were what sustained me thus far

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INTRODUCTION

The interest rate pass through mechanism is one of the crucial gateways for the central bank to achieve the goals of monetary policy. Central bank can manage the retail interest rate[1] through their control of money market rate[2]. Therefore, it is fair to say that the monetary policy affects outcome of the banks, financial institutions and the interest rate's markets behavior. The success of the monetary policy can be measure by the margin and the speed of the interest rate pass through in the money market rate to the retail interest rate (Bredin et al. 2001 and Bondt 2005). In industrialized countries, central bank uses a number of channels to implement the monetary policy (Fuertes and Heffernan 2009). One of the important tools is that central bank can change money market rate to achieve inflation targets. However, this tool of the monetary policy successfully control the future expenditure and the inflation rate.

During different stages of business cycles, whenever central bank change the monetary policy, money market rate will be affected. In this process, the commercial banks would transfer costs to their consumer resulting from the change in monetary policy. This process of transferring cost is called interest rate pass through. There are three different possibilities of the interest rate pass through. Firstly, if the commercial banks are able to completely transfer their costs to their consumers than pass through will be complete. But due to the profit maximization behavior of the financial institutions, most of the time the commercial banks are unable to transfer their complete cost, rather they could only transfer some part of the total cost, immediately; this process is incomplete pass through. There is also possibility of over pass through, when

[1] Deposit rate and Lending rate
[2] In case of Pakistan it is KIBOR

commercial banks transfer more than the total cost to their consumer, the ratio of the pass through is greater than one; which is only possible due to monopoly power. In general, no matter what kind of pass through it is; there will be a long run relationship between different kind of interest rates and this relationship ensures the efficiency of the monetary policy.

The speed, margin, markup and markdown ratios are different measure of the pass through. Economic policies and regulations of an economy affect the parameters of pass through badly. Whenever, the interest rate is out of the long run and in the short run adjustment progression, then parameters would vary. This variation in the parameters will leads to asymmetric pass through. In simple, information about market disequilibrium leads to an imperfect pass through.

Mainly, there are two explanations for asymmetric pass through hypothesis; the consumer behavior hypothesis and the bank concentration hypothesis (Karagiannis et al. 2010). Consumer behavior hypothesis is related the degree of the consumer complexity. It is difficult for the banks to exercise the market power against the complex consumer. Complex consumers are being rigid to the downward adjustment in the deposit rate and upwards adjustment in the lending rate. Consumer behavior hypothesis will leads to the financial market to operate in highly competitive environment. Contrary, there is bank concentration hypothesis, which is about the utilization of market power against consumer for their profit, due to more concentration of banks. Banks with the more concentration are more likely to reduce the deposit rate and boost the lending rate. Under this hypothesis deposit rates is rigid in upward adjustment and the lending rates are rigid to downwards adjustment.

The study of interest rate is important in an economy, because it directly affect the behavior of customers, which ultimate determines the future economic growth through investment channel

and the success of monetary policy. It is important to study because financial variable shows volatility in them, which cannot be easily captured by linear co-integration model. By using high data frequency i.e. monthly will gives us more consistent and efficient results. During the monetary policy transmission, adjustment of monetary policy can also be observed from the fluctuation in interest rate (Manna et al. 2001). It is important to estimate of interest rate pass through because competition among banks makes the financial market information asymmetry and this will generate more volatility in the retail interest rate. As a result of this government's policies are instable and investor's predictions keep on changing about investment. All these factors add up to produce asymmetric adjustment towards the long run path. Most of the literature specifically regarding Pakistan focuses the long run relationship among wholesale and retail rates, but short run equilibrium remains ignored topic. In this study, we have fulfilled this gap by using better technique of estimation of non-linear model i.e. GARCH models, to study the short run adjustment of the interest rate and along with the effect of the interest rate volatility.

Most of the previous studies on this topic use the linear models to estimate the interest rate pass through. The central bank cannot effectively utilize the monetary policy by estimating linear model, under the presence of non-linearity mechanism. Hence, the linear models are biased to the existence of the asymmetric interest rate pass through. In addition, the traditional linear co-integration and error correction mechanism does not encounter the short run asymmetric adjustment, so the estimated results tend to reject the pass through system among the interest rates. Moreover, the risk due to fluctuations of interest rate is getting higher as the financial market. Traditional linear error correction model ignores the effect from the interest rate volatility so the model may not be able to correctly explain the adjustment process of the interest rate in the short run.

In the recent time series literature, an important development has been made by the examination of nonlinear models. Most of the financial data show volatility in it.[3] Volatility due to financial market information would affect the conditional variance (Engle et al. 1990). Nelson (1991) argues that market information affects the conditional variances and this affection varies from information to information and to capture asymmetric adjustment margins effect he set up an EGARCH model. Engle and Ng (1993) recommends standard method to how news information is incorporated into volatility estimates. Lee (1994) set up EC-GARCH model by putting up error correction term in the GARCH model. Empirical results in Enders and Granger (1998) show that the asymmetric error correction model could explain the long run equilibrium.

In the literature on this topic, most of the studies' have center of attention is the industrial or develop countries to discuss the rigidity. Few studies put their attention on Asian countries. There are keep ongoing adjustments in the Asian financial markets (Wong and lee 2009).

In the line of above issue we set up the following objectives; the first the main objective of the study is to check the existence of asymmetry of interest rate pass through. In case of Pakistan short run estimation was ignored so our second objective is to check the short run speed and margin of interest rate pass through along with the long run. Any change in retail interest rate by changing monetary policy will exert a force as a type of external shock. These shocks are similar to the good and bad news in the economy, so one of the objectives is to check this effect, either the change in the monetary policy have good effect on the retail interest rates or bad, along with their direction of rigidity after the change in the monetary policy.

As number of problems mention above associated with the linear model, whenever they deal with the asymmetric, for this reason we utilize the Error-Correction EGARCH in Mean (EC-

[3] Applied Econometrics by Dimirios Asteriou and Stephen G. Hall, Palgrave macmillan, (2011)

EGARCH-M) model (Wong and lee 2009). To examine the interest rate pass through from the KIBOR to the deposit and lending rate and the also about the existence of the asymmetry of this system, we firstly use the non-linear threshold auto regression (TAR) model and the momentum threshold auto regression (MTAR) model suggested by Enders and Siklos (2001). Secondly, we add the error correction term in the mean equation of GARCH models to check the volatility of the interest rate.

In the first chapter, topic of interest rate pass through is discussed. The second chapter is based on literature review, which is further divided into subsection based upon different theories of interest rate pass through. And at the end the literature review specifically regarding Pakistan is given. In the third chapter we discuss the data and methodology for the empirical results. Chapter four having an empirical result of the study fifth is the final chapter concludes the study.

Chapter 2.

