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The Effectiveness of Overnight Policy Rate as a Nominal Anchor for Malaysian Monetary Policy

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Abstract

This paper examines the effectiveness of Overnight Policy Rate (OPR) as a nominal anchor for Malaysian monetary policy and the process through which the monetary authority determines the policy rate in the economy. The paper applies Generalized Method of Moments (GMM) estimators to estimate both baseline and augmented policy rules. The findings of the post OPR adoption and full sample periods are characterized by forward-looking policy rule. Moreover, the study uses the augmented monetary policy rule to identify the factors that determine the overnight policy rate in the economy. The results confirm that the overnight policy rate framework serves as a nominal anchor for the economy. The policy implication of the findings is that for Malaysian economy to continue keeping the overnight policy rate to the required basis point, Bank Negara Malaysia should further enjoy monetary policy independence to strengthen the OPR framework adopted in the economy.

JEL Classification**:** *E31, E52, E58*

Keywords: *baseline policy rule; forward-looking rule; Generalized Method of Moments; Malaysia; monetary policy; nominal anchor; structural breaks.*

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1. Introduction

The evolution of monetary policy in Malaysia has experienced a significant policy changes. This noticeably begins with interest rate liberalisation in the late 1970s which later switched to base-lending rate in 1983. Prior to 1980s, the monetary policy was tailored towards the movement of M1 and later to M2 in the early part of 1980s. Furthermore, the authority shifted to M3 targeting in the late 1980s. The central bank of Malaysia in consideration of new financial innovation, changed from monetary targeting to a new framework of interest rate targeting, overnight policy rate in the year 2004. The policy is not aimed at changing the general operating procedure of the Malaysian monetary policy, rather anticipated to enhance effectiveness of the monetary policy by altering the operating procedures to promote efficient pricing in the financial market (Abdul Karim et al., 2009).

The test of whether the new monetary policy framework become more effective or not can only be assessed under an alternative exchange rate regime (Torres, 2003). The management of exchange rate of Malaysia also witnesses structural changes. The monetary authority of Malaysia abandoned the fixed exchange rate regime to managed floating regime in 2005. This leads to cessation of exchange rate as a nominal anchor in the economy. The term nominal anchor is a policy variable which the economy manipulates through it central bank to achieve its monetary policy objective (Bassey and Essien, 2014; Torres, 2003). Some of the obvious questions this study seek to investigate include; what significance do inflation deviation, output gap, real exchange rate and real money supply have on the new monetary framework of overnight policy rate in Malaysia?. This is a question that has not been properly addressed in the context of Malaysia especially after the implementation of the overnight policy rate in the economy.

The essence of this study is to empirically investigate the effectiveness of overnight policy rate as a nominal anchor and the process through which the monetary authority determines the overnight policy rate for Malaysia. This study differs from the previous studies in number of ways. Unlike the study of Abdul Karim and Abdul Karim (2014) who employ backward-looking policy rule on aggregate supply and demand to assess the monetary policy implementation in interest rate regime, this study uses an augmented forward-looking monetary policy rule to examine the effectiveness of OPR as a nominal anchor and the process followed by the central bank of Malaysia to determine the policy rate. We employ Taylor rule and a different methodology; GMM estimators in the estimation process. The study, to the best of our knowledge, is the first to be conducted on the Malaysian economy especially following Torres (2003) methodology. Moreover, the reasons for the inconsistencies in the literature regarding the role played by interest rate as a nominal anchor in other parts of the world remained unjustified and yet a debatable issue. Furthermore, the use of augmented forward-looking monetary policy rule specification as far as emerging economies are concerned is also an issue that deserves investigation.

The remaining sections of the paper are outlined as follows: Section 2 presents review of literature. Section 3 focuses on the theoretical framework. Section 4 deals with the methodology and describes the data and measurement of variables. Section 5 analyses the empirical results and section 6 gives the concluding remarks and policy implication.

