The Interest Rate Pass-Through in Malaysia: An Analysis on Asymmetric Adjustment

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ABSTRACT

The interest rate channel is the primary and most important mechanism for policymakers. Knowledge of the pass-through of interest rates has allowed policymakers to draw conclusions on how fast and to what extent a shock in policy rates are transmitted to retail rates. This paper investigates the pass-through effect of policy rate on retail rates in Malaysia. Asymmetric threshold autoregressive (TAR) and momentum threshold autoregressive (MTAR) proposed by Enders and Siklos (2001) are employed in the study. Over the period of January 1987 to December 2014, the policy rate was found to be an incomplete pass-through to deposit and lending rates. Based on the asymmetric analysis, we discover the asymmetry effects in the response of retail rates to the change of policy rate. In addition, we find downward rigidity in both deposit and lending rates.

JEL Classification: E43, E52

Keywords: Asymmetric, Interest rate pass-through, MTAR, Retail rates, TAR

INTRODUCTION

Monetary policy has played an important role in maintaining the health of the macro economy. It is designed as a major stabilizing instrument to steer the

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economy toward achieving healthy economic circumstances. Therefore, nearly all the central banks in the world have implemented monetary policies to achieve their economy goals, e.g., sustainable economic growth, price stability, full employment and more. The money market is the major platform manipulated by central banks to implement monetary policies. Through the years, the role of the money supply in influencing an economy is undeniable; voluminous studies have reported the link between money supply and macroeconomic activities (see for example, Tan & Baharumshah 1999; Anglingkusomo, 2005; Aksoy & Piskorski, 2006; Puah & Jayaraman, 2007; Puah et al., 2008; Ibrahim, 2010; Leong et al., 2010; Puah et al., 2010; Tang et al., 2013; Puah et al., 2015).

However, according to Mishkin (1995), money supply alterations have limited direct impact on the economy. Instead, the effect is transmitted through different channels into aggregate demand, and eventually changes the total output. The process through which monetary shock is transmitted into the changes of output is called "monetary transmission mechanism". The interest rate channel is the primary and most important mechanism for policymakers. The changes in money supply will eventually affect interest rate, which in turn cause investment alteration, and lastly affect the total output in the economy. Thus, it is important for policymakers to ascertain the direction and the transmitting power of policy rates in order to identify the effectiveness of interest rate channels.

Interest rate pass-through is the process through which an adjustment in policy rate is transmitted to retail rates. It is an important instrument used by central banks to implement their monetary policy decisions, as inflation rate and future output can be influenced by the adjustment of retail interest rates. As a result, the issues of interest rate pass-through have attracted great attention (see Winker, 1999; DeBondt, 2005; Payne, 2006; Wang & Lee, 2009; Wang & Thi, 2010; Yuksel & Ozcan, 2013). The interest rate channel is said to be effective in achieving its goals if the pass-through effect is complete. However, researchers found that rigidity does appear in the interest rate adjustments when the costs of interest rate changes are not completely passed on to the retail rates (see Hannan & Berger, 1991; Neumark & Sharpe, 1992; Sander & Kleimeier, 2004, Payne 2006; Panagopoulos et al., 2010). The main reasons include contract maturities, financial structures, and operating systems that render banks unable to immediately transfer their costs to retail rates. In general, the costs of interest rates is partially borne by customers. The remaining costs will be pass-through via mark-up or markdown on fixed rates. Based on past studies, the influences of variation information on a bank's interest rate adjustment and pricing might cause an asymmetric relationship, exhibited in bank retail rates adjustment. In other words, the interest rate pass-through mechanism may response asymmetrically to economy booms and recessions.

Understanding the interest rate pass-through and the asymmetric effects are crucial for policymakers, especially in those countries who are implementing interest rate channels as their monetary policy transmission mechanism. The interest rate pass-through mechanism allows policymakers to draw conclusions about how fast and to what extent a shock in policy rates are transmitted to retail rates. A monetary policy may fail to stimulate output sufficiently if we overlook the direction of pass-through effect and the size of this effect during different

economic conditions. In view of this, monetary authorities need to have pertinent insight on the interest rate pass-through effect in their countries in order to select the most suitable policy instruments and intermediate policy targets. This study aims to investigate the pass-through effect of policy rate to retail rates in Malaysia that employs interest rate targeting as its policy framework. Deposit and lending rates are used as retail rate variables in this study. De Bondt (2005) indicated that deposit and lending rates have a significant effect on investment and expenditures of depositors and borrowers, which will further affect the economic growth, while policy rate is a proxy to money market rate. The asymmetric adjustment of retail rates in response to policy rate is also examined in this study.