LITERATURE REVIEW

All the theories of monetary policy transmission system have a common point in them i.e. "how interest rate changes affect the real economy". Real effect is only possible when there is any nominal rigidities exist such as: wage rigidity, imperfect competition, price stickiness, inflation persistence etc. There will be no change in the real interest rate if we change any nominal quantity of outside money. It is the ability of the central bank to change in the level of reserve with commercial banks through monetary policy but it is not an important question. Rather nominal rigidities in the way of banks that restrict banks to change the level of retail interest rate to return are important.

Funds with the commercial banks, which are available for the investment, have prices and that prices are known as interest rate: consequently, the interest rate should be determined by the financial market forces i.e. demand and supply forces. Efficiency of the monetary policy and the predictions about the real business cycles can be analyzed by using the interest rate (Bernanke 1990). This relationship between interest rates would impact the level of investment in economy and other economic activities. Since the money market rates produce fluctuation in retail interest rates; there changes would cause structures adjustments of interest rates.

The ability to conduct monetary policy smoothly depends upon the frame work and the nominal rigidities in the economy (Ramaswamy and Slok 1998). Euro countries fall into two major groups, where contractionary monetary shock based results are different; roughly it takes two

times decline in output but this decline is approximately two times as deep in first group[4] of Euro countries as in the other group.[5] Romania's monetary policy result in lower effectiveness, because policy rate changes quite fast and in most cases almost one-to-one and complete interest rate pass through (Tieman 2004).

2.1.Traditional monetary view and interest rate pass through:

Traditional monetary view is based on the assumption that any reductions in the quantity of money from commercial banks through open market operation will raise in interest rate. It has two sound effects, firstly through exchange rate and secondly is from investment channel. An increase in interest rate will result in lower investment because at higher lending rate most of the project goes unfunded. In exchange rate channel, any appreciation of domestic currency with an increase in interest rate, as a result of this price of domestic goods increases and the foreign demand will reduce for domestically produced goods.

There is almost complete pass through, for industrial and developing countries (Cottarelli and Kourelis 1994). The start of European monetary union implies a regime shift (Toolsema et al. 2002). Lending rate show overshooting in year 2000 (period of sizable hikes), in the reaction of the strong tight monetary policy, lending rate showed overshooting to have a limited effect. Thus it will result in decline of real capital investment (Cuaresmaet *al.* 2004).

Mojon and Peersman (2001) confirm that monetary policy has real effects in euro areas. A contractionary monetary policy exert a negative shock on an economy, this shock reduce output and reach almost at its peak after the four periods of shock and along with it there is a gradual

[4]Austria, Belgium, Finland, Netherlands, Germany, and the United Kingdom
[5]Denmark, France, Portugal,Italy, Sweden and Spain

decrease in prices level (Peersman and Smets 2001). Leuvensteijn et al. (2008) competitive financial market leads to increase the welfare of household and enterprises through lending rate channel.

2.2.Traditional lending view and asymmetric interest rate pass through:

The lending view based upon two parts, one that analyzes the impact of policy changes on customer balance sheets and the second one focuses on bank loans. In both the lending views the effectiveness of the monetary policy can be measure by the capital market perfections. In the capital market perfections it is equally access by all firm for financing and vice versa. There is an asymmetry in the information between banks and customers because customer has more information about their own projects under investment, especially about profitability and risk ratios. As a result of this, when they follow banks for financing about project, they misrepresent bank about the potential profitability or riskiness of the projects. Thus, new investment projects became more profitable through external financing when there is asymmetry of information in the market. More important for the pass through is that for financing the profitable project firm depends upon banks and this level of dependence is affected by monetary policy.

Gertler and Gilchrist (1993) monetary policy cannot directly control the flow of bank credit. They suggest two complementary ways in which credit market imperfections may be relevant to the monetary transmission mechanism i.e. Credit market imperfections and same class of borrowers. Both approaches predict that the first round effect of monetary policy should impact more on small borrowers, while the latter predicts that the same should hold for the second round effect as well, everything else remains same, since the overall decline in economic activity should force credit constrained small borrowers to contract more sharply.

Gambacorta (2001) practically to handle with credit market, tight of monetary policy is preferable. Size of bank is very important to absorb the shock of monetary policy. Large banks have larger share of the long term deposit which enable the banks to change their lending rate more independently after the change in monetary policy (Weth and Mark 2002). The size of the bank does not matter, how commercial bank adjust their retail rates (Ehrmann et al. 2002).

The problem of maturity mismatch arises when retail rates have longer maturity than wholesale rates (Mojon 2000). The ratio of the pass through is half at the timing of impact stage, while the rate of pass through increase in long run this is because of maturity mismatches problem (Bondt 2002). Maturity mismatch leads to sluggishness in the retail rates (Bondt et al. 2005). Aziakpono and Wilson (2010) it is built in nature that banks adjust their deposit rate downwards and lending rates rigidity upward adjustment with the change of monetary policy.

2.3.Nominal Stickiness and monetary policy:

Christiano et al. (1997) differentiate between three types of monetary policy theories, first one depends upon sticky wages, the second one depends upon sticky prices and the third one is based upon the idea of limited participation. Sticky wage and prices theories are most famous and the basic idea is that some normal cost is attached with the change in prices and wages for this reason adjustment is uncommon.

2.3.1. Sticky Wage , Sticky Prices and interest rate pass through:

Like price and wage contracts, most of the banks apply this contract method on the long term loans. Any change in the monetary policy will affect the lending rate and there by the behavior of firm. If some proportions of banks immediately react to the change in monetary policy then the policy change will not affect the whole economy equally (Kobayashi 2007).

2.3.2. Limited Participation and interest rate pass through:

Limited participation model is introduced by Rotemberg (1984), households are somewhat restricted to change their cash balances immediately as financial surroundings. In other words the ratio of participation in the financial market of households in very limited, because they have limited cash balances because of limited portfolio for the long term investment.

Role of information about monetary policy is of great importance in the financial markets. Evidence shows that a significant number of deviations from normal behavior can be identified during the immediate after the implementation of monetary policy and banks learn it quickly and adjust in new environment (Gaspar et al. 2001). Significant difference in the pricing behavior of corporate instruments and household, because of limited participation of the household (Horvath et al. 2004).

Heinemann et al. (2002) asymmetry information in the pass through leads to incomplete pass through, and this incomplete pass through become costly for bank customers. Those losses which were incurred due to the asymmetry cannot be not totally compensated by equally sized benefits at the timing of rise in interest rates. An increase in bank lending rate makes the borrower to pay more (Mojon 2000). In the developing countries the habit of individuals is of low saving ratio, it can be improve by increasing deposit rate. Otherwise lowering the compensation rate for their deposit may worsen more the low habit of saving by individual as whole (Aziakpono and Wilson 2010).

2.4.Balance Sheet Effect & Number of Bank Dependent Firms and interest rate pass through:

Kashyap and Stein (1997) focus on two types of banks. The first type of the banks relay on receivable deposit for funding and for this reason when central bank reduce money supply then

these banks ultimately contract their balance sheet by reducing the supply of loans. In the second type of the banks it directly depends upon the firms, especially those firms which are unable to reduce the supply of bank lending with any other source.