2. Review of literature

The overnight policy rate is an interest rate targeting by the monetary authorities in order to achieve the objective of price and other macroeconomic stability. The appropriateness of interest rate generally in achieving the objective of price stability by central banks around the world still remained a debatable issue and rarely dealt with in the literature. The literature on the macroeconomic performance of interest rate manipulation in form of inflation targeting largely focused on the developed countries (Aizenman, Hutchison and Noy, 2011). The results from the advanced countries also differ in most cases, therefore, inconclusive in the literature. Aizenman and Hutchison (2012) investigate the effect of inflation targeting in 16 emerging markets using Taylor's rule regression model. They conclude that the emerging markets adopt a dual inflation targeting where the central banks set interest rate to respond to inflation and exchange rate simultaneously even though the response to exchange rate is stronger in countries that did not adopt inflation targeting. Some other studies also reveal that inflation targeting (interest rate management) improves the aggregate economic performance of the targeting economies. These include: Abdul

Karim and Abdul Karim (2014); Goncalves and Salles (2008); Lin and Ye (2009); Lin and Ye (2012); Mendonca, Jose and Souza (2012); Mishkin (1999) and Yamada (2013).

However, some findings indicate that there is no economic and policy difference between interest rate targeting and non-targeting countries. Furthermore, some other studies discover that the adoption of interest rate management is irrelevant in enhancing the performance of macroeconomic aggregates. This is found in the studies of Ball and Sheridan (2004); Brito and Bystedt (2010); Mishkin (2007); Roisland and Torvik (2004); Saborowski, (2010) among others.

In Malaysia for instance, Abdul Karim and Abdul Karim (2014) assess the monetary policy implementation during interest rate regime. The study shows that the policy works better during interest rate era. Abdul Karim, Said, Jusoh and Thahir (2009) and Antoni (2010) also estimated the backward-looking monetary policy rule for Malaysia. The findings show that interest rate significantly affect the output gap in the economy. However, Poon and Tang (2009) examine the appropriateness of inflation targeting in Malaysia. Their result indicates that inflation targeting is not appropriate for Malaysia even though changes in interest rate and exchange rate affect consumer price index in the economy.

However, most of the previous studies were carried out under pegged exchange rate regimes which have fewer bases for assessing the success of the policy rule. Taylor rule policy is better assessed under an alternative exchange rate regime due to the principle of "impossibility of the holy trinity" (Edwards, 2007; Carare and Stone, 2006; Mishkin and Savastano, 2001).

3. Theoretical framework

We employ Taylor rule as a framework for monetary policy. The rule specifies how nominal interest rate should be adopted by the monetary authority in response to changes in inflation, output and other macroeconomic variables. The rule hypothesised that inflationary pressure increases in the economy as a result of excess aggregate demand. This leads to an upward raise in the level of inflation as well as output gap and therefore the monetary authorities will raise the rate of interest in response to the increase in the output gap and inflation deviation. However, including the deviation of the actual output from its potential quantity in the framework tend to normalize the high interest rate in response to the high inflationary rate thereby reducing it adverse effect on the economic activities (Torres, 2003).

The baseline Taylor rule is augmented by number of authors. This entails how to approximate the rule in a standard New Keynesian macroeconomic framework through central bank's process of optimization. The central banks try to minimize the quadratic loss function that exist in the inflation and output gaps. The modified rule also suggests that when the expected inflation is above the target, the real interest rate should be raised through increasing the nominal rate in order to restore inflation to the target rate. This is possible through the contraction in the aggregate demand. Furthermore, the modified rule also suggests that as output rise above its potential quantity then, the same response is expected from the monetary authorities in order to curtail the effect of future inflationary pressure in the economy. However, this specification works well in the developed open economies where there is a reasonable macroeconomic stability (Clarida, Gali and Gertler, 2000).

It has been argued in the literature that in a developing small open economy such as Malaysia where the monetary authority is confronted with other macroeconomic instability such as exchange rate volatility and external financial market shocks, other variables like exchange rate, money supply, country risk perception and foreign interest rate can reflect the uncertainty in the expected inflation and deviation of the actual output from the potential quantity (Svensson, 2000; Gali and Monacelli, 2005). Taylor (1993) also suggested similar variables such as money supply and exchange rate.

