The information content of the Islamic interbank money market rate in Malaysia

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Abstract

Purpose – The purpose of this paper is to analyze the information content of the Islamic interbank money market rate (IIMMR), with respect to several macroeconomic indicators such as output, inflation, exports, imports, bank loans and stock market index, and compare it against that of the conventional interbank money market rate using the Malaysian data.

Design/methodology/approach – The paper relies on the causality tests based on the Toda-Yamamoto method, focusing on the period from January 2000 to December 2006.

Findings – The results provide empirical support for the high information content of the IIMMR.

Practical implications – A major implication of this study is that the IIMMR can be a reliable variable for monetary policy implementation in the Malaysian case.

Originality/value – There have been no studies undertaken in the area of Islamic finance to analyze the information content of the Islamic money market rate to determine its possibility as a monetary policy variable. Alos, the paper enriches the literature by presenting the Malaysian experience in developing its Islamic interbank money market.

Keywords Islam, Monetary policy, Money markets, Banking, Malaysia

Paper type Research paper

Introduction

The information content provided by financial variables is highly valuable, particularly to policymakers. Variables with high information content about the economy could function as the relevant policy indicators or trigger variables in the implementation of macroeconomic policies. In the case of monetary policy, often, monetary aggregates or interest rates are considered as relevant trigger variables used to influence the intended macroeconomic variables. Implementation of monetary policy through the policy indicator that has the most information content about the economy ensures effective and timely policy implementation, thus successful achievement of the policy objectives.

The choice of the financial variables as the "best policy indicator" would largely depend on how well the indicator could predict movements and directions of the macroeconomic variables. Furthermore, with the continuously changing financial landscape, the relevance of a particular variable as the policy indicator could also be changing. In this regard, it is a challenge for the policymakers to ensure that the policy indicator that they are adopting continues to remain relevant in line with the dynamic nature of the financial sector.

In this study, we examine the possibility of the Islamic interbank money market rate (IIMMR) as the policy indicator by assessing its information content about the Malaysian economy. What motivates us to undertake this analysis is that while the Islamic financial

market has been rapidly developing in the Malaysian economy for quite some time now, there is no study being undertaken to determine the relevance of the Islamic monetary instrument in the policymaking process of the country. In particular, the Malaysian Islamic money market has been established since January 1994 with the main objective to facilitate fundings for Islamic banks and Islamic banking windows in the country. After 14 years since its establishment, the Islamic money market has experienced rapid growth, in tandem with the vibrant and progressive Islamic financial sector in the country. This is well-reflected by the large amount of funds channeled by the Islamic money market, which range from RM30 billion to RM40 billion monthly. Reflecting the commitment to turn the country into a global Islamic banking and finance hub, the Malaysian central bank – Bank Negara Malaysia (BNM) – continues to remain supportive of the development of the Islamic financial markets. In this regard, BNM continues to provide a conducive policy environment for the Islamic money market to develop, together with the conventional money market.

Owing to the supportive policy environment, as well as the increasingly high demand for Islamic financial products by the local and global players, the Malaysian Islamic interbank money market has become one of the most vibrant. The performance of the Islamic interbank money market has been comparable to that of its conventional counterpart. As shown in Figure 1, the IIMMR has been moving in tandem with the conventional interbank money market rate (CIMMR). Despite this, two interesting observations can be made from the figure. First, there seems to be relatively more volatile movements in the CIMMR in the early 2000s period. In the more recent periods however, the IIMMR seems to be more volatile compared to the CIMMR. Second, movements in the IIMMR seem to be leading those of the CIMMR, which is becoming more obvious in the more recent periods. Despite this, detailed inferences on the movements of the money market rates can only be made after further empirical analysis.

