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INTEREST RATE PASS-THROUGH: THE CASE OF JORDAN

ABSTRACT

The paper seeks to explore empirically the long-run relationship between short-term policy interest rate and deposit and lending rates in Jordan. Technically, we examine the speed of adjustment and pass-through from policy rate to deposit and lending rates. The empirical evidence of the Jordanian economy shows deposit and lending rates adjust primarily in response to the previous period's departure from the long-run equilibrium. Further, retail interest rates follow a symmetric movement for their deviations from the long-run equilibrium. Accordingly, the CBJ has the power to control the spread between deposit and lending rates. Furthermore, deposit rate adjusts larger and faster than lending rate for a deviation from the long-run equilibrium. As a result, Jordan's monetary policy action needs approximately 11 quarters to be effective.

Keywords: *Monetary policy, Central bank, Symmetric adjustment, Interest rate pass-through, Error correction model.*

I. INTRODUCTON

The behavior of macroeconomic variables has long been an object of interest to economists and scholars. They spend significant efforts to predict the future path of these variables based on information from the history. Nowadays, it is widely recognized that monetary policy has a real influence on the economy over the short horizon. Besides, economists aware that the long-run effects of monetary policy fall entirely on prices. That's why, central banks play a crucial role to steer the economy toward more economic growth and more inflation rate in the short run. Central bankers determine the economy destination and they know the considerable responsibility they have. As a result, they work within critical restrictions such as effective, accurate, transparent and accountable monetary policy while performing their missions. Monetary policy effectiveness relies mainly on the degree and speed of retail interest rate adjustment to a change in policy interest rate. For this reason, understanding channels of monetary transmission had received enormous attention on both theoretical and empirical levels. However, it has a shortcoming because central banks use short-term interest rates as a policy instrument i.e. overnight interest rate and certificate of deposit. Consequently, the relationship between policy short-term interest rate and banks' retail interest rates i.e. deposit and lending rates have received modest attention in monetary theory. Economists widely agree that the control on firms' and households' behaviors is more related to retail interest rates rather than policy rate. Despite that, significant theoretical economic models[2] assume lending interest rate is equivalent to policy interest rate[3]. They assume implicitly that central bank has a full control over the interest rate. Hence, it is untrue that central banks have a full

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[2] Bernanke and Gertler (1989), Ravenna and Walsh (2006).
[3] On the contrary, Tillmann (2009) made a clear distinction between deposit rate and lending rate in his model.

direct control over the aggregate demand and inflation rate, because economists should understand the effect of policy short-term interest rate on retail interest rates. Additionally, early researches on the monetary transmission mechanism assumed immediate and complete pass-through of changes in policy rates to retail bank rates[4]. Recently, large numbers of empirical studies report stickiness in retail banks' interest rate, particularly lending rate. Put it in another way, retail banks' interest rate has asymmetric adjustment to an increase or a decrease in policy interest rate.

The current paper seeks to investigate empirically the long-run relationship between short-term policy interest rate and deposit and lending rates in Jordan. Specifically, we investigate the speed of adjustment and pass-through from policy rate to deposit and lending rates. Further, we test whether banks' retail interest rate respond in symmetric manner to policy interest rate or not. The current paper findings help to understand monetary policy effectiveness in Jordan. Moreover, it highlights on the commercial banks' behavior to set the deposit and lending rate in Jordan. The paper contributes by exploring the long-run relationship between short-term policy interest rate and retail interest rates in a developing economy. Further, Jordan lacks such important studies, thus, we believe this paper helps the economic policymakers and scholars to have more knowledge about the Jordanian monetary policy. The rest of the paper is organized as follows: Section II presents the literature review of interest rate pass-through. Section III introduces monetary policy in Jordan. Section IV introduces the method of the current study. Section V presents the empirical results. Conclusions are presented in the last section.