4. Methodology and data

4.1 Unit root test

In this study we investigate the time series properties of the variables using Lee and Strazicich (LS) with one break LM test. The rationale behind employing the LS technique is to account for structural breaks in the series. This will help in overcoming the problems of size distortion, location dependence and nuisance parameter estimates

in the data generating process (Lee and Strazicich, 2013). Furthermore, the test is robust irrespective of whether structural breaks exist or not.

4.2 Taylor rule and GMM estimation

The proper estimation procedure adopted in this study is the commonly employed time series based Generalized Method of Moments (GMM) proposed by Hansen (1982) and Hansen and Singleton (1982). The use of the methodology is justified due to the anticipated overlapping data problem resulting from the variable construction and non-constant variance in the forecast error. This leads to moving average process which prevents the consistency of the usual variance covariance matrix. Thus, not efficient in testing hypotheses. The first-order of the discrete-time conditional model is given in Equation 1.

$$\mathrm{E}_t h(x_{t+n}, b_0) = 0 \tag{1}$$

here E_t stands for expectation operator over time, x_{t+n} is the observed variables k dimension vector at time $t+n$ for the forward-looking policy rule. The observed variables in this study include the nominal interest rate, inflation deviation, real output gap, real exchange rate, and real money supply. b_0 denotes the unknown l dimension vector of parameters estimated using the procedure of the generalized instrumental variables with orthogonal condition and criteria function that guarantee consistency, asymptotic normal distribution and consistent asymptotic covariance matrix estimators of b_0. In this study, the monetary policy rule for Malaysia will be considered under both the baseline and augmented forward-looking rules described underneath.

4.2.1 The monetary policy rule for Malaysia: the baseline case

The paper specifies the policy rule for Malaysia following Clarida, Gali and Gertler (1999) and Torres (2003). The baseline monetary policy rule is estimated to determine the process followed by the Bank Negara Malaysia to set interest rate in the economy. The rule is assumed to react to deviations in inflation and output gaps in the economy. Following Orphanides (2004) the policy rule is a function of inflation and real economic activities outlook as presented in Equation 2.

$$i_t = \alpha + \beta(\pi_t - \pi_t^*) + \gamma(y_t - y_t^*) + \varepsilon_t \tag{2}$$

here i_t denotes the instantaneous interest rate, α connotes the equality of inflation to its target policy rate in a steady state when deviation of output from its potential quantity equals to zero. The symbols β and γ are coefficients of inflation deviation and output gap respectively. The symbols $\pi_t - \pi_t^*$ and $y_t - y_t^*$ denote inflation deviation from target and output gaps. The error term ε_t represents other factors that can affect the interest rate at that period apart from the inflation and output gaps. We specify a forward-looking baseline policy rule in Equation 3 because the monetary policy is more concern about future expectations compared to the usual historic approach.

$$i_t^* = (k + \alpha\pi_{t+n}^*) + \beta(\mathrm{E}_t[\pi_{t+n} - \pi_{t+n}^*]) + \gamma(\mathrm{E}_t[y_{t+k} - y_{t+k}^*]) \text{ , } i_t = (1-\rho)i_t^* + \rho i_{t-1} + \nu_t \tag{3}$$

where i_t^* represents the target interest rate. $k + \alpha\pi_{t+n}^*$ denotes the nominal interest rate. The actual interest rate assumed a gradual adjustment process in converging to the target interest rate. Moreover, the actual interest rate is the combination of the lagged interest rate, the weighted average of the interest rate target and the white noise interest rate shock. The estimable baseline, forward-looking monetary policy rule is described in Equation 4.