To provide evidence on the IIMMR's predictive ability of the economic activity in Malaysia, we analyse the information content of the IIMMR with respect to selected macroeconomic and financial indicators. Then we compare it against the CIMMR so as to determine the performance of the IIMMR as the information variable or the policy indicator in the Malaysian case. From this finding, we hope to draw some policy implications in terms of the relevance of the Islamic monetary instrument in the monetary policy implementation in the Malaysian economy.
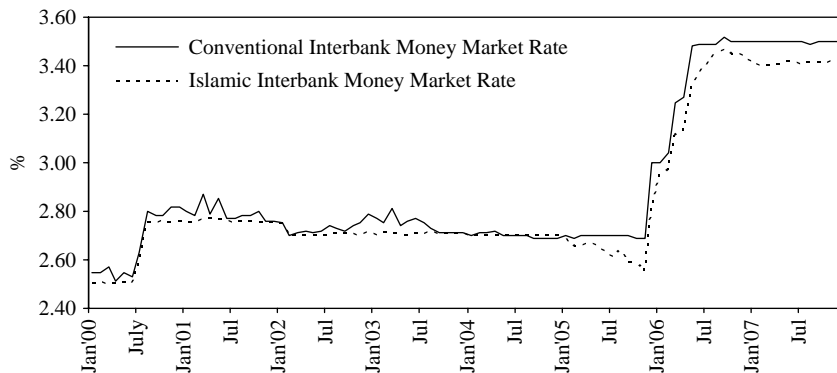
Figure 1.
The interbank money
market rate: conventional
and Islamic

This paper contributes to the literature in several ways. First, to our knowledge, studies analysing the information content of the IIMMR to determine its possibility as a monetary policy variable have been meagre. Thus, it is hoped that this paper will enrich the Islamic finance literature by providing a deeper analysis on this topic through the use of more sophisticated investigation technique in its empirical analysis. This paper would also enrich the literature by presenting the Malaysian experience in developing its Islamic interbank money market.

The rest of the paper is organised as follows: the next section surveys some of the available literature on the information content of financial aggregates and their relevance in monetary policy implementation. Section 3 presents the nature of data and methodology adopted by this paper and Section 4 highlights the empirical findings based on the Toda-Yamamoto method. Finally, Section 5 discusses the policy implications and concludes.

Literature review

Ensuring the most relevant policy indicator is one of the critical factors for an effective monetary policy implementation. In view of its importance, extensive research has been done in this area, particularly on the predictive ability of the financial variables on the macroeconomic indicators (Bernanke and Blinder, 1992; Friedman, 1996; Tallman and Chandra, 1996; Bullock *et al.*, 1989). These studies mostly employ the vector auto-regression (VAR) methodology to assess the forecasting ability of the financial aggregates on major macroeconomic variables such as output and prices.

Bernanke and Blinder (1992) use the VAR methodology to asses the predictive ability of selected monetary policy indicator candidates, namely, M1, M2, three-month Treasury bill rate, ten-year government bond rate and federal (fed) funds rate on several measures of economic activities including industrial production, capacity utilisation, unemployment rate, housing starts, personal income and retail sales. Focusing on monthly data spanning from July 1959 to December 1989, the study shows that the fed funds rate has the most information content about the economy owing to its significant predictive ability in explaining the movements in the macroeconomic variables. Since much of the information content of the economy is concentrated in the fed funds rate, the study concludes that the fed funds rate is the best measure for the monetary policy stance in the USA. Therefore, findings of the study support the current adoption of the fed funds rate as the indicator for monetary policy in the USA. Recent works of Bernanke and Boivin (2003) and Bernanke *et al.* (2005) largely adopt the more sophisticated factor-model approach developed by Stock and Watson (1999) which allows for the utilization of a large data set by summarising the data into a few estimated factors. The new approach enables more accurate forecast and reliable policy prediction (Bernanke and Boivin, 2003).

Several other studies, such as those by Friedman (1996) and Friedman and Kuttner (1992), lend further support to Bernanke and Blinder's (1992) study. These studies show that interest rates are a better predictor of the economic activity, while monetary aggregates are becoming less relevant as monetary policy indicator. Friedman (1996) adopts a variance decomposition analysis to show that the information content of monetary aggregates on the real economy has diminished and is virtually non-existent. Apart from the various approaches adopted by these studies in searching for the best policy indicator for a particular economy, a major implication that can be drawn is that

the monetary policy indicator might be changing in line with the dynamic transformation of the economic and financial landscape of a country.