REVIEW OF LITERATURE

In the study of monetary transmission mechanisms, the interest rate channel has been considered to play a key role in monetary policy. A considerable amount of literature on the study of the interest rate channel has been published over the decades. Recently, renewed attention has been focused on the interest rate pass-through. Several attempts have been made to study the degree of the pass-through effect, the speed of interest rate pass-through, and the adjustment of interest rate (whether it is symmetric or asymmetric).

The study of pass-through effect on deposit and lending rates in Euro countries was pioneered by De Bondt (2002). He found that the effect of change in policy rate can be passed-through almost completely to the bank lending rates in the long-term. This finding is supported by Hofmann and Mizen (2004) and Ozdemir (2009). In 2004, Hofmann and Mizen (2004) conducted a study on pass-through effect in the UK using monthly data over the period of 1985 to 2001. They discovered a complete pass-through in deposits and mortgage rates in response to the change of money market rates in the long-run. Moreover, they indicated that gap between money market rate and retail rates played an important role in determining the force of adjustment. The adjustment is faster with a bigger gap as compared to a smaller gap. A similar study was carried out by Ozdemir (2009) in Turkey using symmetric and asymmetric ECM. Similarly, Ozdemir (2009) claimed that in the long-term, retail rates are able to pass-through completely in response to the change in money market rate. However, he found that retail rates are incomplete in the short-term and the change in loan rate tends to be more flexible compared to that in deposit rate.

Mojon (2000) examined the interest rate pass-through effect for EU countries using annual data. By analyzing the rates on corporate loans, household loans, overnight deposits, savings, and time deposits, Mojon (2000) found mixed results across EU countries and maturities of rates. Different degrees of the pass-through effect were found in Belgium, Germany, France, the Netherlands and Spain. Mojon (2000) also concluded that interest rates with shorter maturities tend to respond faster than rates with longer maturities. This finding is in line with De Bondt (2005) who implemented an interest rate pass-through study in the EU countries using VECM and VAR methods. De Bondt (2005) also found that maturities of interest rates will influence the degree and the speed of pass-

through. In his findings, interest rates with shorter maturities have a complete pass-through effect, while incomplete pass-through is found in long-term interest rates. De Bondt (2005) also stated that the pass-through effect will be faster if common currency and monetary policies are used. Chionis and Leon (2006) drew a similar conclusion as De Bondt (2005) on the aspect of common currency and monetary policy. Chionis and Leon (2006) employed bivariate cointegration and ECM to investigate whether the effectiveness of interest rate transmission in Greece is better after entering the EU. The findings indicated that degree of interest rate pass-through in Greece was stronger after entering the EU, even though it is an incomplete pass-through.

On the other hand, several studies revealed that mostly, the pass-through for interest rates is incomplete. Cottarelli and Kourelis (1994) discovered a sluggish and incomplete adjustment in bank lending rates when there is a shock in money market rates. They pointed out that the pass-through effect in the short-term is sluggish if compared to a longer time period. They further explained that capital control, poor bank competition and uncompetitive monetary instruments are the factors that weaken the pass-through effect of interest rates. Aydin (2007) used panel cointegration to analyze the interest rate pass-through of all different classified loan types offered by public, private, foreign and investment banks in Turkey. The findings revealed that shock in policy rate can be transmitted to loan markets in a quarter of the time, but the degree of pass-through is incomplete. Aydin (2007) highlighted the pass-through effect of housing loans, which had a better response compared to cash and vehicle rates. Tai et al. (2012) carried out a study on six Asian countries with the aim to identify the effectiveness and compare the interest rate transmission mechanisms across the countries. By using seemingly unrelated regression equations, interest rate pass-throughs were found to be sluggish in all the analyzed countries.

More recently, literature has emerged that offers contradictory findings about symmetric and asymmetric adjustments in interest rates. Crespo-Cuaresma et al. (2004) carried out an investigation on the pass-through effect of policy rates on lending rates in EU countries by using the Autoregressive Distributed Lag (ARDL) model. They found that there are no asymmetric adjustments in the interest rate pass-through when the policy rates are negatively or positively amended. The findings further concluded that loan rates can be completely pass-through in the long-term while deposit rates are sticky and sluggish in both short- and long-term. Payne (2006) obtained a similar result as Crespo-Cuaresma et al. (2004). Payne (2006) examined the pass-through effect of federal fund rates on mortgage rates in the U.S. with the momentum threshold autoregressive (MTAR) method. Payne (2006) concluded that the adjustment of mortgage rates to the change in federal fund rates is sluggish and incomplete. He also indicated that there is symmetric behavior in the speed of adjustment.