$$i_t = (1-\rho)(k + \alpha\pi_{t+n}^*) + (1-\rho)\beta(\mathrm{E}_t[\pi_{t+n} - \pi_{t+n}^*]) + (1-\rho)\gamma(\mathrm{E}_t[y_{t+k} - y_{t+k}^*]) + \rho i_{t-1} + \nu_t \tag{4}$$

here the parameter ρ indicates the magnitude of interest rate smoothening and in turn assumed the value of between zero (0) and a maximum of one (1). Equation 4 is estimated using GMM technique following Torres (2003) and Ophanides (2004). The study tests the hypothesis of whether the overnight policy rate of Malaysia has fulfilled the requirements to serve as a nominal anchor and whether it represents the process through which the central bank

determines interest rate from the baseline monetary policy rules. Equation 4 is estimated to see if β and γ are significant and greater than 1 and 0 respectively. For the central bank to achieve price stability as one of its objectives, the monetary authorities will be more concerned about inflation gap compared to the output gap.

4.2.2 The augmented simple forward-looking monetary policy rule

The augmented forward-looking rule takes account of other important set of variables in addition to lagged inflation and output in predicting the future economic situation (Clarida *et al*., 2000). The augmented rule also uses interest rate as the policy reaction function. The rule is a function of the expected inflation and output gaps each period coupled with their target levels. This is presented in a linear form in Equation 5 following the work of Clarida *et al*. (2000).

$$r_t^* = r^* + \beta(\mathrm{E}[\pi_{t,k} / \eta_t] - \pi^*) + \gamma \mathrm{E}[x_{t,q} / \eta_t] \quad (5)$$

here r_t^* represents the target interest rate at time *t*. r^* is the target interest rate when the target levels of inflation and output are achieved. $\pi_{t,k}$ stands for the price level annual percentage change between *t* and *t+k*. The symbol $x_{t,q}$ is the deviation of output from its potential quantity expressed in percentage. This measures the average output gap in terms of *t* and *t+q*. The estimable forward-looking augmented monetary policy model is also specified in equation 6 below.

$$i_t = (1-\rho)(k + \alpha\pi_{t+n}^*) + (1-\rho)\beta(\mathrm{E}_t[\pi_{t+n} - \pi_{t+n}^*]) + (1-\rho)\gamma(\mathrm{E}_t[y_{t+k} - y_{t+k}^*]) + (1-\rho)\phi(\mathrm{E}_t[z_{t+m}]) + \rho i_{t-1} + v_t \quad (6)$$

The additional symbol z_{t+m} represents other variables such as the real money supply and real exchange rate that can also help in determining the process through which interest rate is determined in Malaysia. This is considered in order to find out the function of other macroeconomic variables in determining the process through which the overnight interest rate is determined by the monetary authorities in the economy. Equation 6 estimates α, β, γ and ρ parameters using the Hansen (1982) generalized method of moments while accounting for serial correlation in v_t using an optimal weighting matrix until the vector of instrument variables become greater than the number of the estimated parameters. This assessment is also done considering expected inflation as the most important measure compared to the lagged inflation. The rule also follows the same process in determining the process of setting interest rate and the way in which monetary policy become a nominal anchor in the economy. The equilibrium real interest rate $rr*$ is derived as an average of the observed sample. The estimation is further subjected to the test of validity of the instruments and model specification.

4.3 Data and measurement of variables

The paper uses quarterly time series data over the period of 1980Q1 to 2015Q1. The data were collected on nominal interest rate, inflation rate, real gross domestic product, real exchange rate and real money supply from the International Financial Statistics and Central bank of Malaysia. A set of instrument variables are employed to ensure zero forecast error. In this study, the instruments include lag values of the observed variables in the model. Moreover, the inflation deviation and output gap are measured as difference in inflation and real output from their target and potential output respectively. This is measured using the Hodrick-Prescott filter. The method was proposed by Hodrick and Prescott (1997).