If the firms are more back depended by the banks then the pass through will be stronger. Firm are unable to resolve problems, firstly; as firms have no or less direct access to capital markets, thus firm have a limit to direct effect on the contraction of bank loans. Secondly, when central banks increase the required reserves then commercial banks are forced to shorten their balance sheets by decreasing the amount of lending.

Heterogeneities across financial institutions speed up the pass through ratio. The pass through of deposit rates is also found to be greater than that of mortgages, thus it implies the existence of a balance sheet effect. Pass through is spread out and mostly incomplete where the financial institution diverge extensively in the nature and behavior of their responses (Fuertes and Heffernan 2009).

2.5.The non-linear adjustment of the retail interest rate:

Many studies consider that the asymmetric in the retail interest rates leads to inflexibility in the retail interest rates. Pass through to the lending rate is mostly dominated by the behaviors of commercial banks and thus the behavior analyzes the ratio of pass through. According to Lim (2001) one should keep in mind while dealing with pass though, What is the essential relationship among retail and money market rate? What is the speed and margin of these rates? More importantly, are the speeds and sizes of the adjustments asymmetric to a tightening and loosening of policy? And are these asymmetric effects temporary or permanents in nature?

Toolsema et al. (2002) one has to try the following questions: Why retail rate face rigidity when they are in phase of adjustment? Which type of relationship exists between inflexibility, monetary policy and financial organization? Fuertes and Heffernan (2009), Why retail interest rate responses might be rigidity? Collusion or contest between financial institutions, menu costs due to change in monetary policy and forceful price discrimination that relies on consumer habit will result in rigidity in retail interest rates.

Greater downward rigidity in the more typical case in which prices are paid to the firm, rather than by the firm, and contrasts with the finding of no asymmetry recently reported (Carlton 1986). The direction of the rigidity and magnitude of the margin of the adjustments depends on the existence of adjustment rigidity (Bernanke 1990). The degree of rigidity vary from county to countries, Cottarelli and Kourelis (1994) identify three structural features that can increase the ratio of the pass though; non-attendance of controls on capital mobility, suppression of random movements in money market rate, and private ownership of the banking system. Espinosa and Rebucci (2003) observe in his empirical study that incomplete pass through in the long run in Chili because Chilean interest rates are more unstable and less determined. Evidence of volatility is corruption across markets and international correlation increases in periods of high market volatility (Solnik et al. 1996).The rate at which central bank is change in monetary policy implies that stability of the government policies and thus it leads to the volatility or stability for the future path of these rates. Bank concentration arrangements and adverse customer reaction give rise to asymmetric adjustments of deposit and lending rates (Neumark and Sharpe 1992). Price rigidity in the financial markets can be explained by; the agency costs theory; the adjustment costs theory; the switching costs theory; and the risk sharing theory. However, the interest rate rigidity depends on the level of concentration and integration of the financial market along with

it the temporary and permanent changing nature of wholesale interest rate change (Lowe and Rohling 1992).

2.5.1. The asymmetric adjustment in interest rate due to menu cost:

With the change in the monetary policy, the deposit rate will changed only if the profit margin from the change in monetary policy seems to be superior to the cost concerned in altering the deposit rates (Hanan and Berger 1991). Even small change in menu costs incurred in rescheduling retail interest rates could lead to slow adjustment in prices. If commercial banks are not changing their retail rates due to change in monetary policy the banks implicitly provided insurance to their customers (Mojon 2000). Kobayashi (2007) interest rate stickiness arises from; by the time taken and the decision to how much to transfer cost to customer by the banks and the presence of overlapping multi period contracts. Because of the existence of a highly keeping pace or less competitive financial market; menu costs in changing loan rates is cost for banks and for customer's costs of changing banks, etc.

2.5.2. The asymmetric adjustment and integration

The subject of the interest rate pass through has fascinated lots of special treatment in the literature especially after the amalgamation of the currencies in the European countries, because with the introduction of the euro has given a motivation to competitive forces (Bondt 2002). The monetary policies and financial reforms, those promote free market ideology and leads to completions between the financial institutions. A transparent monetary policy will tend to speed up the adjustment in the retail interest rates then the restrictive policies of central bank (Aziakpono and Wilson 2010).

Heinemann et al. (2002) integration is costly for bank customers, because of the asymmetry of the pass through these losses are not rewarded by equally sized reimbursement in times of rising interest rates. Competition among banks also seems to quicken the pass through (Mojon2000). Sander and Kleimeier (2004) observe that competition among banks, integration in banking market, an unwavering monetary policy, a more homogeneous growth performance etc. are the important variables for homogenizing the pass through and thus efficiency of monetary policy.

2.6.The short run adjustment term and the asymmetric instability of the interest rate:

In the recent time series literature, an important development has been made by the examination of nonlinear adjustment mechanisms. Most of the financial data and macroeconomic variables show volatility in it, such as interest rate, GDP, unemployment, and industrial production display asymmetric adjustment over the course of the business cycle.

Researcher found cluster feature in the financial market due to the price fluctuation in financial assets. Volatility due to market information would affect the conditional variance of the price (Engle et al. 1990). Nelson (1991) argues that market information affects the conditional variances and this affection varies from information to information and to capture asymmetric adjustment margins effect he set up an EGARCH model. Traditionally, the EGARCH model is used to explain the cluster phenomena of the fluctuations of the stock price. Engle and Ng (1993) recommends a standard measure to how news information can be incorporated in to the volatility estimates. In order to better estimate and match news information impact curves to the data, several new candidates for modeling time varying volatility are introduced and contrasted. These models allow several types of asymmetry in the impact of news information on volatility. Observed results in Enders and Granger (1998) show that the asymmetric error correction model

could explain the long run equilibrium relation between the U.S, long and short term interest rates.

Officially, the idea of asymmetric margin's adjustments with the co-integration technique projected by Enders and Siklos (2001), which is an additional room of the Engle-Granger approach. Their findings are not sensitive, with various model specifications which are under consideration of their study and but their empirical results are consistence with Enders and Siklos (2001) for the US term structure. Horvath et al. (2004) use threshold ECM models to examine the possible asymmetry of banks' pricing behavior. It is found that there is downward rigidity in the corporate loan rates, a healthy competition in the corporate loan sector could not fully offset balance this downward rigidity in the interest rates and individuals deposit rates regulate more quickly to upward than to downward shifts due to the limited participation.

Engle and Yoo (1987) and lee (1994) argue that the error-correction term is a critical factor to explain the conditional mean of the co-integration variables. Lee (1994) puts the error-correction term in the GARCH model and establishes the EC-GARCH model. In this thesis, we use the model expanded by Wong and Lee (2009), this model is developed by adding the error-correction term in the mean equation to construct the Error-correction EGARCH in Mean model.