Conversely, a few researchers argued that interest rates are asymmetric in adjustment. In order to explore the asymmetric behavior of interest rates in Italy, Gambacorta and Iannotti (2007) analyzed the data of policy rates and interest rates during the period of 1985 to 2002 using asymmetric ECM. The findings indicated that asymmetric behavior exists in the interest rate pass-through in the short-term. According to Gambacorta and Iannotti (2007), loan rates have a

better asymmetric adjustment speed than deposit rates when easing of monetary policy is implemented. In 2009, Wang and Lee (2009) studied the interest rate pass-through in the U.S. and nine Asian countries. By using Enders and Siklos's (2001) threshold cointegration method and EC-EGARCH model, they found a complete pass-through effect in the economy of the U.S. but not in the analyzed Asian countries. Wang and Lee (2009) obtained mixed results on the aspect of asymmetric adjustment. Five out of nine Asian countries showed asymmetric adjustment in deposit rates and only three of them showed asymmetric behavior in the adjustment of lending rates. Moreover, two out of nine Asian countries showed a symmetric relationship in both retail rates. Wang and Thi (2010) carried out a similar study using the same method and model on the interest rates in Taiwan and Hong Kong. The empirical results indicated that for both countries, interest rate pass-through were incomplete and asymmetric in the adjustment.

THE METHODOLOGY AND MODEL

In order to estimate the cointegrating relationship in a long-term or equilibrium phenomenon for the interest rate pass-through mechanism, as well as the existence of asymmetric effect, threshold autoregressive (TAR) and momentum threshold autoregressive (MTAR) models proposed by Enders and Siklos (2001) are employed in this study.

A full residual-based two-stage estimation developed by Engle and Granger (1987) will be adopted. The first stage begins by posting the long-term relationship of the form given in the estimation model below:

$$y_t = \hat{\beta}_0 + \hat{\beta}_1 y_{2t} + \ldots\ldots + \hat{\beta}_n y_{nt} + \mu_t,$$ (1)

where β_t is the estimated parameters and μ_t is an error term. Stationary of μ_t means existence of the long-term equilibrium relationship. The following equation is given as the second-stage procedure:

$$\Delta\mu_t = \rho\mu_{t-1} + \varepsilon_t,$$ (2)

Rejection of the null hypothesis of no co-integration could be reached when the residuals in Equation (2) is stationary with mean zero.

If money-shock adjustment tends to be asymmetric, the assumption of symmetric adjustment will induce bias. Thus, TAR process is used for asymmetric adjustment and Equation (2) will be replaced with:

$$\Delta\mu_t = I_t \rho_1\mu_{t-1} + (1 - I_t) \rho_2\mu_{t-1} + \varepsilon_t,$$ (3)

where I_t is the Heaviside indicators:

$$I_t = \begin{cases} 1 \text{ if } \mu_{t-1} \geq \tau \\ 0 \text{ if } \mu_{t-1} < \tau \end{cases}$$ (4)

ρ_1 and ρ_2 are asymmetric adjustment in different value. ρ_1 is the adjustment value when μ_{t-1} is positive, while ρ_2 is the adjustment value when μ_{t-1} is negative. When there is a serial correlation in the adjustment process, Equation (3) can be re-parameterized as:

$$\Delta\mu_t = I_t\,\rho_1\mu_{t-1} + (1-I_t)\,\rho_2\mu_{t-1} + \sum Y_i\Delta\,\mu_{t-i} + \mu_t, \tag{5}$$

Here, Heaviside indicator of Equation (4) is rewritten as:

$$I_t = \begin{cases} 1 \text{ if } \Delta\mu_{t-1} \geq \tau \\ 0 \text{ if } \Delta\mu_{t-1} < \tau \end{cases} \tag{6}$$

TAR model is designed to capture 'deep' asymmetric movements in the series of deviations from the long-term equilibrium. It is able to determine whether positive deviations are more prolonged than negative deviations. MTAR model, on the other hand, is used to capture 'sharp' movements in the sequences. In order to determine the threshold value τ and the minimum value of square terms of residual errors, Chan's (1993) method is adopted. The lags selection of the TAR or MTAR model can be done by using the Akaike information criterion (AIC) and the Schwartz Bayesian information criterion (SBC) as proposed by Enders and Siklos (2001).