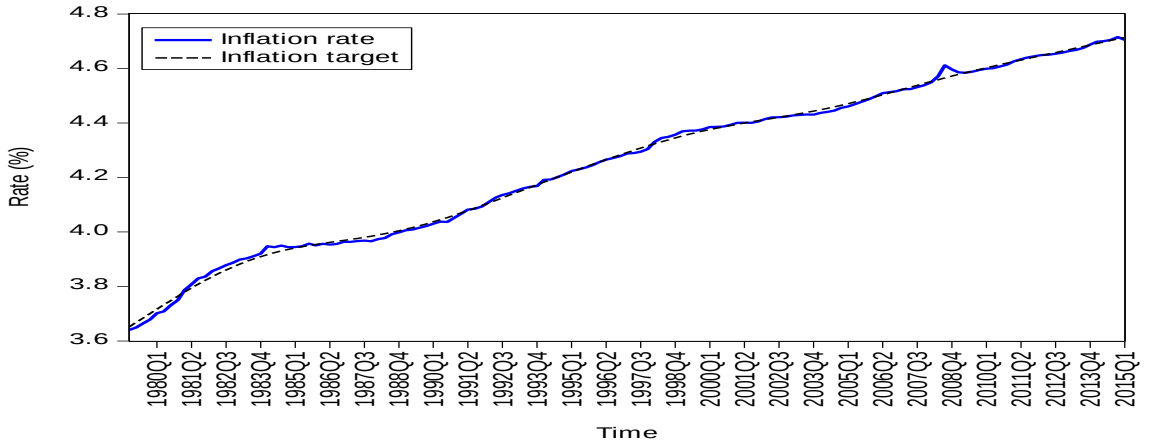

Figure 1: *Inflation rate and inflation target*

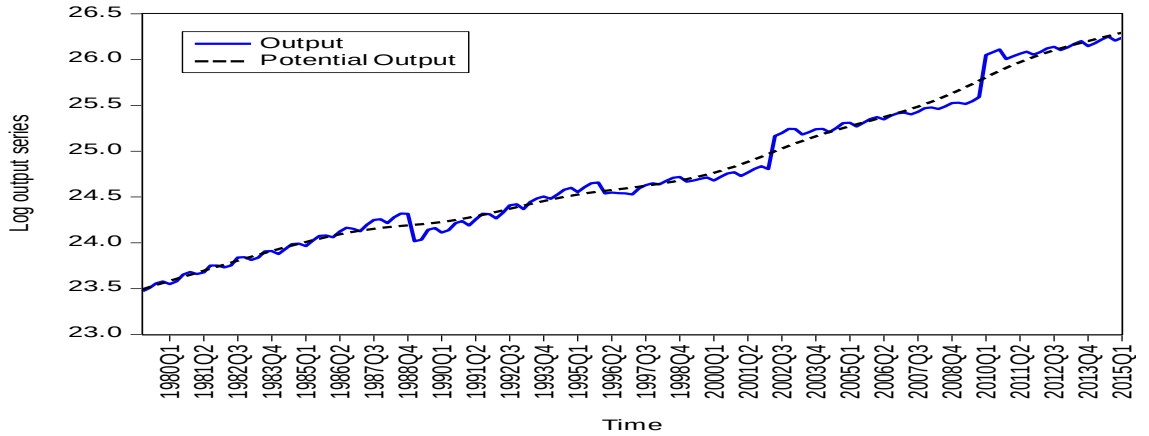

Figure 2: *Output and potential output*

Figures 1 and 2 depict the plots of inflation and inflation target and output and potential output respectively. The graphs indicate that both the actual inflation and output have not been equal to the inflation target and potential output in the economy. The graphs further indicates that the deviations are more widely observed in output gap than in inflation deviation. The wide deviation of inflation from its target occurred in early 1980s, 1998 and 2008. These points might be explained by the financial crisis and measures taken by the government to combat the menace of the shocks. The output gap also shows a similar trend although it is apparently wider than the inflation deviation at all the times.

5. Empirical results

5.1 Unit root result

The paper employs LS test to check the stationarity of the series. The test assumes the existence of breaks in both the null and alternative hypotheses. The test is break point nuisance invariant under both null and alternative hypotheses. The procedure is unaffected by neither size nor location distortion. This makes the test free from spurious rejection and unaffected by size and incorrect estimation irrespective of whether a structural break is present or not (Lee and Strazicich, 2003).