2.7.Interest rate-pass through in case of Pakistan:

Qayyum et al. (2005) analysis depends up the traditional view; if there is any change in interest rate it will affect the cost of capital. Thus any change in cost of capital affects the level of investment and thus the level of real prices and income. They found complete pass through immediately after the change in the monetary policy. However the ratio of pass through from Treasury bill rate to retail rates is much longer, this is due to the rigidity in the financial market.

These rigidities of the deposit and lending rate could be menu costs involved in changing the rates and oligopolistic structure of the banking sector.

Asymmetry pass through among various bank and the overall efficiency of monetary policy is limited and there are significant lags are required to complete in the process (Mohsin 2011, and Fazal and Salam 2013). Fazal and Salam (2013) observe that there is higher ratio of the pass through to lending and the lower ratio of the pass through to the deposit rate both lead to a higher interest rate margin. Thus it leads to reduce the efficiency of the monetary policy and hence lower banking competition.

Literature on this topic, most researches focus on the U.S. or European Union or industrial or develop countries to talk about the sluggishness or slow adjustment in the retail interest rate. There is few literature found that put their attention on Asian countries. Wong and lee (2009) there is keep ongoing adjustments or convergence in the Asian financial markets. Different economic system are established in different Asian countries, thus, central banks in Asia adopt different type of monetary policies, thus lead to different type of adjustment of retail interest rates. In case of Pakistan I found only few studies in literature i.e. Qayyum et al. (2005), Mohsin (2011) and Fazal and Salam (2013). Our study is important because, financial data like interest rate is non-linear in its behavior, so co-integration technique is not appropriate for proper results. The data frequency is low, thus using monthly data will gave more consistent and efficient results.

It is important to estimate the interest rate pass through because, the switching cost theory, agency cost theory, adjustment cost theory, risk sharing theory, competition or collusion between commercial banks make the information of the financial market asymmetry and this will generate more volatility in the retail interest rate. As a result of this government keep on

changing his policy (instability in policies) and investors predictions keep on changing about the business conditions. All these factors add up to produce asymmetry adjustment towards the long run path of the retail interest rates. We can also infer from this that there exists the asymmetric long run equilibrium among the wholesale and retail rates. In the literature specifically regarding Pakistan focuses the long run relationship among wholesale and retail rates, but short run equilibrium remains ignored topic. In this study, we have fulfilled this gap by using better technique of estimation of nonlinear model i.e. GARCH models, to studying the short run dynamic adjustment process of the interest rate and along with the effect of the interest rate instability.

Chapter 3.

DATA AND METHODOLOGY

3.1.The data:

Monthly data of Pakistan has been used; to examine the long run relationship along with short run speed of adjustment of interest rate pass through mechanisms running through the money market rate and the retail interest rate. The variables employed for the purpose of estimation are the deposit interest rate, the lending rate (retail interest rates) and the KIBOR (wholesale rate). Deposit and lending rates are weighted averages. Data for the entire three variables are taken from State Bank of Pakistan (SBP). The sample period of the data is January 2004 to December 2013.

KIBOR stands for "Karachi inter-bank offer rate", "which is used by bank in order to lend the many with each other's and with their customers. This is the minimum interest rate (inflation adjusted) which the banks have to change form their customer". Deposit interest rate is "the rate which is paid by financial institutions to deposit account holders". Lending interest rate is "the bank rate that usually meets the short- and medium-term financing needs of the private sector".

3.2. The Methodology:

Most studies in the relevant field applied the symmetric co-integration test i.e. the Engle and Granger (1987) co-integration test, to inspect the presence of the interest rate pass through and frequently found no evidence of interest rate pass through. For instance, in case of Pakistan Qayyum et al. (2005) apply auto-regressive distributed lag (ARDL) technique for the purpose mentioned above, by using semiannual data. Generally speaking, linear estimation model

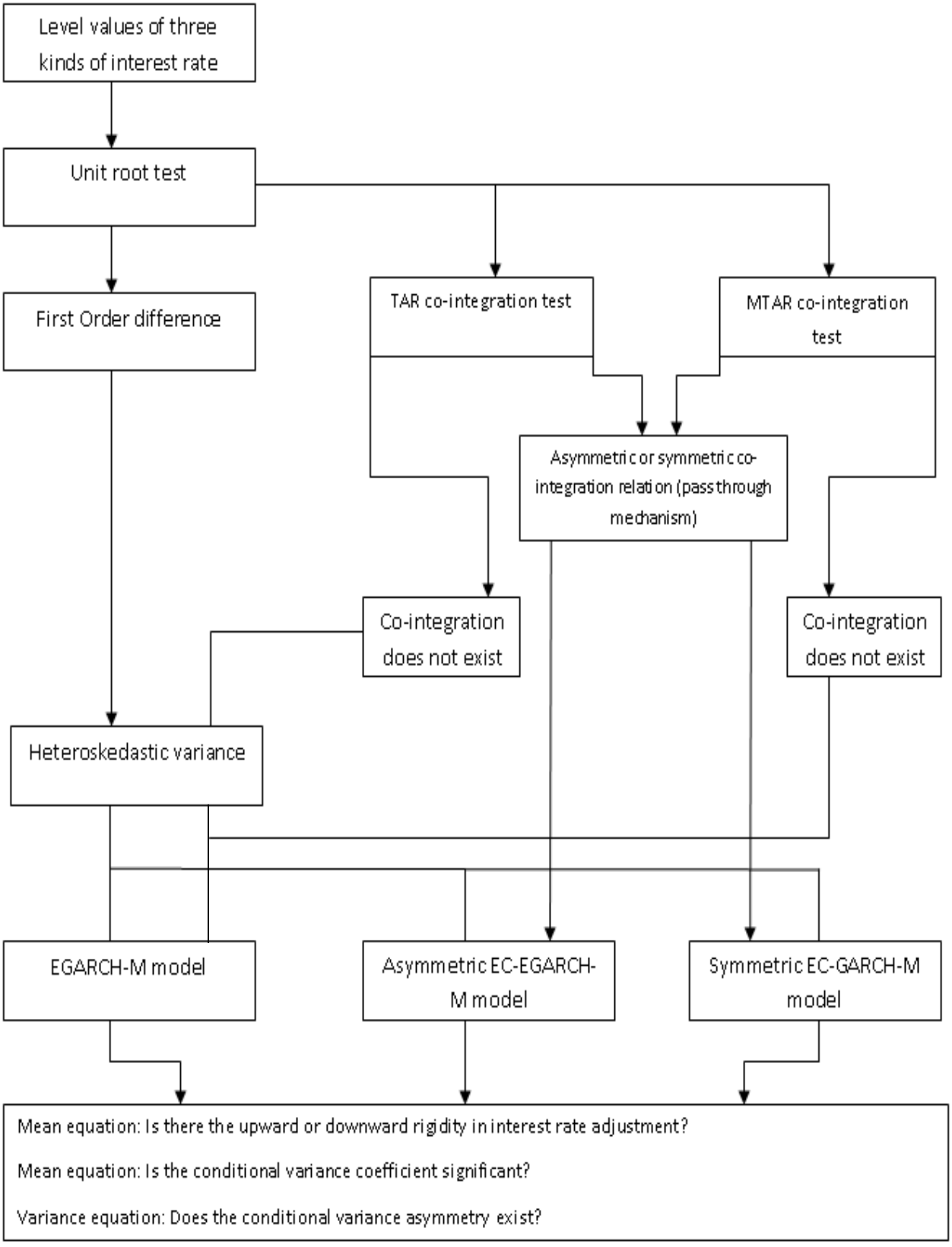
undergo from the lack of asymmetric long run relationship. Thus results obtained from linear models might be biased and give wrong prediction or direction. For this reason we apply nonlinear model to examine the presence of the asymmetric pass through in a simple way.

