

## Interest Rate Pass-Through in Pakistan: Evidence from the Asymmetric Co-integration Approach

Farrukh Mahmood\*

### Abstract:

*This study examines the asymmetry of interest rate pass-through between wholesale (KIBOR) and retail interest rates (Deposit and Lending rate) for Pakistan, by using the asymmetric threshold co-integration proposed by Enders & Sikles (2001) and EC-EGARCH-M model proposed by Wang & Lee (2009). Empirical results of threshold co-integration test confirm that asymmetric relation exists between wholesale and retail interest rates, and hence the rate of pass-through is incomplete. Furthermore, in the long-run, retail interest rates are rigid towards the downwards adjustment, and hence there is an upward adjustment in error correction mechanism.*

**Keywords:** Asymmetry, Interest Rate Pass-Through, Threshold Co-Integration, Rigidities, JEL Classification: D82, E43, C22.

### 1. INTRODUCTION

The interest rate pass-through (hereafter IR-PT) mechanism is one of the crucial gateways for the central bank to achieve the goals of monetary policy (hereafter MP). The central bank use money market rate (hereafter MMR) to manage the retail IR. Therefore, it is fair to say that the MP affects the outcome of the banks, financial institutions, and the IR's markets behaviour. The success of the MP can be measured by the size of margin and the rate of the PT [Bredin, *et al.* (2002) and Bondt (2002)].

Whenever central bank change MP to boost the economy, MMR will be affected. In this process, some cost is transferred to the commercial banks, accordingly, commercial banks transfer this cost to their consumers. This process of transferring cost from central banks to

---

\* Farrukh Mahmood <farrukhmahmood1206@gmail.com> is a PhD scholar at Pakistan Institute of Development Economics (PIDE), Quaid-e-Azam University Campus, Islamabad, Pakistan.

consumers is known as IR-PT. There are three different possibilities for IR-PT, i.e., incomplete, complete and over PT [Wang and Lee (2009)]. In general, no matter what kind of PT it is; there will be a long-run (hereafter LR) relationship between a different kind of IRs, which ensure the effectiveness of the MP.

The rate of the PT and margin are the different parameters of the PT. The estimates of these parameters would vary, whenever IR is in disequilibrium and in the short-run (hereafter SR) adjustment progression. This variation in the values of the parameters will lead to asymmetric PT. In literature, this asymmetric PT is explained by two proposition; the consumer behaviour and the bank concentration proposition [Karagiannis, *et al.* (2010)].

In the literature, Qayyum, *et al.* (2005) estimated IR-PT for Pakistan and examined the low rate of PT by using 6-month retail interest rates, and the T-bill rate is taken as MMR, by using transfer function. Furthermore, the impact of the policy is effective after 2 to 2.5 years. Hassan, *et al.* (2012) estimated IR-PT, by using monthly Karachi Inter Bank Offered Rate (hereafter KIBOR) instead of 6-months T-bill rate. Fazal, *et al.* (2013) used monthly t-bill rate. On the other hand, Mohsin (2011) used panel data and found a low rate of PT. All these mentioned studies analyze the low speed of the PT. However, Khawaja, *et al.* (2008) use the Box-Jenkins methodology and analyze that there is instantaneous PT to the deposit rate, however, for the lending rate the PT is not instantaneous.

Most of the previous studies on this topic use the linear models. The central bank cannot effectively utilize the MP by estimating the linear model, in the presence of an asymmetric one. Hence, the linear models are biased against the existence of the asymmetric IR-PT, both in short and LR. Moreover, the risk due to fluctuations in IR is getting higher. Traditional linear error correction mechanism (hereafter ECM) model ignores the effect from the IR volatility. Therefore, the model may not be able to correctly explain the adjustment process in the SR. Present study; have filled this gap by using the improved technique of estimation, i.e., GARCH-type models, as suggested by Wang and Lee (2009).