The LS test results presented in Table 1 shows that all the series are found to be level stationary at the conventional significance level under both intercept and trend models with the exception of real exchange rate (*RER)* which is found non-stationary under the trend model. Therefore, the test results establish that the series are level stationary with structural breaks.

Table 1 Lee and Strazicich One-Break Minimum Lagrange Multiplier (LM) Unit Root Test

	Model A					Model C				
Variables	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*t-stat.*	λ	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*t-stat.*	λ
INR	4	1999:1	-4.389***	-3.578[B]	-.03	4	1986:4	-3.273***	-4.358[C]	-.01
IFD	4	1986:1	-1.198	-3.898[B]	-.01	4	1986:1	-2.212**	-4.388[C]	-.02
YGP	4	2009:3	-1.209	-5.310[A]	-.01	4	2000:2	.202	-5.146[A]	.01
RER	4	1986:1	-1.916*	-3.377[C]	-.04	4	1998:3	-.553	-3.676	-.01
MSS	4	1993:4	2.757**	-3.889[B]	.02	4	1995:1	.857	-4.978[B]	.01
Critical values		*1%*	*5%*	*10%*						
Model A		-4.239	-3.566	-3.211						
Model C		-5.110	-4.500	-4.210						

Note: k is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. T_B denotes the estimated break points. $\hat{t}_{\gamma j}$ is the *t* value of DT_{jt}, for j=1. See Lee and Strazicich (2013) page 2488, for the critical values. The lambda, λ is the critical value break point. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% critical level, respectively. While ***, ** and * indicate the two-tailed significance level of the break date at 99%, 95% and 90% respectively.
Source: Authors' computation

5.2 Result of the baseline forward-looking monetary policy rule

The baseline case of the forward-looking monetary policy rule is estimated based on Equation 4. The model is estimated for the period prior to the adoption of the overnight policy rate, after the adoption and the full sample period. The results are presented in Table 2.

Table 2: Baseline forward-looking monetary policy rule for Malaysia

Regime	κ	α	β	γ	ρ	J -Stat.
Pre-OPR era	-0.001	0.770	-0.074	5.305	0.674	0.003(0.993)
	(0.007)	(2.154)	(10.004)	(20.322)	(1.387)	
Post-OPR era	4.363	0.012	2.865***	-0.991	0.536***	4.894(0.073)
	(7.117)	(0.013)	(0614)	(0.779)	(0.023)	
Full-Sample era	1.249***	0.309***	1.035***	0.016	1.032***	13.505(0.061)
	(0.203)	(0.022)	(0.032)	(0.063)	(0.014)	

***, ** & * represent 1%, 5% and 10% respectively. The values in parentheses denote standard errors, while the parentheses attached to *J* statistics show the probability values of the *J* statistics.
Source: Authors' computation

Prior to the implementation of the OPR in Malaysia, a rise in the nominal interest rate by the central bank was not sufficient enough to rise the real rate. Therefore, the increase was not enough to lower aggregate demand in order to bring inflation back to its equilibrium level in the economy. However, the result in the post-OPR adoption indicates that the real interest rate responds to the rise in the nominal rate which succeed in cutting the aggregate demand and inflation to their target rates. Furthermore, the full sample period also follow the trend of the post-OPR adoption

which depicts the pursuance of true interest rate targeting in the economy. The values of k and α in the second and third columns of Table 2 represent the equilibrium nominal interest rate in the long run. The result of the β in the pre-OPR era is found negative and not significant indicating that prior to the adoption of OPR the rise in the nominal rate of interest does not influence the real rate to restore inflation back to its appropriate required level. The significant positive and greater than one value of $\beta > 1$ in the post-OPR and full sample periods, 2.865 and 1.035 respectively indicate that the central bank of Malaysia has performed the role of nominal anchor for the economy through the mechanism of interest rate targeting. The coefficients of the output gap for all the eras are found not significant which also reveal a further indication that the monetary authority practices full pledged interest rate targeting in the economy.