There are three main steps involves in our experimental study. In the first step, we verify either a long run relationship exist or not between the KIBOR and the retail interest rates. Second step is to check the asymmetries in the interest rate pass through. Third, after the confirmation of long run relationship we then move to get the information about short run adjustment process. We summarize our empirical study steps in figure 1.

3.2.1. Threshold co-integration test:

One of the basic assumptions of OLS estimator, to be consistent, is that data should be stationary. It is the basic requirement of the time series analysis is to confirm about level of stationarity of whole data set. If all variable are I(0) (variable is stationary at level) then we simply apply OLS. In the presence of non-stationary, the results from classical regression analysis become invalid, so we need to resort to stationary. Non-stationary series used in regressions ultimately lead to 'spurious' regressions. When each variable is stationary at first difference i.e. I(1) and at least one long run relationship which is stationary exists, then co-integration relation among the variables under study exists. The Engel and Granger (1987) test is used for the analysis of the linear co-integration relation. However, the financial data like interest rate may exhibit is showing asymmetric volatility in it. Enders and Siklos (2001) put forward that co-integration relation may not result in symmetry and suggest a test for the inspection of the asymmetric co-integration relationship. In the present study, we take up the TAR model and

Flow Chart for Empirical Findings



MTAR model as recommended by Enders and Siklos (2001) to test for the asymmetry in long run co-integration relationship.

Suppose the ranks of variable $(y_{1t}, y_{2t}, y_{3t}, \ldots y_{nt})$and all variables under study are I(1). In accordance with the assumptions of Engle and Granger (1987) co-integration test, the variables show a long run relationship of the form:

$$Y_{1t} = \beta_0 + \beta_1 y_{1t} + \beta_2 y_{2t} \ \ldots + \beta_n y_{nt} + e_t, \qquad (1)$$

Where β_{i} are the parameters whose values are to be estimated, e_t represents the error term, whereif e_t error term is stationary at level i.e. I(0), it will imply long run relationship or co-integration between variables. To verify existence of the co-integration relationship, we apply unit root test to every equation:

$$\Delta e_t = \rho e_{t-1} + lags + \varepsilon_t \qquad (2)$$

Where $\varepsilon_t$is a white noise process, when -2< ρ<0, a linear long run relationship is in equilibrium. In the linear or symmetric model, no matter $e_{t-1}$is positive or negative, the changes of the value of e_t equals ρtimese_{t-1}. However, asymmetry in long run equilibrium relationship causes the problem of misspecification in eq. (1). Enders and Granger (1998) and Enders and Siklos (2001) presume that the positive and negative shocks from the error in the long run cause asymmetric adjustments. For this reason, we employ the TAR model for inspection of any presence of the asymmetry in long run equilibrium relationship. Our model is as follows:

$$\Delta e_t = I_t \rho_1 e_{t-1} \ + \ (1 - I_t)\rho_2 e_{t-1} + \varepsilon_t \qquad (3)$$

Where I_t represents an indicator variable, specified of the form

$$I_t = \{1 \text{ if } e_{t-1} \geq \tau \quad \text{or} \quad I_t = \{0 \text{ if } e_{t-1} < \tau \tag{4}$$

Eq (4) says that $\tau$is threshold, when e_{t-1} is greater or equal to τ (threshold value), the ρ_1 is the adjustment parameter and $\rho_1 e_{t-1}$represents the adjustment margin. However, when $\tau$is greater thane_{t-1}, the adjustment parameter and the adjustment margin areρ_2 and$\rho_2 e_{t-1}$respectively.

True characteristics of the nonlinear model are still unknown, therefore, Enders and Siklos (2001) assume that Δe_{t-1}, the first orderdifferenced value ofe_{t-1}, could represent themomentum of the interest rate adjustment and reveal the asymmetric adjustment of the interest rate. This asymmetric TAR model is called momentum TAR (MTAR) model and is specified as follows:

$$\Delta e_t = M_t \rho_1 e_{t-1} + (1 - M_t)\rho_2 e_{t-1} + \varepsilon_t \tag{5}$$

Where $M_t$is the indicator variable and is defined as

$$M_t = \{1 \text{ if } \Delta e_{t-1} \geq \tau \quad \text{or} \quad M_t = \{0 \text{ if } \Delta e_{t-1} < \tau \tag{6}$$

Eq (6) states that $\tau$is threshold, wheneverΔe_{t-1}becomes greater or equal to τ (threshold value), the ρ_1 is the adjustment parameter and $\rho_1 e_{t-1}$represents the adjustment margin. However, when τ is greater thane_{t-1}, the adjustment parameter and the adjustment margin areρ_2 and$\rho_2 e_{t-1}$respectively. Alongside this, if autocorrelation also exists in equation (3) and equation (5), then the revised form ofTAR and MATR models is used, which is as follows:

$$\Delta e_t = I_t \rho_1 e_{t-1} + (1 - I_t)\rho_2 e_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta e_{t-1} + \varepsilon_t \tag{7}$$

$$\Delta e_t = M_t \rho_1 e_{t-1} + (1 - M_t)\rho_2 e_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta e_{t-1} + \varepsilon_t \tag{8}$$

$-2<(\rho_1, \rho_2)<0$ is the sufficient condition for the error term series (e_t) to be stationary and then it does not depend that which model Eq.(7) or Eq.(8) is chosen. The OLS estimators of ρ_1 and

$\rho_2$are consistent estimators according to F distribution only when e_t is stationary and has a known value of the threshold.

Enders and Siklos (2001) have used the F statistic for the examination of the asymmetric co-integration relationship. Null hypothesis is ρ_1=ρ_2=0 and if it gets rejected, it indicates existence of co-integration relationship. The presence of symmetric adjustment process could be tested with the null hypothesis specified as ρ_1=ρ_2. If this null hypothesis does not get rejected in symmetric adjustment, then this implies the presence of symmetric long run relationship as suggested by Engel& Granger. If, however, the null hypothesis (ρ_1=ρ_2) gets rejected, this will give the confirmation about the asymmetric long run co-integrating relationship between the interest structures.