Negative information in the financial market affects the conditional variance badly [Engle, *et al.* (1990)]. Nelson (1991), suggested the EGARCH model for the exponential effect of information. Lee (1994) set up EC-GARCH model by putting up ECM term in the GARCH model. Empirical it is shown that the asymmetric ECM model could explain the LR equilibrium [Enders and Granger (1998)]. Adjustment of MP can also be observed from the fluctuation in IR [Manna, *et al.* (2001)]. Wang and Lee (2009) suggested a complete model that incorporates ECM, co-integration, and asymmetric information.

The study of IR is important in an economy because it directly affects the behaviour of the consumer, subsequently, the investment channel regulates the future economic growth and hence the success of MP. In addition, it is well known that the banking sector in Pakistan is an oligopoly, where information is asymmetric among the competitors. This asymmetric information negatively responds to the efficiency of MP. Because of this, government's policy is unstable and investor's predictions keep on changing about investment.

The basic objective of the study is to test the asymmetric IR-PT from wholesale to the retail interest rate (hereafter RIR), with the better estimation technique, suggested by Wang and Lee (2009). This technique encompasses asymmetric and threshold co-integration, and resolve those issues faced in the case of linear models.

The study is organized as follows. The first section is based on introduction, with brief literature. In the second section, data and methodology will be discussed. The third section contains the discussion of empirical results, while the final section concludes the study.

## **2. DATA AND METHODOLOGY**

### **2.1. The Data**

Monthly data of Pakistan have been used; to examine the asymmetric co-integration for the IR-PT mechanism, running through the MMR and the RIR. The variables employed for the purpose are the

Deposit, Lending and KIBOR rate<sup>2</sup>. Deposit and lending rates are weighted averages, for a whole month. The source of data is the State Bank of Pakistan (SBP). The sample of the data set starts from January 2004 to December 2013.

## 2.2. The Methodology

Mostly empirical literature used the Engle and Granger (1987) co-integration test, to estimate the different parameters of IR-PT and frequently found no or low rate of PT. For instance, in the case of Pakistan Qayyum, *et al.* (2005) apply auto-regressive distributed lag (ARDL) technique for the purpose mentioned above, by using semi-annual data. Linear estimation model undergoes from the lack of asymmetric LR relationship. Thus, results obtained from linear models might be biased and give a wrong prediction or direction. For this reason, we apply the non-linear model to examine the presence of the asymmetric PT in a simple way.

This study comprises three steps: the first step tests the identification of the LR relationship, then the existence of asymmetries will be tested. Finally, the error-correction mechanism will be analyzed.

### 2.2.1. Threshold Co-Integration Test

The basic requirement of the time series analysis is to confirm the level of stationarity. If variables are stationary at the level, then simply OLS is used for the estimation. However, in the case of time series data, variables are non-stationary at level. Therefore, the estimates of OLS become inconsistent to test co-integration. In this case, the linear co-integration is used to analyze by using Engle and Granger (1987) test. Whereas the financial variables as IR may exhibit asymmetric volatility, and hence the estimates of linear model are biased. TAR and MTAR

---

<sup>2</sup> KIBOR is used by the 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 that is paid by financial institutions to deposit account holders. The lending interest rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector.

models are valid for the inspection of asymmetric co-integration [Enders and Siklos (2001)].

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

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

where,  $\beta_i$  are the unknown parameters,  $e_t$  is the error term, if  $e_t$  is stationary, i.e.,  $I(0)$ , it will imply an LR relationship between variables.

To verify the presence of the LR relationship, we apply a unit root test:

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

where,  $\varepsilon_t$  is a white noise process, and if the value is  $\rho$  lies between  $-2 \leftrightarrow 0$ , implies a linear LR relationship is in equilibrium. In the linear model the sign of  $e_{t-1}$  does not matter, any deviation in the value of  $e_t$  equals  $\rho$  times  $e_{t-1}$ . On the other hand, if the LR relationship is asymmetrical then it causes the problem of misspecification in Eq. (1). Enders and Siklos (2001) assume asymmetric adjustment in the LR. For this reason, the TAR model for inspection of the asymmetry in the LR relationship is employed. TAR model is as follows:

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

where,  $I_t$  is an indicator variable, which is specified as follows:

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

The true properties of the asymmetric model are still unidentified. Therefore, the first order-differenced value of  $e_{t-1}$  could represent the momentum in IR adjustments and hence reveal the asymmetric adjustment [Enders and Siklos (2001)]. It is called momentum TAR (MTAR) model and is identified as follows:

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

where,  $M_t$  is the indicator variable and is specified as follow;

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

Moreover, to remove serial correlation, modify Eqs. (3) and (5), as follows:

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

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

If the error term is stationary then it does not depend ever on the equation is chosen. According to F-distribution, the estimates of Eqs. (7) and (8) are consistent with OLS, if the error term is stationary with a known threshold value. F-statistic is used to test the existence of the asymmetric co-integration [Enders and Siklos (2001)]. If the null hypothesis  $\rho_1 = \rho_2 = 0$  is rejected, then it indicates that co-integration exists. Moreover, if the null hypothesis of  $\rho_1 = \rho_2$  is rejected, this indicates the presence of asymmetric co-integration.

Moreover, Chan (1993) method is used to find threshold value  $\tau$ . Let  $\{y^j\}$  represent the series,  $j = 1, \dots, T$ , where the elements of the series  $\{y^j\}$  are organized in ascending order. For each  $y^j$ , assign  $\tau = y^j$ . 15% of observations are dropped from both ends leaving behind 70% of the observations in the middle. It guarantees that the observations used for the estimation of the threshold value are proper and suitable. Subsequently, OLS is used to estimate the model, iteratively, by treating each observation as a  $\tau$ . These iteratively estimated models search for the minimum value of SSR. This minimum value of the SSR indicates the optimum value of the threshold. It is then used along the indicator variables to test co-integration. The critical values are as provided by Enders and Siklos (2001).

After the identification of the LR relationship between the IRs, ECM is introduced to test SR dynamic for a better results from estimation. On the other side, if the heteroskedastic problem in data set arises, then the

traditional ECM may give biased results of estimation. To correct the heteroskedastic problem, we apply a GARCH model with ECM.

### 2.2.2. Introduction of ECM Term in EGARCH-M Model

This subsection systematically illustrates the EC-EGARCH-M model. The model is set in such a way that a LR relation of the RIR is first established with the MMR:

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

where,  $R_t$  is the retail rates,  $MMR_t$  represents the KIBOR;  $e_t$  is the error term. Parameter  $d_0$  denotes the fixed margin upon RIR; parameter  $d_1$  shows the speed of PT, the value of the  $d_1$  varies from 0 to 1. If the estimated value of  $d_1 < 1$ , then it implies incomplete PT, if  $d_1 = 1$  then it implies the PT is complete and if the  $d_1 > 1$  then it implies the PT is larger. Eq. (9) represents the LR relationship, and if there is an asymmetric adjustment, then the error from the ECM model will not be white noise. Therefore, we modified the model to incorporate the asymmetric adjustment as follow;

$$\Delta R_t = \alpha_0 + \sum_{i=1}^p \alpha_i \Delta R_{t-1} + \sum_{j=1}^q b_j \Delta r_{t-1} + m \Delta MI_t + s \sqrt{\sigma_t^2} + \eta_1 M_t \hat{e}_{t-1} + \eta_2 (1 - M_t) \hat{e}_{t-1} + v_t v_t \mid \Omega_{t-1} \sim \mathcal{N}(0, \sigma_t^2) \quad \dots (10)$$

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

Eq. (10) represents the conditional mean equation of the GARCH model. ARMA model is introduced, to correct the autocorrelation problem. In addition, the mean equation by adding the time-varying standard deviation is specified  $\sqrt{\sigma_t^2}$  to test the effect of volatility on the IR. Where  $\sigma_t^2$  is the conditional variance of  $v_t$ . Hence, when the parameter is statistically significant and negative will imply that volatility in IR can reduce the fluctuation in the IR margin spread. In addition, if the parameter is statistically significant and positive, it shows that the volatility of the IR would boost the fluctuation margin of the IR. Parameters  $\eta_1$  and  $\eta_2$  are the speed adjustment, in addition  $\eta_1$  is the speed

of adjustment of positive ECM and  $\eta_2$  is of negative ECM term.  $\hat{e}_{t-1}$  is the LR equilibrium value in the previous period of the ECM term. Whenever, the speed of adjustment is positive, the RIR has a higher price than the LR equilibrium error, vice versa. If the parameter  $\gamma$  in the conditional variance model is statistically significant and is greater than zero, then it implies that the asymmetric effect exists. On the other hand, if the  $\gamma$  is statistically significant and less than zero then it indicates the presence of leverage effect.