The adequacy of the model is assessed for the moments condition of over-identification using an objective function through Sergen statistics (*J*-statistics). We test the null hypothesis that the over-identifying restriction is fulfilled. We fail to reject the null hypothesis of over-identification. This shows that the GMM estimators are asymptotically normally distributed and consistent (Hansen and Singleton, 1982). The instruments employed in the estimation contain the necessary information at the time of setting the rate of interest by the authorities and anticipated to be vital in determining the output gap and inflation deviation.

5.3 ***Results of the augmented forward-looking monetary policy rule***

Table 3 presents the results of the augmented forward-looking policy rule. The rule accounts for the influence of other variables such as the real exchange rate and real money supply in determining the equilibrium interest rate. The statistical significance of the variable β in all cases; pre-OPR, post-OPR adoption and full sample period indicate the independence of each variable augmented in the model. The fact that including the additional variables did not alter the expected signs and magnitude of the baseline result; it is an indication that none of the variables is correlated with the output gap and inflation deviation. Therefore, the information obtained in the real exchange rate and real money supply is independent of expected inflation and output gaps in the economy. The following combination (expected inflation deviation, output gap and real exchange rate) portrays the approximation of the mechanism through which the central bank of Malaysia can determine its overnight policy rate.

Table 3: Augmented forward-looking monetary policy rule for Malaysia

Regime	κ	α	β	γ	EXC	MSS	ρ	*J*-Stat
Pre-OPR	1.478	0.416	-4.149***	-1.880	0.083	1.343	1.094***	
	(11.417)	(0.199)	(1.474)	(1.634)	(0.239)	(1.512)	(0.131)	1.782(0.092)
Post-OPR	0.513	0.137	2.251***	4.375	0.664***	3.776	0.593	
	(11.984)	(1.013)	(1.049)	(29.386)	(0.198)	(18.522)	(0.980)	2.236(0.135)
Full-Sample	0.004	0.482***	2.864***	0.206	0.168***	1.575	0.937***	
	(0.011)	(0.107)	(0.032)	(0.460)	(0.071)	(1.084)	(0.077)	0.001(0.970)

***, ** & * represent 1%, 5% and 10% respectively. The values in parentheses denote standard errors, while the parentheses attached to *J* statistics show the probability values of the *J* statistics.
Source: Authors' computation

The augmented rule also indicates that the coefficients of β and γ do not follow the Taylor rule principle in the pre OPR era. The findings in both post OPR and full sample periods report a significant and positive none zero parameters for the real exchange rate; meaning that any increase in exchange rate in the economy can be restore by a sufficient rise in the nominal interest rate which stimulate the real rate of interest. The parameters β and γ are found positive and greater than 1 and 0 respectively. However, only the coefficient of β is found to be statistically significant. This result further supports the nominal anchor hypothesis and adoption of the full-fledged interest rate

targeting in the country as earlier revealed by the baseline case. The finding is in line with Taylor principle and Abdul Karim and Abdul Karim (2014) for Malaysia among others.

6. Conclusions and policy implication

The study investigates the process through which the Malaysian monetary authority determines its policy instrument in the economy and whether OPR has performed the role of the nominal anchor in the economy. The finding indicates that the monetary policy in Malaysia is characterised by a forward-looking policy rule in which the parameter of the inflation deviation is significant and greater than one in both cases and that of output gap is positive and greater than zero although not significant in most cases. The implication of this result is that, when monetary authority increases the nominal interest rate, the real rate will respond sufficiently in response to the expected inflation in the economy. The finding confirms that Malaysian economy uses OPR as a nominal anchor immediately after the adoption of policy. In the alternative policy rule; the augmented version of the monetary policy rule, the Malaysian interest rate could be determined by the real exchange rate and real money supply in addition to the baseline variables (inflation deviation from its target and output gap). This indicates how the domestic economic performance of Malaysia relates to monetary policy rate, although real exchange rate is an asset price which relates to the strength of the domestic currency in relation to the basket of foreign currencies. The policy implication of the findings is that for Malaysian economy to continue keeping the overnight policy rate to the required basis point, Bank Negara Malaysia should further enjoy monetary policy independence to strengthen the OPR framework adopted in the economy.

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