II. LITERATURE REVIEW

Since the last two decades, the concept of interest rate pass-through receives more attention in monetary economics. Central banks can influence short-term money market interest rate which, in turn, affects retail bank interest rates. On the aggregate demand side, retail interest rates play a crucial role to determine the decision of both lenders and borrowers, which creates inflation rate and economic growth. What is more, lending rate has a significant influence on the production cost, aggregate supply side. Tillmann (2008) states that monetary transmission cost channel describes the supply side effect of interest rates on firm's cost structure. If firms decide to borrow from financial intermediaries to finance factors of production in advance, then interest rates have an influence on their costs of production and, hence, on inflation rate. Additionally, he argues two significant points regarding the relationship between interest rate and inflation rate. First, the financial intermediaries play a decisive role in propagating interest rate shocks to the cost side of the economy and, finally, to inflation rate. Second, interest rate effect might reflect other factors leading to cost pressure more than labor share as a measure of marginal cost, which leads ultimately to a higher inflation rate. Tillmann (2009) demonstrates that uncertainty about the cost channel reflects uncertainty regarding the role of financial markets in transmitting policy shocks to the supply side of the economy. He proves that uncertainty about the cost channel affects the strength of interest rate adjustment.

Interest rate pass-through means how a change in policy interest rate influences retail interest rates; deposit rate and lending rate. Consequently, the nature of this relationship has a direct impact on monetary policy effectiveness. For the purpose of introducing the idea of interest rate pass-through, we adopt de Bondt (2005) method which uses the relationship between policy interest rate and retail interest rate as follows:

$$RR_t = C_0 + C_1 MR_t \quad (1)$$

4 For more details see Bernanke and Gertler (1995) and Kashyap and Stein (2000).

where RR_t is the retail interest rates (price) set by banks. C_0 is a constant markup. MR_t denotes the market interest rate (the marginal cost price for banks). The coefficient C_1 is the response of retail interest rates to market interest rate. If we live in a perfectly competitive economy with complete information, then we should not worry about the response of retail interest rates for a change in market rate, because we expect one-to-one relationship. But, we live in imperfect competition economies. As a result, the relationship should be less than one in the short run, which is known as interest rate stickiness. Technically, the value of C_1 depends on all types of imperfections in the economy and the level of uncertainties. For example, market power, switching costs and asymmetric information costs (adverse selection and moral hazard). The empirical studies focus on the value of C_1. Hence, we expect to find the value of C_1 is less than one in Jordan.

Most the empirical studies focus on answer the following question do banks' interest rates respond in asymmetric manner to policy interest rate? Sorensen and Werner (2006) show the previous practical studies[5] differ widely in terms of scope and methods. As for the scope, some studies focus on aggregate interest rate series for individual countries. Other studies use micro banks information to investigate the price setting behavior of these banks. In terms of method, the macro studies utilize single-equation error-correction model (ECM) to measure the dynamics of the pass-through. On the contrary, the micro studies employ panel data techniques. The previous applied studies conclude the degree and speed of pass-through differ significantly across countries as well as across banking products, especially in the short-run.

Large numbers of economists submit different justifications for the stickiness in retail banks' interest rates. These explanations rely either on theoretical or empirical work. In the theoretical part, Lowe and Rohling (1992) state there are four theories to explain loan rate stickiness, which they are; adverse selection, switching costs, risking sharing and consumer irrationality. In an earlier theoretical work, Stiglitz and Weiss (1981) show in an equilibrium characterized by *credit rationing* lending rate may not move-up even when other interest rates in the economy increase, because the interest rate charged by a bank may influence the hazardousness of the loans through imperfect information; *adverse selection and moral hazard*. In this case, higher interest rate may attract riskier borrowers, thus, the probability of not repaying back the loan is higher. Also, higher interest rate may incentive borrowers to engage in riskier investments. Accordingly, banks cannot increase lending rates even if they face higher marginal costs. In sum, the existence of asymmetric information between borrowers and lenders in the loan market may create an upward stickiness in lending rates.

In the bank loan market, running the business is completely different from other markets. The bank needs to find out some information about the features of each customer. This is a costly activity for the bank and usually it passes onto the customer as fees. This fee makes it costly for a buyer to switch from one bank to another. This is known in the literature as switching cost. Klemperer (1987) shows in a theoretical model that switching cost in a mature market reduces the elasticity of demand facing banks or creates a monopoly power in the banks' hands. Thus, for any bank to attract any customer from any other banks, the interest rate cut should be at least greater than the switching cost. With a large switching cost, there is no incentive to cut the interest rate. As a result, incomplete adjustment of retail interest rate for a change in market interest rate.