Eq. (10) is used to test the adjustment rigidity in the retail rate. By comparing  $\Delta\hat{e}_{it-1}$  with  $\hat{t}$ , the adjustment rigidity is checked as either upward or downward, for RIRs. If  $\Delta\hat{e}_{it-1} \geq \hat{t}$  then it implies that after any change in MP will ultimately adjust the rate of the money market. Thus, changes in deposit and lending rate are larger than the change in the LR error term in MMRs. Therefore, the adjustment in the margin spread must be reducing of the deposit and lending rates. When  $\Delta\hat{e}_{it-1} < \hat{t}$ , this illustrates that the LR error of the MMR shows more change than the RIR, so the adjustment margins on the RIRs need to be enlarged. We put the terms  $M_{it}\hat{e}_{it-1}$  and  $(1 - M_{it})\hat{e}_{it-1}$ , in the ECM, which results in a suitable size of adjustment in the margin of retail rates. Parameters  $\eta_1$  and  $\eta_2$  in Eq. (10) shows the speed of adjustment, in addition  $\eta_1$  is the speed of adjustment of positive ECM and  $\eta_2$  is of negative ECM term. If equality does not hold between  $\eta_1$  and  $\eta_2$  it implies adjustment rigidity exists in RIRs. When  $|\eta_1| < |\eta_2|$ , there is downward adjustment rigidity in the RIR, otherwise, upwards rigidity in adjustment is seen. However, if the co-integration relationship is symmetric, then Eq. (10) is modified into the symmetric ECM:

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

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

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



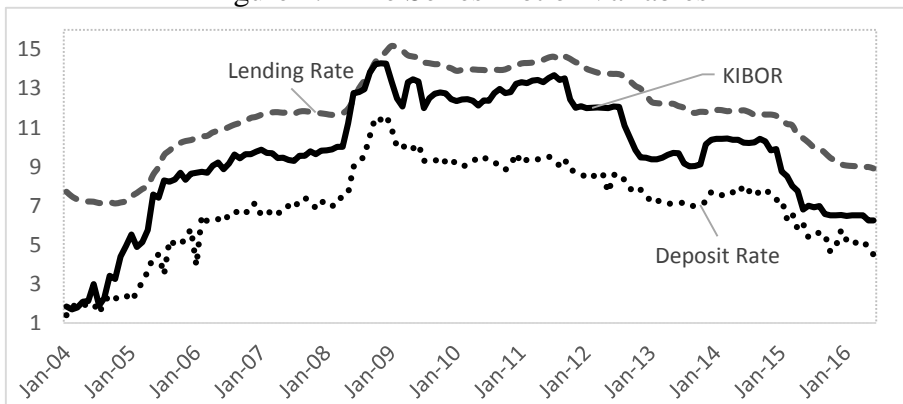
This final empirical model is unlike others; firstly, to the best of our knowledge, it is the first study in Pakistan which combines ECM in GARCH models. In addition, it also incorporates an asymmetric adjustment of the RIR in the empirical model. Secondly, this model also studies the effect of a change in IR volatility on asymmetric adjustment.

### 3. EMPIRICAL RESULTS AND ANALYSIS

#### 3.1. Data Description

Visualization is important to study the different time series properties of variables, otherwise, empirical results could be misleading, and hence the inference derived from them [for detail, see Mahmood (2017)]. Variables are plotted in Fig. 1. They represent that initial values of all variable increases up to 2009, and then decreases very slowly over time. In addition, these series apparently imply that there is co-integration, i.e., when the value of KIBOR increases, then Lending and deposit rates also increase, vice versa. However, KIBOR series shows more volatility than others, and the Lending rate is approximately smoother as compared to others. Economically, these phenomena show that as KIBOR rate changes, it is immediately responded by Deposit rate, i.e., the rate of PT is higher than the Deposit rate, and low rate of PT to Lending rate.