In conclusion, these analyses will be able to detect the dynamic properties of retail banking rates to policy rates, and trace the asymmetric long-term relationship between the stated interest rates.

DATA

Monthly time series data from the sampling period of 1987:1 to 2014:12 are used in the analysis for investigating the interest pass-through of policy rates to bank retail rates in Malaysia. The variables included deposit rate (DR), lending rate (LR) and money market rate (MMR). All the data can be obtained from the database of CEIC, International Financial Statistics as well as relevant statistical publications published by Centre Banks and Department of Statistics, Malaysia. The graphs of monthly deposit rate, lending rate and money market rate are depicted in Figure 1.
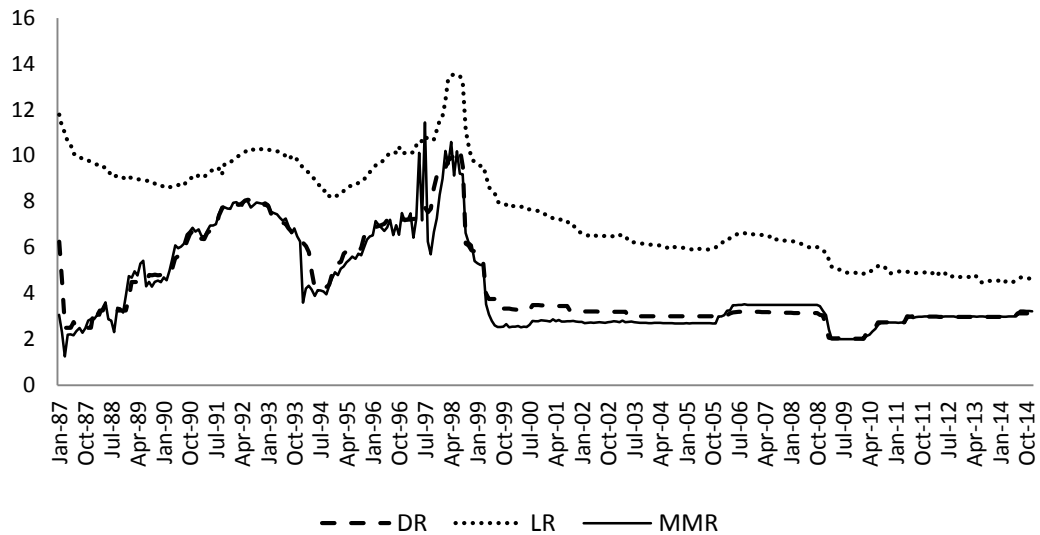
Note: DR, LR MMR denote deposit rate, lending rate and money market rate respectively.

Figure 1 Monthly deposit rate, lending rate and money market rate (percent) of Malaysia

From Figure 1, it is obvious that, generally, there is a spread between lending rate and money market rate, although the spread seems to be narrower and narrower in the last decade. One the other hand, it can be said that deposit rate is slightly higher than money market rate most of the time[1]. All series seems to move in tandem over the sample period of study, suggesting the existence of long-term relationships among them. Moreover, apparently these rates are nonlinear in behaviour.

RESULTS

For a preliminary analysis, Augmented Dickey-Fuller (ADF) (1981) and Phillips-Perron (1988) unit root tests are conducted to determine the stationary processes of the time series involved in the study. Table 1 reports the results of ADF and PP unit root tests, with lag selection determined by the minimum Akaike's information criterion (AIC). The results reveal that all the variables are non-stationary in level form and appeared to be stationary after first differencing. We conclude that all the variables are integrated on the order of 1.

Table 1 Results of ADF and PP Unit Root

Variables	Level, Trend and Intercept		First difference, Intercept	
	ADF	PP	ADF	PP
DR	-2.548 (1)	-2.348 (8)	-13.436 (0)***	-13.299 (5)***
LR	-2.757 (2)	-2.551 (10)	-8.215 (1)***	-11.853 (8)***
MMR	-2.472 (1)	-2.823 (6)	-27.571(0)***	-26.789 (3)***

Notes: *** indicate statistically significant at 1% level. DR = deposit rate, LR = lending rate, and MMR = money market rate.

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[1] To be exact, 60% of the time, deposit rate is higher than the money market rate.