In the empirical part, Thompson (2006) proves that the prime lending-deposit rate spread displays asymmetric adjustment. He argues asymmetric adjustment in the spread is due to the *information asymmetries* between banks and their customers and the existence of switching costs. As a result, banks may be slow to adjust their rates for a change in market interest rate.

[5] For more details about the sample of the studies see Sorensen and Werner (2006) footnote 3 in page 8.

Banks may utilize this practice of asymmetric price setting behavior even though it may not be optimal in the long run. If banks have market power, they can widen of the spread by slowly adjusting their lending rates to the falling deposit rates. However, other competing banks would simply adjust their lending rates first to capture more customers and gain greater market share. Dueker (2000) examines the existence of an asymmetric relation between the prime rate and market interest rates. He finds two types of asymmetry in the prime rate. First, the latent prime rate moves more quickly in relation to the market interest rate, if the two rates are rising than if they are falling. This implies prime rate responds faster to positive shocks of market rate than negative shocks. Second, prime rate fluctuation is biased upward. Consequently, he argues banks are unlikely to lower their prime rates during a recession due to the *higher risk of default*. This risk-averse behavior of banks and their managers may result in prime rates adjusting asymmetrically to movements in market rates.

Recently, Leuvensteijn et al. (2008) investigate the effects of *bank competition* on bank loan and deposit rate levels as well as on their responses to changes in market rates by using data from the euro area during the period (1994-2004). They find stronger competition significantly lower spreads between banks and market interest rates. In addition, they conclude in more competitive markets, bank interest rates react more strongly to changes in market interest rates. Besides, they confirm when competitive pressure is heavier in the loan market than in the deposit markets, banks compensate for their reduction in loan market income by lowering their deposit rates. Neumark and Sharpe (1992) investigate the impact of *market concentration* on the adjustment prices in the market for consumer bank deposits. They use panel data of consumer bank deposits interest rate from the U.S. economy. They find banks in concentrated markets are slower to raise interest rates on deposits in response to rising policy interest rate. On the contrary, they find[6] the same banks are faster in reducing deposits' interest rates for decreasing policy interest rate. This result suggests that downward price rigidity, the analogy to upward interest rate rigidity, exists and related to the *market power*.

The methodologies employed in estimating the interest rate pass-through are developed during the last two decades. Some economists develop new techniques with noteworthy features to explore the economic variables fluctuations in-depth. Technically, they focus on the asymmetries of the macroeconomic and monetary variables. Scholars look to asymmetry from two different dimensions; persistence and influence. The former indicates, for example, the positive phases persist more than the negative phases of a series. The latter means, for example, to specify that positive shocks of money supply has a stronger effect on the real output than the negative shocks. Sichel (1993) states that the importance of asymmetries arises from a desire to understand facts about business cycles and other economic variables. Further, standard linear time series models are not capable to illustrate asymmetric behavior under certain assumptions.

Some economists noticed that some macroeconomic variables in many countries follow an asymmetry behavior, despite the fact that asymmetries have only recently been examined empirically, for example, Cover (1992) proves that an expansionary monetary policy in the U.S. economy does not affect the output, while a contractionary monetary policy affects the output. Sichel (1993) provides evidence from the U.S. shows real GNP displays weak asymmetric adjustment[7]. Additionally, recent studies concerning monetary variables reported asymmetric behavior. Enders and Granger (1998) present evidence shows the movement toward the long-run equilibrium of the interest rate has asymmetric process. Peersman and Smets (2001) use data from 7 countries of the euro area and find asymmetric effect of monetary policy in Germany, France, Italy, Spain, and Belgium. Florio (2004) reviews five

[6] Their result is similar to Hannan and Berger (1991).

[7] For more studies Holly and Stannett (1995), Terasvirta and Anderson (1992), Falk (1986) and Neftci (1984).

proposed explanations of why monetary policy has an asymmetric effect, of which credit market imperfection. This means the effect on a boom is not the same as in a recession.
Furthermore, the recent studies illustrate the pass-through may be incomplete and the adjustment speed may be slow. The pass-through and adjustment speed also differ across financial institutions and across financial products, implying the speed of monetary transmission may vary across different segments of the banking sector. For example, see Cottarelli and Kourelis (1994), Mojon (2000), de Bondt (2005), Hofmann and Mizen (2004) and Liu et al. (2008). Besides, some studies find the speed of adjustment may be asymmetric. For example, see Chong et al. (2006), Kleimeier and Sander (2006) and Payne and Waters (2008). In a recent study, Ozdemir (2009) finds retail interest rate adjusts symmetrically for an increase or a decrease in money market rate in Turkey.