Figure 1. Time Series Plot of Variables



Note: The x-axis represents time, and the y-axis represents the level of rate.

### 3.2. The Unit Root Test

The empirical results of the unit root test are presented in Table 1. Augmented Dickey-Fuller (hereafter ADF) test is used to test stationarity. All variables are stationary at first difference. Most familiar criterion for the lag length selection is employed, i.e., AIC. Under the AIC criterion, there are maximum 12 lags because the data are of monthly frequency.

Table 1. ADF-Values Unit Root Test at First Difference

Variables	Level	First Difference
Deposit Rate	-1.299	-2.284**
Lending Rate	-1.178	-2.225**
KIBOR	-1.786	-1.782*

Note: We use the seasonality-adjusted series for the stationary test. For this reason, the intercept and trend term are removed in the ADF equation. \*, \*\* and \*\*\* indicates the significance at 10%, 5%, and 1% respectively.

### 3.3. Asymmetric Co-Integration Relation Test

Table 2 contains the empirical result of co-integration. The results implies that there is the fixed margin in case of both models. While the level of the fixed margin is high for the lending rate, and the rate of PT is high in the deposit rate. Overall, the models imply a low rate of PT in case of Pakistan. It implies that if the central bank of Pakistan changes MP then commercial banks will not have the power to transfer their complete cost, by raising the RIRs. In addition, commercial banks can influence their depositors but not lenders. This result is consistent with Qayyum, *et al.* (2006), Mohsin (2011), Fazal and Salam (2013).

Table 2. LR Co-Integration

	Deposit Rate Model	Lending Rate Model
$d_0$	0.23**	0.65*
$d_1$	0.39***	0.03*

Note: \*, \*\* and \*\*\* indicates the significance at 10%, 5%, and 1% respectively.

To check up the asymmetrical relationship between KIBOR and the RIRs, the TAR and MTAR models are used to test the existence of

co-integration. However, to estimate the TAR and MTAR model, the threshold is required. Chan's method is used to search for optimal threshold value. After finding optimal threshold value, Wald-statistics is applied to check whether any co-integration exists or not, and whether there is symmetric or asymmetric PT. In the first step, the null Hypothesis  $H_0: c(1) = c(2) = 0$  is tested on the threshold value.

Table 3. TAR and MTAR Co-Integration Results

	Co-integration			
	TAR		MTAR	
	F-Statistics		F-Statistics	
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

This null is rejected in both the models, which indicate that the LR relationship occur among the RIR and MMR. To check the asymmetry the null hypothesis, i.e.,  $H_0: c(1) = c(2)$  is not rejected, in case of TAR of lending model, which imply that there is symmetric co-integration in the lending IR. On the other hand, there is an asymmetric relationship in all other cases.

### 3.4. The Estimated Results of the ECM in EGARCH-M Model

As it is well known that the traditional linear ECM model is not appropriate to tackle with the heteroskedasticity problem. To handle this issue ECM-EGARCH model is combined with the MTAR to test the SR adjustment in the IR from KIBOR to RIRs. Empirical results in Table 3 imply that both deposit and lending rate follow the asymmetric model, i.e., ECM-EGARCH-M model.

Table 4 presents the empirical results of the ECM-EGARCH-M model. Before estimation results reported in Table 4 are discussed, it is necessary to explain the parameters with their rationality behind them and their meaning. Parameter "s" denotes the effect of fluctuations of the IRs on the deposit and lending IRs. The GARCH-M model generates this

term. GARCH-M models allow the conditional mean to depend on its own conditional variance. It can also be interpreted as a measure of risk. Theoretically, parameter  $s$  is positive for the deposit and lending rate models. This implies that volatility in the KIBOR rate has a positive effect on the IR adjustment margins, but the impact on retail rates is different. There is more volatility in lending rate than the deposit rate.