Moreover, to find threshold value τ Chan (1993) recommended a method of the TAR and MTAR models, we take advantage of it. We use $\{y^j\}$ to represent the series, j=1,…,T. we organize the elements of the series $\{y^j\}$ in such a way that y^1<y^2<…<y^T. For each y^j, allocation is τ=y^j. We use 70% observations which remain in the middle and dispose 15% observations from both extreme ends. Thus, we can make a guarantee to our self that the observations used for the estimation of the threshold value are proper and suitable. Afterwards, we estimate our model with OLS again and again taking each value of $\tau$and utilize thegrid search method to search for the minimum of all the sum of squared errors from the OLS estimations. The threshold value for which the sum of squared error is minimum is the optimum value of the threshold. Then we use optimum threshold value along with the indicator variables for the co-integration test. The critical values are as provided by Enders and Siklos (2001).

If long run co-integration relationship is found between the interest rates, the next step is construction of the error correction mechanism to inspect the short run dynamic for a better result from estimation. On the other side, if it's found there is problem of heteroskedastic variance in data set, and then the traditional error-correction mechanism may go ahead to bias the result of estimation. However, to correct heteroskedastic variance problem we apply GARCH model with error correction.

3.2.2. Introduction of error correction term in EGARCH-M model:

This subsection systematically illustrates the EC-EGARCH-M model. The model is set in such a way that we first establish a long run relation of the retail interest rate with the money market rate:

$$R_t = d_0 + d_1 MI_t + e_t \quad (9)$$

Where $R_t$the retail is rates,MI_t stands for the KIBOR: e_t is the error term for the long run. Parameter d_0 denotes the fixed margin upon retail interest rate, parameter d_1 stands to show the speed of pass through, value of $d_1$varies from 0 to 1. When d_1<1it indicates the incomplete pass through, d_1=1indicates the pass through is complete and d_1> 1 indicates the pass through is larger.

According to eq. (9) whenever co-integration exists and there is asymmetric adjustment, the residual from the error correction model does not comes to be white noise in the error-correction model, we construct the asymmetric EC-EGARCH-M model:

$$\Delta R_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \, \Delta R_{t-1} + \sum_{j=1}^{q} b_j \, \Delta r_{t-1} + m\Delta MI_t + s\sqrt{\sigma_t^2} + \eta_1 M_t \hat{e}_{t-1} + \eta_2 (1 - M_t)\hat{e}_{t-1} +$$

$$v_t v_t \,|\, \Omega_{t-1} \frown N\,(0, \sigma_t^2) \quad (10)$$

$$\log(\sigma_t^2) = \omega + \alpha \left| \frac{v_{t-1}}{\Omega_{t-1}} \right| + \gamma \frac{v_{t-1}}{\Omega_{t-1}} + \beta \log(\sigma_{t-1}^2) \quad (11)$$

Eq. (10) represents the equation of conditional mean of GARCH model. For correction of autocorrelation problem, ARMA model is introduced. In addition, we specify the mean equation by adding the time varying standard deviation $\sqrt{\sigma_t^2}$ to check the effects that interest rate volatility have on the interest rate. Where σ_t^2 is the conditional variance of v_t. Hence, when parameter is significantly statistically and negative will implies that volatility in interest rate can reduce the fluctuation in the interest rate margin spread. And if the parameter is significantly statistically and positive, it shows that the volatility of the interest rate would boost the fluctuation margin of the interest rate. Parameter η_1 and η_2 in Eq. (10) are the adjustment speeds, in addition $\eta_1$is the speed of adjustment of positive error correction and η_2 is of negative error correction term. $\hat{e}_{t-1}$is the error correction term which shows long run equilibrium error value in the earlier period. Whenever the parameter of adjustment speed is positive, the retail interest rate has a larger value with the long run equilibrium error, alongside this, whenever the parameter of adjustment speed is negative, the retail interest rate moves to a smaller value with the long run equilibrium errors. Eq. (11) represents the equation for the conditional variance. If γ is significant statistically and not equal to zero, then the asymmetric effect is present in the conditional variance. If γ is significant statistically and less than zero then leverage effect is found to be present in the conditional variance.

Eq. (10) is used for the inspection of the adjustment rigidity in the retail rate. By comparing $\Delta\hat{e}_{it-1}$with$\hat{\tau}$, we can check either the adjustment rigidity of deposit and lending is reduce or increase. If $\Delta\hat{e}_{it-1} \geq \hat{\tau}$ then it implies that after any change in monetary policy will ultimately adjust rate of money market. Thus, changes in deposit and lending rate are greater

than the change in the long run error term in money market rates. Therefore, the adjustment in the margin spread must be reducing of the deposit and lending rates. When $\Delta\hat{e}_{it-1} < \hat{\tau}$, this illustrates that the long run error of the money market rate shows more change than the retail interest rate, so the adjustment margins on the retail interest rates needs to be enlarged. We put the terms $M_{it}\hat{e}_{it-1}$ and $(1 - M_{it})\hat{e}_{it-1}$, in the error correction, which results in a suitable size of adjustment in the margin of retail rates. Parameter η_1 and η_2 in Eq. (10) showsthe speed of adjustment, in addition $\eta_1$is the speed of adjustment of positive error correction and η_2 is of negative error correction term. If equality does not hold between η_1 and $\eta_2$it implies adjustment rigidity exists in retail interest rates. When $|\eta_1| < |\eta_2|$, there is downward rigidity of adjustment in the retail interest rate, otherwise, upwards rigidity in adjustment is seen.

However, if the co-integration relationship is symmetric, then Eq. (10) is modified into the symmetric error correction:

$$\Delta R_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \, \Delta R_{t-1} + \sum_{j=1}^{q} b_j \, \Delta r_{t-1} + m\Delta MI_t + s\sqrt{\sigma_t^2} + \eta_1 M_t \hat{e}_{t-1} + v_t \qquad (12)$$

If co-integration relationship of the above form does not exist, then the error-correction term in Eq. (10) is of no use.

$$\Delta R_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \, \Delta R_{t-1} + \sum_{j=1}^{q} b_j \, \Delta r_{t-1} + m\Delta MI_t + s\sqrt{\sigma_t^2} + v_t \qquad (13)$$

Our empirical model is different from other studies in following regards. Firstly, to the best of our knowledge, our study is one in Pakistan that incorporates error correction in GARCH models and employed for the examination of the asymmetric adjustment of the retail interest rate of Pakistan. Secondly, through examination of short run adjustment in the retail interest rate we also encounter there heteroskedastic variance problem. Thirdly, we check the behavior of interest rate adjustment with changes in interest rate volatility.

Chapter 4.

EMPIRICAL RESULTS AND THE ANALYSIS

4.1.Basic summary statistics of all variables:

Table 4.1, lists the summary statistics of all the interest rate variables at their first differenced. The means of the differenced interest rates are positive and there is more fluctuation in KIBOR than in the deposit and lending rate. And on the other hand there is more fluctuation in deposit rate than the lending rate. When we compare these interest rates on the basis of standard deviation, then we see that there is more deviation in deposit rate than in any other rate. Moreover summary statistics such as the skewness, kurtosis and the Jarque-Bera statistics are for the normality of the data set, which are rejected for the normal distribution, which implies that data is not normal.