III. MONETARY POLICY IN JORDAN[8]

Jordan is a small open economy classified as lower middle-income country with about 5.98 million inhabitants and annual per capita income at current market prices equal to $4202 in 2009. The Jordanian economy is living in an unstable region. As a result, the economy is vulnerable to external developments either political events or economic shocks i.e. higher international oil prices and lower external grants. That's why, the Central Bank of Jordan (CBJ) is seeking to accumulate foreign reserves to help cushion external shocks and maintain the peg. In 1989, the Jordanian economy experienced bad economic shock leads to high inflation rate reached at 25.7% and negative economic growth got in touch with -16.7%. Thus, Jordan adopted an economic adjustment program in the consultation with the IMF aimed to achieve economic stability and to move toward the market-oriented economy. Lately, Jordan relies on its own economic adjustment programs.
Jordan has a stable banking sector; it is privately owned, growing, well capitalized, opened to external investors, liquid and profitable. There are 23 banks are currently operating (13 local commercial banks, 8 foreign banks and 2 Islamic banks). The banking environment is highly competitive. The latest data shows a noticeable decline in the market concentration. Despite that, the largest three banks account for a market share of slightly over 40%.

The CBJ primary announced objective is to enhance economic growth, maintain price stability and sustain a pegged exchange rate to the U.S. dollar. In September 1993, the CBJ moved toward the indirect method i.e. certificate of deposits issued by the CBJ to control money supply and absorb excess liquidity. The reasons behind this new policy are its convenience in the philosophy of free market economy, and its effect on both deposit and lending rates. Prior to mid of 1995, Jordan targeted the monetary aggregate to achieve its economic goals. After the mid of 1995, certificate of deposit auction rate started to be the main tool to conduct monetary policy in Jordan. The new operating procedure of the CBJ is to influence *banks' deposit and lending rates* to guarantee a high demand on the Jordanian dinar relative to the U.S. dollar. Hence, the success of monetary policy to achieve its goals depends on how the certificate of deposit rate affects the bank's retail interest rates. In March 1998, the CBJ added the overnight deposit facility (ODF) as a new tool to manage the liquidity on a daily basis. The ODF interest rate is the floor of the inter-bank rate.
Figure (1) shows the movement of the interest rate in the Jordanian economy and the federal fund rate from the U.S. economy during the period (1994:1-2008:3). It is obvious that since the first quarter of 1999, certificate of deposit rate declined. As a result, the deposit rate responds faster than lending rate and started to decline in the third quarter of 1999. However,

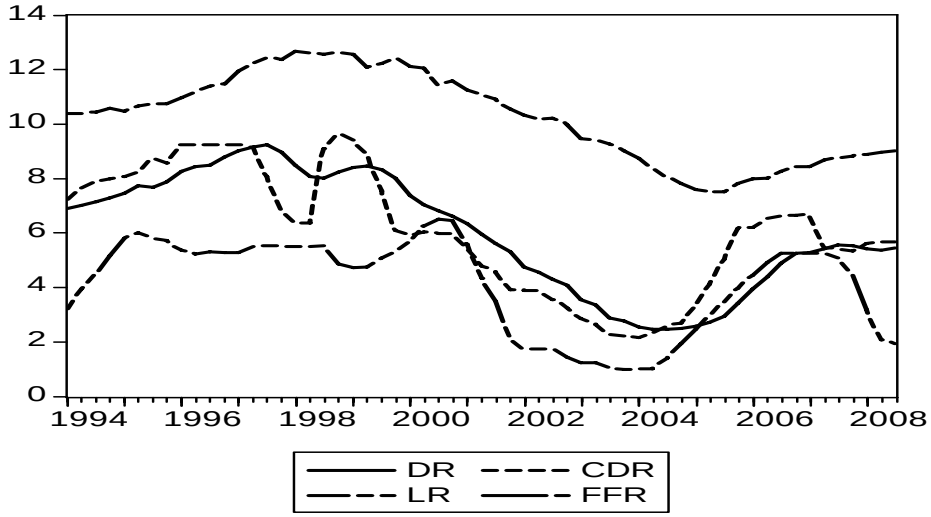
[8] Some details of this part depend on information from Sweidan (2008) and Sweidan (2009).