For the case of Malaysia, studies focusing on the information content of financial indicators have been somewhat limited, mostly focusing on the information content or the predictive ability of monetary aggregates on output (Kwek, 1992; Ibrahim, 1999; Habibullah, 1999; Tan and Ahmad, 1999). In general, these studies support the high information content of monetary aggregates owing to their importance in predicting the behaviour of real output in the Malaysian economy.

A general conclusion from the above studies is that interest rates are a better information variable for the developed economies (such as the US economy), while monetary aggregates are superior information variables for the developing economies (such as the Malaysian economy). This is largely owing to the different levels of financial sector development that the two groups of economies are having (Ibrahim, 1999). As the financial sector increases in depth and width, the importance of monetary aggregates in influencing the economic activity diminishes.

Data and methodology
Data
In efforts to evaluate the information content of the IIMMR *vis-à-vis* the CIMMR, we study the interactions between the real macroeconomic variables and the two policy indicator candidates, and compare which policy indicator candidate that has the most information content of the macroeconomic variables. The selected policy indicator candidate can therefore be termed as the "best policy indicator" owing to its ability to explain the movements in the macroeconomic variables.

In this study, the candidates for the policy indicator are the overnight interbank money market rate from the conventional and Islamic interbank money markets, namely the CIMMR and IIMMR. Meanwhile, the real macroeconomic variables are the industrial production index (IPI), consumer price index (CPI), stock market index (the Kuala Lumpur Composite Index-KLCI), total bank loans (LOANS), total exports (EXPORTS) and total imports (IMPORTS). These macroeconomic variables are selected owing to their availability on monthly basis. With regard to data sources, the study relies on the Bank Negara Malaysia's *Monthly Statistical Bulletin*. The study focuses on the sample period from January 2000 to December 2006.

Methodology
The study relies on the Toda-Yamamoto (1995) method to analyse the causality relationship between the policy indicator and macroeconomic variables. The advantage of using the Toda-Yamamoto method for testing causality lies in its simplicity and ability to overcome many shortcomings of the traditional Granger (1969) causality test. It has been noted that the traditional Granger causality test for inferring leads and lags among integrated variables will end up in spurious regression results, and the *F*-test is invalid unless the variables in levels are cointegrated. New developments in econometrics offer the error-correction model (Engle and Granger, 1987) and vector error-correction model (Johansen and Jesulius, 1990) as alternatives for the testing of non-causality between economic time series. Unfortunately, these tests are cumbersome and sensitive to the values of the nuisance parameters in finite samples[1] and therefore

their results are unreliable[2] (for more critical discussion on this issue; Toda and Yamamoto, 1995; Zapata and Rambaldi, 1997).

The procedure proposed by Toda and Yamamoto (1995) is a simple procedure requiring the estimation of an "augmented" VAR, even when there is cointegration, which guarantees the asymptotic distribution of the modified-Wald (MWald) statistic. All one needs to do is to determine the maximal order of integration $d_{\max}$ (where $d_{\max}$ is the maximal order of integration suspected to occur in the system), which we expect to occur in the model and construct a VAR in their levels with a total of $(k + d_{\max})$ lags. Toda and Yamamoto (1995) point out that, for $d = 1$, the lag selection procedure is always valid, at least asymptotically, since $k > = 1 = d$. If $d = 2$, then the procedure is valid unless $k = 1$. Moreover, the MWald statistic is valid regardless whether a series is $I(0)$, $I(1)$, or $I(2)$, non-cointegrated or cointegrated of an arbitrary order.