Table 2 revealed the parameter estimation in the long-term of deposit and lending rates in Malaysia. The fixed mark-up of retail rates, which is represented by parameter d_0, indicated that a raise in policy rate is significant to deposit and lending models. The parameter d_1 implied that the pass-through effect of retail rates differ from each other, and rigidity existed in the retail rates as the pass through are incomplete. In other word, cost of policy rate change is not completely passed on to its retail rates. However, compared to lending rate, the pass-through effects of deposit rate are closer to 1.

Table 2 The Long-Term Parameter Estimation

Parameter	d_0	d_1
DR model	0.425 (0.000)***	0.935 (0.000)***
LR model	4.317 (0.000)***	0.809 (0.000)***

Notes: *** indicates statistically significant at 1% level. The long-run run estimation is based on $R_t = d_0 + d_1 \text{MMR} + e_t$. R_t is referred to retail rates.

The empirical results of the TAR cointegration test are presented in Table 3. The results show that cointegration exists between policy rate and retail rates. Given that policy rate and retail rates are cointegrated, the null hypothesis of symmetric adjustment (φ) can be tested. Based on the result, the null hypothesis is rejected at a 5% significant level for both models, which show that asymmetry does appear in the model. As for the DR model, $|\rho_1| < |\rho_2|$ shows that the deposit rate moves faster toward the long-term equilibrium when the policy rate is rising, and slower toward long-term equilibrium when the policy rate is declining. In other words, the speed of adjustment is faster for policy rate increases compared to the time when the policy rate decreases. An adverse result is shown in the LR model. For lending rates, the speed of adjustment is found to be slower (faster) when the policy rate increases (decreases). This finding is in line with Bruna (2008), who reported that deposit rate and lending rate reacted differently to the change in policy rate.

Table 3 Results of TAR Test

	Lags	τ	ρ_1	ρ_2	Φ	F
DR model	2	-0.388	-0.233	-0.648	40.814**	21.917**
			(-3.833)***	(-8.753)***		
LR model	3	-0.152	-0.072	-0.025	7.153**	2.315
			(-3.789)***	(-1.086)		

Note: ** and *** indicate statistically significant at 5% and 1% levels, respectively.

Table 4 illustrates the results of MTAR for DR and LR models. The F-statistic indicates that both deposit and lending rates are cointegrated with policy rate. As shown in the results, the null hypothesis of symmetric adjustment is rejected at a 5% significant level. Therefore, we can conclude that the

cointegrations are asymmetric. Given that $|\rho_1| < |\rho_2|$ in both models, the response of deposit and lending rates are faster when there is an increase in the policy rate rather than a decline in policy rate. This implies that the adjustment speed of both retail rates move faster toward the equilibrium path when the policy rate is increasing.

Table 4 Results of MTAR

	Lags	Threshold	ρ_1	ρ_2	Φ	F
DR model	2	-0.113	-0.132 (-2.316)**	-0.793 (-11.493)***	65.028**	63.301**
LR model	3	-0.172	-0.018 (-1.028)	-0.144 (-4.983)***	13.132**	13.855**

Note: ** and *** indicate statistically significant at 5% and 1% levels, respectively.

SUMMARY AND CONCLUSIONS

This study aims to provide more evidence regarding interest pricing behavior in Malaysia financial markets by analyzing the interest rate pass-through of policy rate to retail rates in Malaysia. Asymmetric threshold cointegration tests are utilized in this study, with monthly data covering the period from 1987:1 to 2014:12.

The empirical results of this finding show that interest rate pass-through of retail rates in Malaysia are incomplete. However, the pass-through of deposit rate is higher than lending rate, and the pass-through effect is nearly 1. This shows that the deposit rate may have a closer linkage with policy rate. In the adjustment process, we discover the presence of asymmetric adjustment in both retail rates. It means there is a difference between positive and negative deviation in returning to an equilibrium path. The occurrence of asymmetric adjustment might arise from the asymmetric information.

As the power of MTAR is stronger than TAR in plausible range of adjustment parameters (Enders & Siklos, 2001), the adjustment speeds of MTAR are emphasized. The findings imply that retail rates in Malaysia have downward rigidity. It reflects that retail rates respond faster to policy rate when it is increasing rather than declining. This result is in line with the findings of Levine and Loeb (1989), Dueker (2000) and Thacz (2001) which documented that interest rate exhibits downward rigidity. Thus, policymakers need to take heed of the asymmetric information that will induce adverse selection and moral hazard (Stiglitz & Weiss, 1981).

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