Table 4.1: The summary statistics of theinterest rate variable at their first differenced:

	Deposit Rate	**Lending Rate**	**KIBOR**
Mean	0.053025	0.034118	0.071765
Median	0.030000	0.020000	0.040000
Standard deviation	0.501369	0.176075	0.479224
Skewness	0.953974	1.012691	0.500225
Coefficient of Skewness	0.137773	0.240545	0.198853
Kurtosis	9.922236	4.831822	5.641146
J-B statistic	255.6398*	36.97798 *	39.55040*

4.2.The unit root test for all variables:

One of the basic assumptions of OLS is that data should be stationary at level i.e. I(0). For this reason we check the stationarity of all three different types' interest rate variables. For this purpose we use Augmented Dickey Fuller (ADF) unit root test. Results of ADF test are listed in table 4.2, which includes both level and first difference values of the variables. We use most familiar criterion for the lag length selection i.e. AIC. Under the AIC criterion there are maximum 12 lags because the data is of monthly frequency. All variables shows trend in them; for this reason we put trend term in ADF test. We also put constant term in ADF test. It is obvious the all variable are significant at first difference with the P-value less the 0.05.

Table 4.2: ADF-Values unit root test:

	Critical Values			**Level Values**		**First difference Values**	
	1%	5%	10%	Critical Value	P-Value	Critical Value	P-Value
Deposit Rate	-4.0428	-3.4508	-3.1507	-1.3771	0.8624	-4.2643	0.0051
Lending Rate	-4.0383	-3.4486	-3.1495	-1.6695	0.7586	-3.9907	0.0116
KIBOR	-4.0376	-3.4483	-3.1493	-1.7790	0.7088	-9.8750	0.0000

We put intercept and trend term in the ADF equation. Values in the parentheses are the optimum delay differences periods that are determined by applying the AIC criterion; the maximum is 12. The critical values refer to Mackinnon (1996).

4.3.***The test for the asymmetric co-integration relation****:*

Table 4.3, contains long run parameters of the both deposit interest rate and lending interest rate model of pass through. Deposit and lending interest rates are dependent on the KIBOR and estimated separately. To check the long run relationship we use Engle and Granger co-integration technique. Intercept term i.e. do is interpreted as margin of interest rate pass through while the slope term i.e. d_1 is interpreted as speed of interest rate pass through. In both the cases, deposit rate and the lending rate there exist a fixed markup effect (do) which is statistically significant. On the other hand, the speed of pass through (d_1) is incomplete in both the cases but it is statistically significant. This result is consistent with Qayyum et al. (2006), Mohsin (2011), Fazal and Salam (2013). Speed of pass through is higher in case of deposit rate as compared to lending rate. We also inspect the hypothesis that whether there is complete pass through or not ($Ho: d_1 = 1$), in both deposit and lending rates and we reject null hypothesis in both the cases.[6]This means that there is incomplete pass through in Pakistan. Whenever the central bank of Pakistan change monetary policy then commercial banks have not much power to transfer the their complete cost to their consumers by raising the retail interest rates.

Table 4.3: Long run co-integration:

	Deposit Interest Rate Model	***Lending Interest Rate Model***
do	3.38(0.0002)	12.22(0.0000)
d_1	0.43(0.0000)	0.06(0.0099)

[6] We apply Wald test statistics for the confirmation of null hypothesis.

To check up the asymmetry relationship between KIBOR and the retail interest rates, we use the TAR and MTAR models to carry out the co-integration test. Before the TAR and MTAR we do not know the threshold or minimum value in equation (4) and (6). Chan (1993) suggested a method that chooses the optimum threshold value by using minimum the sums of the squared errors. After finding optimal threshold value, by applying Wald test statistics we can check easily either there exist any co-integration or not and also weather there is symmetric or asymmetric pass through. In the first step we check the null hypothesis on the threshold value is $Ho: c(1) = c(2) = 0$. We rejected null in both TAR and MTAR models, which implies that co-integration exist between the deposit and lending interest rate and the KIBOR. To check the asymmetry, we cannot reject null hypothesis i.e. Ho: c(1)=c(2), in case of TAR of lending model, which means that there is symmetric co-integration in lending interest rate. On the other hand there is asymmetric relationship in all other cases.

Table 4.4: TAR and MTAR co-integration results:

Co-integration				
	TAR		**MTAR**	
	F-value		**F-value**	
Deposit Rate	8.65(0.0003)	Co-integration	16.01(0.0000)	Co-integration
Lending Rate	7.05(0.0013)	Co-integration	7.49(0.0009)	Co-integration
Symmetric/Asymmetric				
Deposit Rate	3.82 (0.0531)	Asymmetric	17.05(0.0001)	Asymmetric
Lending Rate	3.05(0.0836)	Symmetric	3.85(0.0521)	Asymmetric

4.4.The estimated results of the error correction in EGARCH-M model:

As it is well known that the traditional linear/symmetric traditional ECM model in unable to deal with the problem of heteroskedastic variance. To deal with problem of heteroskedastic variance problem we use EC-EGARCH model under the structure of MTAR to examine the short run adjustment in the interest rate from KIBOR to retail interest rates. Basing on the basic statistics in table 4.1 and the test results in table 4.4, as in both the tables it is examined that data is not symmetric, for this reason to examine the deposit rate and lending rate model in Pakistan we use the asymmetric EC-EGARCH-M model.

Table 4.6, presents the estimation results of the EC-EGARCH-M model. Before we discuss the estimation results in Table 4.6, it is necessary to explain the parameters with their rationality behind them and their meaning. Parameter "*s*" denotes the effect offluctuations of the interest rates on the deposit and lending interest rates. This term is generated by the GARCH-M model. GARCH-M models allow the conditional mean to depend on its own conditional variance. It can also be interpreted as measure of risk. Theoretically parameter *s*is positive for the deposit and lending rate models. This implies that volatility in the KIBOR rate has positive effect on the interest rate adjustment margins, but the impact on retail rates is different. There is more volatility in lending rate then deposit rate.

Parameters "η_1" and "η_2" represent the effect to the asymmetric adjustment oferror correction term in the short run on the deposit and lending interest rates, the test results of parameters "η_1" and "η_2" could give information about the adjustment rigidity of the deposit and the lending interest rates follows the adverse customer reaction hypothesis or collusive pricing arrangement hypothesis. Parameter "η_1"also represents the effect to the symmetric error correction term on

the deposit and lending interest rate. The test results of Ho $\eta_1 = \eta_2$ indicate that the null hypothesis is rejected in both the interest rate models. This implies that the disequilibrium in the short run adjustment of the interest rate is asymmetric. By comparison of the absolute value of the η_1 andη_2 shows that there is downward rigidity ($|\eta_1| < |\eta_2|$) in both the model. Theoretically sign of parameter$\eta_1$is negative in both themodels. This indicates that there will be adjustment or convergence towards the long run equilibrium through bias adjustment.