the lending rate began to decline since the first quarter of 2000. The same behavior happens again when the certificate of deposit rate started to hike in the second quarter of 2004. This behavior proves the reaction of deposit rate to a change in certificate of deposit rate is faster than the reaction of lending rate. Thus, we expect the empirical part of the current study to confirm this behavior. Also, we predict to find a noticeable slow pass-through adjustment because of two reasons; first, the highly competitive business-banking environment in Jordan. Second, large share of the local banks in Jordan are a family-business, as a result, they are careful in running their family investments. We believe this is a fundamental constraint on the effectiveness of monetary policy in Jordan.

What is more, the CBJ works between two edges; maintaining the attractiveness of the Jordanian dinar versus maintaining a pegged exchange rate to the U.S dollar. Therefore, it is crucial for the CBJ to be effective and have a symmetric control and effect on deposit and lending rates to keep their spread within a certain margin.

Figure (1):

Jordan Interest Rate Data and Federal Fund Rate



Recently, Poddar, Sab and Khachatryan (2006) seek to understand monetary transmission mechanism in Jordan. They find the CBJ operating targets affect foreign reserves and bank rates successfully. However, the evidence shows monetary policy is unable to influence output. Sweidan (2008) proves that policy interest rate in Jordan displays symmetric adjustment. This indicates that the CBJ is not prejudice of either easy or tight monetary policy. Recently, Sweidan (2009) studies the preferences of the CBJ. He proves the CBJ prefers higher level of inflation rate and higher level of output.

IV. THE METHODOLOGY

In order to explore a separate dynamic interest rate adjustment in the Jordanian economy between policy interest rate and deposit from one side and between policy interest rate and lending rate from the other side, we employ a symmetric error-correction model (ECM) as a first step in the estimation process. The specification of the ECM is as follows:

$$\Delta rr_t = \mu_0 + \sum_{j=1}^{J} \alpha_j \Delta cdr_{t-j} + \sum_{k=1}^{K} \gamma_k \Delta rr_{t-k} + \beta ect_{t-1} + \varepsilon_t \qquad (2)$$

Where Δ is the first difference, rr_t denotes lending rate (lr_t) or deposit rate (dr_t), cdr_t stands for policy interest rate, certificate of deposit, ect is the error correction term[9], ε_t stands for stochastic error and assumed to be normally distributed, $(0, \sigma^2)$ but not serially correlated. α_j and γ_k reflect the immediate or short run pass-through parameters, β is the speed of adjustment of deposit or lending rates for a divergence from the previous long-run equilibrium. The above-mentioned three parameters help us to understand the long-run relationship between the monetary variables in the model.

Following Scholnick (1996), Sander and Kleimeier (2000) and Ozdemir (2009), we utilize the asymmetric short-run dynamic model to investigate if deposit and lending rates adjust asymmetrically to the movement of the error correction term (ect). Technically, we investigate if retail interest rates adjust in an asymmetric manner to their divergence from the long-run equilibrium. The error correction term is divided into two components, as follows:

$ect_t^+ = ect$, if $ect > mean(0)$

$ect_t^+ = 0$, otherwise

$ect_t^- = ect$, if $ect < mean(0)$

$ect_t^- = 0$, otherwise

Then, we estimate the asymmetric short run dynamic model, which has the following form:

$$\Delta rr_t = \mu_0 + \sum_{j=1}^{J} \alpha_j \Delta cdr_{t-j} + \sum_{k=1}^{K} \gamma_k \Delta rr_{t-k} + \beta_1 ect_{t-1}^{+} + \beta_2 ect_{t-1}^{-} + u_t \quad (3)$$

The asymmetric mean adjustment lag of dr above the equilibrium = $(1 - \alpha_j / \beta_1)$.

The asymmetric mean adjustment lag of dr below the equilibrium = $(1 - \alpha_j / \beta_2)$.

The asymmetric mean adjustment lag is the time horizon through which policy interest rate is fully passed through to deposits and lending interest rates. Put it in another way, it measures the time span during which retail interest rates stick above and below the equilibrium.