Table 4. Results of the ECM in EGARCH-M Model

Interest model	Deposit Rate Model	Lending Rate Model
	GARCH(2,1)	GARCH(2,1)
$\alpha_0$	-1.03*	3.59*
$m$	0.41*	0.19*
$s$	1.16*	-16.03*
$\eta_1$	-0.15*	-0.18*
$\eta_2$	-0.43*	-0.19*
$\omega$	-0.22**	-1.32*
$\alpha_1$	0.48*	0.02*
$\alpha_2$	-0.27*	-0.12*
$\gamma$	-0.07**	0.05*
$\beta_1$	0.96*	-0.07*

Note: \*, \*\* and \*\*\* indicates the significance at 10%, 5%, and 1%, respectively.

Parameters “ $\eta_1$ ” and “ $\eta_2$ ” represent the effect to the asymmetric adjustment of ECM term in the SR on the deposit and lending IRs, the test results of parameters “ $\eta_1$ ” and “ $\eta_2$ ” could give information about the adjustment rigidity of the deposit and the lending IRs following the adverse customer reaction hypothesis or collusive pricing arrangement hypothesis. Parameter “ $\eta_1$ ” also indicates the result to the symmetric ECM on the deposit and lending IR. The null hypothesis  $\eta_1 = \eta_2$  is rejected in both the IR models, which implies that the disequilibrium in the SR is asymmetric. On comparison of  $\eta_1$  and  $\eta_2$  in absolute values give clue about the downward rigidity ( $|\eta_1| < |\eta_2|$ ). Theoretically, a sign of the parameter  $\eta_1$  is negative in both the models. This indicates that there will be adjustment or convergence towards the LR equilibrium through bias adjustment.

Parameter “ $\gamma$ ” indicates that the conditional variances of the IRs are affected by the presence of asymmetric adjustment. This term is statistically significant which implies that the leverage effect exponential rather than quadratic and therefore the estimates of the conditional variance are guaranteed to be non-negative.

### 3.5. The Economic Significance of the Empirical Results

The summary of estimated results is given in Table 5. It shows that the PT in both models is incomplete. According to Bertrand model of the classical theory, if the information is totally given to the producer and consumer, it implies market is perfectly competitive and the price will be equal to the marginal cost. In this scenario, any change in prices will perfectly reflect the changes in marginal cost, which implies the symmetric case and the PT are complete. On the other hand, there is oligopoly market model, in which market is not perfect. Any change in the prices leads to change in marginal cost, but it 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.

Commercial banks can respond to the changes in MMR both positive and negative, even if there is full information given because banks have already more information than their consumers do and they can react through their expectation. In addition, our empirical findings show that there is incomplete PT, i.e., whenever the MMR changes, commercial banks adjust margin in the identical to the central bank.

Table 5. Summary of Empirical Results

Model	Markup/ Markdown ( $d_0$ )	Pass- Through Type ( $d_1$ )	Impact of IR Fluctuation ( $s$ )	Adjustment Rigidity ( $\eta_1, \eta_2$ )
Deposit Rate	Markup	Incomplete	Positive	Downward
Lending Rate	Markup	Incomplete	Positive	Downward

Why is the IR-PT too low in Pakistan? It is all because the customers are either insensitive or approximately little sensitive to the IR changes, then the determination of IR would be outside the market, hence, the financial institution cannot maximize their revenue. In this situation, the decision about lending rate made by the commercial banks

is affected by the government's policy. Thus, IR-PT seems irrelevant to the effectiveness of MP. Therefore, if the central bank of Pakistan uses IR as a tool for MP, then the central bank cannot maximize its objectives. Conversely, the IR is not the ideal tool of the MP when there are too many factors that create hurdle in the path of MP. To increase the effectiveness of MP, central bank have to give more attention to the market information and working of the financial market.

In the field of finance, many a time IR is used as a discount rate to evaluate the asset value. If we deal with an IR in this meaning, then the IR volatility implies the risk of financial assets. Hence, this risk of the financial asset varies accordingly to MP. Our empirical results imply that the influence of MMR on the RIRs is different. It means that IR risk responds differently to RIR, so central bank has to focus either deposit or lending rate at a time.