Parameter "γ" indicates that the conditional variances of the interest rates effect by the presence of asymmetric adjustment. If this term is statistically significant then this makes the leverage effect exponential rather than quadratic and therefore the estimates of the conditional variance are guaranteed to be non-negative.

Table 4.6: Results of the error correction in EGARCH-M model:

Interest model	Deposit Rate Model		Lending Rate Model	
	GARCH(2,2)		GARCH(1,1)	
	Estimate	P-Value	Estimate	P-Value
α_0	-0.10	0.0001		
m	0.37	0.0000	0.13	0.0000
s	1.14	0.0020	4.24	0.0076
η_1	-0.15	0.0000	-0.18	0.0000
η_2	-0.43	0.0000	-0.19	0.0000
ω	-8.13	0.0000	-8.66	0.0000
α_1	0.74	0.0004	0.70	0.0000
α_2	0.73	0.0005		
γ	-0.05	0.3580	0.05	0.6162
β_1	-1.33	0.0000	-0.55	0.0000
β_2	-0.79	0.0000		

Parameter "m" indicates the effect on deposit and lending rate due to change in the KIBOR rate,

Parameter "s" indicate the effect of the fluctuation on the deposit and lending rates,

Parameters "η_1" and "η_2" represent asymmetric error correction term of deposit and lending rates,

Parameter "η_1" also represents the symmetric error correction term of deposit and lending rate,

Parameter "γ" indication about the subsistence of the asymmetric adjustment of the conditional variance

4.5.The economic significance of the empirical results:

The estimated results are given in Table 4.7. It shows that the pass through in both deposit and lending interest rate models is incomplete. According Bertrand model of the to the classical theory, if information is totally given to the producer and consumer then it mean then the market is perfectly competitive then even in this framework market prices will be equal to the marginal cost. In this scenario any change in prices will perfectly reflect the changes in marginal cost. Thus the rate of the change in prices to change in marginal cost will be one which implies the symmetric case and the pass through is complete. On the other hand there is oligopoly market model. Where there is market which is not perfect. In this case of rate of the change in prices to the change in marginal cost will be less than one. These scenarios can be explained by many theories, such as switching cost theory, adverse selection theory, risk sharing theory etc.

Horvath et al. (2004) argue that the commercial banks can over or under react to the adjustment of the KIBOR rate, even if there is full information given, because banks have already more information than their consumers and they can react through their expectation. In addition, our empirical findings show that there is incomplete pass through for both deposit and the lending rate, then whenever the KIBOR rate changes, to cover the costs that were inured my the change in monetary policy, commercial banks markup or markdown in the same direction of the central bank.

Table 4.7: Comparison of empirical results:

Model	Markup/markdown (d_0)	Pass through type (d_1)	Impact of interest rate fluctuation (s)	Adjustment rigidity(η_1 , η_2)
Deposit Rate	Mark-up	Incomplete	Positive	Downward
Lending Rate	Mark-up	Incomplete	positive	Downward

Why the interest rates pass through is too low in Pakistan? The reason is that because if the customers are not sensitive or less sensitive to the interest rate cost and revenues, then the determination of interest rate is outside the market. In these scenario commercial banks does not maximize their profit. In this case government's economic policies might be one of the factors that affect the commercial bank loan rate decision rather than the debt risk. Thus the efficiency of the monetary policy associated with the interest rate pass through would decrease and in most of the case it would reduce up to zero. Consequently if the government of Pakistan uses the interest rate as a tool for the monetary policy, then the government cannot fulfill its objective. In other wards it is not ideal tool (KIBOR) of the monetary policy, when there are too many factor make hurdle in the path of monetary policy. To resolve this issue central bank must pay close attention about the market information and structure of market.

In the field of finance, many a time interest rate is use as a discount rate to evaluate the asset value. If we deal with interest rate in this meaning, then the interest rate volatility implies risk of the assets price, which would change with the change in the monetary policy. Our estimated results put forward that the impact of the KIBOR on the retail interest rates is different, which might imply that the interest rate risk assessment of financial institutions on the commercial banks will be different and that each commercial bank will have different interest rate pricing to

risks. Moreover, the asymmetric test confirms that the asymmetry exists in both deposit and lending rates, which implies if there is adverse shock faced by the commercial banks then the adjustment margin of the retail interest rate is greater and when it is face by the favorable shock then the adjustment of the margin is lower.

Why there is asymmetric pass through mechanism exist in Pakistan and why does adjustment rigidity bias downwards instead of upwards? Bondt (2005) argue that if there is imperfect information, then there will be greater benefit for the borrower to not pay the debts. In this situation to recover the loss, bank must raise the lending rate. Therefore, no matter how the KIBOR adjusts, the lending rate must not be decrease by the commercial banks. In addition, when the banks can not completely transfer their cost to their customers, then to remove the loss banks must increase the margin by the fixed proportion.

Chapter 5.

CONCLUSION

This study checks for asymmetric relationship between KIBOR and retail interest rates by applying the threshold co-integration test and examines the impact of KIBOR fluctuation or uncertainty on deposit and lending rate we apply the EC-EGARC-M model. The important contribution of this study has been summarized as follows:

Firstly, by examining the interest rate pass through of the retail interest rate of Pakistan; we can easily understand the pricing behavior of interest rate in the financial market. Thus it will be helpful for the international or domestic borrowers and lenders. It is also helpful to understand the change in the cost and revenue associated with the deposit and loan, due to change in monetary policy. In our empirically results we found low rate of pass through from KIBOR to retails interest rates. Specifically there is low rate of pass through to the lending rate. It implies that borrowing from the domestic banks for investment is more efficient as banks have low power to transfer the cost to their consumer due to change in monetary policy. Moreover, both the deposit and lending rates are rigid towards downward adjustment.

Secondly, our empirical results suggest that there is asymmetric adjustment mechanism and the speed and the margin vary with the market information. For the effectiveness and to attain the objective of monetary policy, the central bank must closely monitor the market information and their impact on the retail interest rates and their menu cost. As it is found that the interest rates are downward rigid and after the change in monetary policy adjustments are upwards in the retail interest rates.

Thirdly, these findings can be helpful for investor and the commercial bank interested in investing in Pakistan, for domestic and foreign investor and for the recommendation by financial institution and monetary authorities.

Our empirical findings can provide a basis for future studies. Further studies on interest rate pass through can increase the data set of 20 banks that are currently member of KIBOR club, to check the level of competition or integration in banking system. Furthermore it can also improve by comparing 20 banks of KIBOR club and other banks and financial intuitions for the rate of pass through.

KIBOR data is available from January 2004 to onwards. By increasing data set up to daily frequency may give better results. But there is issue of compatibility of data set, as deposit and lending rate is not available up to daily frequency.

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