In order to clarify the principle, consider the simple example of a bi-varite model, with one lag ($k = 1$). That is:

$$\begin{bmatrix} x_{1t} \\ x_{2t} \end{bmatrix} = \begin{bmatrix} A_{10} \\ A_{20} \end{bmatrix} + \begin{bmatrix} A_{11}^{(1)} & A_{12}^{(1)} \\ A_{21}^{(1)} & A_{22}^{(1)} \end{bmatrix} \begin{bmatrix} x_{1t-1} \\ x_{2t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \tag{1}$$

where A_{i0} are the parameters representing intercept terms and $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})$ is an independently and identically distributed bi-variate white noise process with zero mean and non-singular covariance matrix.

To test that x_2 does not Granger cause x_1, we will test the parameter restriction $A_{12}^{(1)} = 0$. If now we assume that x_{1t} and x_{2t} are $I(1)$, a standard t-test is not valid. We test $A_{12}^{(1)} = 0$ by constructing the usual Wald test based on least squares estimates in the augmented model:

$$\begin{bmatrix} x_{1t} \\ x_{2t} \end{bmatrix} = \begin{bmatrix} A_{10} \\ A_{20} \end{bmatrix} + \begin{bmatrix} A_{11}^{(1)} & A_{12}^{(1)} \\ A_{21}^{(1)} & A_{22}^{(1)} \end{bmatrix} \begin{bmatrix} x_{1t-1} \\ x_{2t-1} \end{bmatrix} + \begin{bmatrix} A_{11}^{(2)} & A_{12}^{(2)} \\ A_{21}^{(2)} & A_{22}^{(2)} \end{bmatrix} \begin{bmatrix} x_{1t-2} \\ x_{2t-2} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \tag{2}$$

The Wald statistic will be asymptotically distributed as a chi square (χ^2), with degrees of freedom equal to the number of "zero restrictions", irrespective of whether they are $I(0)$, $I(1)$, or $I(2)$, non-cointegrated or cointegrated of an arbitrary order.

Results

Since the Toda-Yamamoto method requires certain stochastic structure of the time series, stationary tests are performed to determine the order of integration of each time series using the standard Augmented Dickey-Fuller (ADF) (1979) and Kwiatkowski, Phillips and Shin (KPSS) (1992) tests. The results from Table I clearly suggest that none of the variables is stationary in level. The ADF test results show that the null hypothesis of a unit root cannot be rejected for all the variables at level. This result is further supported by the KPSS test which has the null of stationarity. In view of this, we differentiate the time series and based on the ADF test, all variables achieved stationarity after first difference. As in the previous case, the KPSS test result is supportive of that of the ADF test, that these time series are $I(1)$ process. As a result, the maximal order of integration is 1 to be considered for the purpose of optimum lag length for the causality tests based on the Toda-Yamamoto method.

| Series | ADF test | | KPSS test | |
	Level	First difference	Level	First difference
CIMMR	−1.252	−3.193**	0.597**	0.186
IIMMR	−0.772	−4.414***	0.573*	0.175
CPI	1.714	−10.36***	1.145***	0.613
IPI	−0.396	−5.472***	1.131***	0.077
RER	2.828	−3.867***	0.253*	0.727
IMPORTS	−0.589	−11.663***	1.063***	0.054
EXPORTS	−0.647	−11.985***	1.078***	0.057
KLCI	1.109	−8.214***	0.852***	0.611
LOANS	0.634	−7.084***	1.126***	0.305

Notes: *, **, ***denotes significance at the 1, 5 and 10 percent levels, respectively

Table I.
Results of the stationary
tests

Upon determining the order of integration of the time series, the next step is to proceed to the causality test. First, a bi-variate or pair-wise causality test based on the Toda-Yamamoto method is undertaken to test for causality between each policy indicator candidate and the individual macroeconomic variables. The results are shown in Table II. It should be noted that different pairs of estimations used different lags depending on the optimum lag selection criteria.