In equation (3), the parameter β_1 of the ect_{t-1}^{+} measures the speed of adjustment of deposit or lending rate in response to the previous disequilibrium relation with the policy rate, when the two rates are above their long-run equilibrium level. Whereas, the estimated parameter β_2 of the ect_{t-1}^{-} computes the speed of adjustment of deposit or lending rate toward the new long-run equilibrium, when the two rates are below their previous long-run equilibrium level. The test of whether retail interest rates adjust asymmetrically relies on the values of β_1 and β_2 in equation (3). If β_1 and β_2 are statistically significant and $\beta_1 > \beta_2$, then banks adjust retail interest rate downward faster than upward. However, if $\beta_1 < \beta_2$, then banks adjust retail interest rate upward faster than downward.

V. EMPIRICAL RESULTS

The current study uses quarterly data from Jordan during the period (1994:1-2008:3). The data source is the International Financial Statistics (IFS) CD-ROM. Hence, the first step of the

[9] For the lending rate ECM model, $ect_{t-1} = (lr_{t-1} - \lambda_1 cdr_{t-1})$, Moreover, in the deposit rate ECM model, $ect_{t-1} = (dr_{t-1} - \lambda_2 cdr_{t-1})$. Where λ_1 and λ_2 reveal the long-run pass-through.

empirical part is to investigate whether the data on the level has a unit root or not. Since running a regression of a nonstationary time series on other nonstationary time series may produce a spurious regression. The three variables of the model; certificate of deposit, deposit rate and lending rate have a unit root on the level. This result is confirmed by performing the Augmented Dickey-Fuller (ADF) unit root test without trend and intercept[10]. Table (1) presents the results of the ADF unit root test. The lag length of ADF test is selected based on the Schwartz Criterion. The three variables of the model are stationary at the first difference. Besides, we perform Phillips-Perron and Kwiatkowski-Phillips-Schmidt-Shin tests to support ADF findings. Both tests confirm that all the series have a unit on the level and they are stationary on the first difference.

Table (1):

Augmented Dickey-Fuller Unit Root Test

Variable	Levels		First Difference	
	Lag Length	ADF test	Lag Length	ADF test
cdr	1	-0.89	0	-4.71
dr	1	-0.75	0	-2.62
lr	2	-0.50	1	-2.81

Note: The critical values are -2.60, -1.94 and -1.61 at 1%, 5% and 10%, respectively.

The second step is to test if there is a bivariate cointegration relationship between deposit rate and certificate of deposit from one side and between lending rate and certificate of deposit from the other side. The current study utilizes Johansen test and the results are reported in Table (2) and Table (3). The trace test statistics and maximum eigenvalue in Table (2) illustrate that there is one cointegration relation between deposit rate and certificate of deposit at 1 percent and 5 percent significance levels. Likewise, Table (3) reveals the existence of one cointegration relation between lending rate and certificate of deposit at 1 percent and 5 percent significance levels. These results assure bivariate long-run relationships exist between retail interest rates and policy interest rate in Jordan.

Table (2):

Deposit rate and certificate of deposits cointegration test

Trace Test Statistics				
Null	**Alternative**	**Statistic**	**5% Critical Value**	**1% Critical Value**
r = 0	r > 0	39.95	15.41	20.04
r≤ 1	r > 2	1.64	3.76	6.65
Maximum Eigenvalue				
Null	**Alternative**	**Statistic**	**5% Critical Value**	**1% Critical Value**
r = 0	r = 1	38.31	14.07	18.63
r = 1	r = 2	1.64	3.76	6.65

[10] We follow Enders (1995) methodology to choose the best regression equation that can be used to test for the presence of a unit root, for more details see Enders (1995) pages 221-224.