Why does an asymmetric PT mechanism exist in Pakistan? Why does adjustment rigidity bias downwards? If the market information is imperfect, then it will be better for the debtor to not pay the arrears. In order to recover this loss, the bank will raise the lending rate [Bondt (2005)]. So, it does not matter, how the central bank adjusts MMR. On the other hand, there is the other way to recover this loss, by adjusting the fixed margin at a higher rate.

#### 4. CONCLUSION

This study tests the asymmetric co-integration between money market and RIRs. The important contributions of the study are summarized as follows:

Firstly, we found that there is a low rate of PT in case of Pakistan, specifically to lending rate. Secondly, there is an asymmetric adjustment mechanism which suggests that the speed and margin vary according to market information. Hence, in this case, central bank of Pakistan cannot effectively utilize MP in case of low PT.

The rate of PT helps understand the behaviour of the financial market. The low rate of PT to lending rate implies that MP is unable to affect the lenders. On the other hand, the central bank itself does not affect the lender, because Pakistan being a developing country needs funds for investment. Hence, financial market behaviour welcome

investors (both national and international). In addition, banks frequently fix a certain level of investment, to start a relation with the bank. This certain level of investment is often not met by the small investors. Lastly, there is a lack of transparency among young investors and banks, more specifically due to hidden taxes. All these factors combine to cause an asymmetric adjustment in the deposit and lending rates.

## REFERENCES

- Bondt, G. (2002) Retail Bank IR Pass-through: New Evidence at the Euro Area Level. Frankfurt: European Central Bank.
- Bredin, D., T. Fitzpatrick, and G. O'Reilly (2002) Retail Interest Rate Pass-through: the Irish Experience. 20:20
- Chan, K. S. (1993) Consistency and Limiting Distribution of the Least Squares Estimator of a Threshold Autoregressive Model. *The Annals of Statistics*, 520-533.
- De Bondt, G.J. (2005) IR Pass-through: Empirical Results for the Euro Area. *German Economic Review*, 6:1, 37-78.
- Enders, W., and C.W.J Granger (1998) Unit-root Tests and Asymmetric Adjustment with an Example Using the Term Structure of IRs. *Journal of Business & Economic Statistics*, 16:3, 304-311.
- Enders, W., and P.L. Siklos (2001) Co-integration and Threshold Adjustment. *Journal of Business & Economic Statistics*, 19:2, 166-176.
- Engle, R.F., and V.K. Ng (1993) Measuring and Testing the Impact of News on Volatility. *The Journal of Finance*, 48:5, 1749-1778.
- Engle, R.F., and B.S. Yoo (1987) Forecasting and Testing in Cointegrated Systems. *Journal of Econometrics*, 35:1, 143-159.

- Mahmood, F. (2017) Model Specification, and Data Problem: A Case Study of Market Volatility and RIR Pass-Through, <https://mpira.ub.uni-muenchen.de/79734/>
- Fazal, S.K., and M.A. Salam (2013) IR Pass-Through: Empirical Evidence from Pakistan. *The Lahore Journal of Economics*, 18:1, 39.
- Horváth, C., J. Krekó and A. Naszódi (2004) Interest Rate Pass-through: the Case of Hungary. *National Bank of Hungary Working Paper*, 8.
- Lee, T.H. (1994) Spread and Volatility in the Spot and Forward Exchange Rates. *Journal of International Money and Finance*, 13:3, 375-383.
- Manna, M., H. Pill and G. Quirós (2001) The Eurosystem's Operational Framework in the Context of the ECB's MP Strategy. *International Finance*, 4:1, 65-99.
- 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.
- Qayyum, A., S. Khan, I. Khawaja, and A.M. Khalid (2005) Interest Rate Pass-through in Pakistan: Evidence from Transfer Function Approach. *The Pakistan Development Review*, 975-1001.
- Wang, K. M., and Y.M. Lee (2009) Market Volatility and Retail Interest Rate Pass-through. *Economic Modelling*, 26:6, 1270-1282.