Table (3):

Lending rate and certificate of deposits cointegration test

Trace Test Statistics				
Null	**Alternative**	**Statistic**	**5% Critical Value**	**1% Critical Value**
r = 0	r > 0	31.72	15.41	20.04
r≤ 1	r > 2	1.86	3.76	6.65
Maximum Eigenvalue				
Null	**Alternative**	**Statistic**	**5% Critical Value**	**1% Critical Value**
r = 0	r = 1	29.86	14.07	18.63
r = 1	r = 2	1.86	3.76	6.65

Table (4) and Table (5) present the results of the ECMs[11] of deposit and lending rates, respectively. In both models, the coefficients of the error correction term and the long-run adjustment are statistically significant different from zero and have the right signs. On the contrary, in both models, the short-run coefficients are statistically insignificant different from zero[12]. This is a significant conclusion because it tells deposit and lending rates adjust principally in response to the previous period's deviation from the long-run equilibrium. Consequently, the mean lag adjustment of deposit rate illustrates it requires approximately 6 quarters to get to its long-run equilibrium. Conversely, it requires about 11 quarters of lending rate to arrive at its long-run equilibrium. The symmetric short-run adjustment of the deposit rate deviation from the long-run equilibrium is corrected by about 17 percent in the current period. The asymmetric adjustment speed of the deposit rate above and below the equilibrium is 22 percent and 15 percent, respectively. To inspect if deposit rate displays symmetric adjustment to the deviation from the long-run equilibrium, we test whether the two parameters β_1 and β_2 are equal or not. The Wald statistic is reported in Table (4), the symmetric adjustment hypothesis of deposit rate cannot be rejected. This implies deposit rate adjusts in a symmetric manner to the movement of the error correction term. In the long-run, the deposit rate adjustment coefficient is 1.09 percent which indicates a complete pass through from certificate of deposit to deposit rate.

[11] We run two residual tests of autocorrelation and both of them reject the hypothesis of autocorrelation.

[12] We have one exception which is in Table (5) where certificate of deposit second lag has a negative effect on lending rate at 10 percent significance level.

Table (4):

The Results of the Error Correction Model: The Deposit Rate

Variables	Δdr_t	
	Symmetric	**Asymmetric**
C	- 0.026 (-1.4)	0.01 (0.28)
cdr_{t-1}	-1.09 (-33.23)***	-
Δdr_{t-1}	0.07 (0.52)	0.04 (0.30)
Δdr_{t-2}	0.01 (0.09)	0.01 (0.07)
Δcdr_{t-1}	0.06 (1.25)	0.06 (1.16)
Δcdr_{t-2}	- 0.004 (-0.10)	-0.008 (-0.19)
ect_{t-1}	-0.17 (-3.3)***	-
ect_{t-1}^{+}	-	-0.22 (-3.40)***
ect_{t-1}^{-}	-	-0.15 (-2.73)***
$\overline{R}^2$	0.80	0.80
F-stat.	45.1	38.04
Wald stat. Prob.	-	1.36 (0.24)

Notes:
1) The ECM estimated using 2 lags based on lag length criterion; LR, FPE, AIC and HQ.
2) */**/***: denotes significance at the 10/5/1 percent level, respectively.
3) T-statistics are in parenthesis.

The symmetric short-run adjustment of lending rate departure from the long-run equilibrium is corrected by approximately 9 percent in the current period. The asymmetric adjustment speed of lending rate above and below the equilibrium is 10 percent and 7 percent, respectively. Similar to deposit rate behavior, the Wald statistic is reported in Table (5), the symmetric adjustment hypothesis of lending rate cannot be rejected. Lending rate adjusts in a symmetric manner to the movement of the error correction term. In the long-run, lending rate adjustment coefficient is 1.21 percent, which implies a complete pass through from certificate of deposits to lending rate.

Table (5):

The Results of the Error Correction Model: The Lending Rate

Variables	Δlr_t	
	Symmetric	**Asymmetric**
C	-0.007 (-1.28)	-0.002 (-0.03)
cdr_{t-1}	-1.21 (-8.62)***	-
Δlr_{t-1}	-0.12 (-0.91)	-0.12 (-0.89)
Δlr_{t-2}	0.03 (0.22)	0.04 (0.28)
Δcdr_{t-1}	-0.01 (-0.32)	-0.01 (-0.25)
Δcdr_{t-2}	-0.08 (-1.70)*	-0.08 (-1.63)
ect_{t-1}	-0.09 (-4.88)***	-
ect_{t-1}^{+}	-	-0.10 (-3.30)***
ect_{t-1}^{-}	-	-0.07 (-1.98)**
$\overline{R}^2$	0.46	0.45
F-stat.	10.3	8.50
Wald stat. Prob.	-	0.23 (0.63)

Note:

1) The ECM estimated using 2 lags based on lag length criterion; LR, FPE, AIC and HQ.
2) */**/***: denotes significance at the 10/5/1 percent level, respectively.
3) T-statistics are in parenthesis.

Overall, the findings of the current paper help the scholars to understand in depth the monetary policy of Jordan. In addition, the results are consistent, making sense and tell a story. Deposit and lending rates change mainly in response to the previous period's departure from the long-run equilibrium.

In the long run, there is a complete pass through from certificate of deposits to deposit and lending rates. Over the modification period, deposit and lending rates adjust in a symmetric process to the deviation from the long-run equilibrium. Further, deposits rate adjusts *larger and faster* than lending rate for a divergence from the long-run equilibrium. These facts mean Jordanian banking sector gives a priority to adjust deposit rate then it focuses on lending rate for a change in policy rate. One possible explanation of this behavior is that banks compete to affect their costs (deposit rate), because it seems their costs are connected to their revenues from certificate of deposit, their costs *backed by* their revenues. On the other hand, they are careful when adjusting their *not backed* lending rate in order to capture more customers and gain greater market share to maximize their profits. The policy implications of our findings are the ability of the CBJ to control the spread between deposit and lending rates since they have symmetric adjustments. In addition, the procedures of Jordan's monetary policy need about 11 quarters to be effective.

VI. CONCLUSIONS

Central banks play a crucial role to steer the economy toward either more economic growth or more inflation rate. The effectiveness of monetary policy relies mainly on the degree and speed of retail interest rates adjustment to a change in policy interest rate. Therefore, the channel between policy interest rate and retail interest rates polarized more attention of monetary economists over the last two decades. This is known in the literature as interest rate pass-through. Recently, some economists develop more techniques to explore the fluctuations in depth. Most empirical studies focus on the question whether bank interest rates respond in asymmetric manner to policy rate. The trend of research concentrates on either aggregate interest rate series or micro banks information. The results are mixed across countries and even across banks' products.

The current paper seeks to explore empirically the pass-through from short-term policy interest rate to deposit and lending rates in Jordan. In particular, we highlight on the behavior of deposit and lending rates. The current paper utilizes an error correction model. The empirical evidence is based on quarterly data over the period (1994:1-2008:3). We can summarize our findings as follows: *First*, deposit and lending rates change principally in response to the previous period's divergence from the long-run equilibrium. *Second*, deposit and lending interest rates follow a symmetric movement for their deviations from the long run equilibrium. *Third*, deposit rate adjusts faster and larger than lending rate to the deviations from the long-run equilibrium. *Fourth,* in the long-run, there is a complete pass-through from certificate of deposit to deposit and lending rates. We believe such a behavior is driven by two motives: the competition among the banks to gain larger market share and the enthusiasm to achieve the largest profits. Banks in Jordan connect their costs (deposit rate) with their revenues from certificate of deposits. They follow a rule: if I take I will give! Conversely, they adjust their lending rate carefully. The policy implications of our paper are the CBJ has the power to control the spread between deposit and lending rates. Besides, Jordan's monetary policy action needs around 11 quarters to be effective.

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PASS-THROUGH (PRIJENOS) KAMATNIH STOPA: SLUČAJ JORDANA

SAŽETAK

Rad empirijski istražuje dugoročnu vezu između kratkoročnih ključnih kamatnih stopa i kamatnih stopa na depozite i kredite u Jordanu. Tehnički, ispitujemo brzinu pilagodbe i pass-through od ključne stope do kamatnih stopa na depozite i kredite. Empirijski dokazi jordanske ekonomije pokazuju da se kamatne stope na depozite i kredite prvenstveno usklađuju u odnosu na odmak od dugoročne stabilnosti u prethodnom periodu. Nadalje, kamatne stope na kredite i depozite slijede simetrična kretanja u svojim devijacijama od dugoročne stabilnosti. Shodno tome, Jordanska Centralna Banka ima moć kontrole razlike između kamatnih stopa na depozite i onih na kredite. Osim toga, kamatne stope na depozite se usklađuju šire i brže od kamatnih stopa na kredite radi devijacije od dugoročne stabilnosti. Zbog toga jordanska monetarna politika treba oko 11 kvartala da bi bila efikasna.

Ključne riječi: *monetarna politika, centralna banka, simetrično usklađivanje, prijenos (pass-through) kamatnih stopa, model korekcije greške*