Very interestingly, the results indicate that the IIMMR out-performed the CIMMR in most of the cases. The null hypothesis of the causality test from the IIMMR to CPI, LOANS and RER can be rejected at the 1 percent significance level, suggesting that the IIMMR is highly significant in causing CPI, LOANS, and RER. In other words, the IIMMR has high information content about the movements in consumer prices, bank loans and real exchange rate based on the Malaysian case. However, the CIMMR is shown to be significant is causing only the RER at the 1 percent significance level and to a lesser extent, the CPI at the 10 percent significance level. Based on these results, the information content as well as the predictive power of the IIMMR is much higher compared to the CIMMR.

Since using only two variables in a system may result in mis-specification of the model, next, a multi-variate two-system model is being estimated with each containing the different policy indicator candidate and all the selected macroeconomic variables. The results shown in Table III further substantiate the earlier findings of the high information content of the IIMMR of the macroeconomic variables. The IIMMR is

Dependent variables	CIMMR	IIMMR
CPI	10.724 (0.057)*	22.064 (0.000)***
IPI	3.978 (0.553)	8.659 (0.372)
EXPORTS	5.534 (0.237)	2.166 (0.759)
IMPORTS	4.460 (0.347)	2.673 (0.614)
KLCI	5.962 (0.544)	1.763 (0.880)
LOANS	1.549 (0.901)	32.647 (0.000)***
RER	32.517 (0.000)***	23.635 (0.005)***

Notes: Figures in parentheses are p-values. *, **, ***denotes significance at the 1, 5 and 10 percent levels, respectively

Table II.
Results of the bi-variate
Toda-Yamamoto
causality test

significant at the 1 percent level in causing the CPI and RER, and KLCI at the 5 percent significance level. As for the CIMMR, the results based on the multi-variate estimation show that the CIMMR has information content of the macroeconomic variables comparable to the IIMMR. In particular, the CIMMR is significant in causing CPI and RER at the 1 percent significance level and LOANS at the 5 percent significance level. While the results based on the multi-variate causality estimation show that the CIMMR exhibits similar information content to the IIMMR, the findings are consistent to that of the bi-varite estimation that the IIMMR has high degree of the information content of the macroeconomic variables.

Conclusion

This paper analyzes the information content of the IIMMR with respect to several macroeconomic indicators such as output, inflation, exports, imports, bank loans and stock market index compared to the CIMMR, so as to analyze the possibility of it being a monetary policy indicator. The findings of the causality tests based on the Toda-Yamamoto method are supportive of the high information content of the IIMMR of the Malaysian economy.

These findings suggest that the IIMMR can be a likely candidate for a relevant and reliable monetary policy indicator for Malaysia owing to its high information content of the economy. In fact, the paper has shown that the predictive power of the IIMMR is comparable, if not better than, the current overnight policy rate (which is benchmarked against the CIMMR) adopted by the BNM. Alternatively, the IIMMR could also be use as a trigger variable to support the role of the CIMMR to reflect the monetary policy stance of BNM. In this context, the IIMMR could be an effective trigger variable to influence movements of the macroeconomic variables, thus the direction of the economy as intended by the central bank.

The findings of this study provide further support to the gradual adoption of a fully-fledged Islamic monetary system in Malaysia. Several studies have shown that the Islamic financial system at a disadvantage in a financial system where the conventional and Islamic systems operate in parallel, such as in the case of Malaysia (Rosly, 1999; Kaleem and Isa, 2006). In a dual financial system, the interest rate differentials between the Islamic and conventional money markets create arbitrage opportunity for the conventional financial institutions, leaving the Islamic financial institution at a disadvantage since these institutions are limited to transacting only in the Islamic financial market. Since we have shown that IIMMR's information content is

Dependent variables	CIMMR	IIMMR
CPI	40.448 (0.000)***	22.085 (0.005)***
IPI	6.892 (0.648)	3.134 (0.925)
EXPORTS	4.710 (0.858)	3.062 (0.930)
IMPORTS	7.805 (0.554)	4.889 (0.774)
KLCI	8.394 (0.495)	17.152 (0.028)**
LOANS	19.585 (0.021)**	11.518 (0.174)
RER	44.126 (0.000)***	33.211 (0.000)***

Notes: Figures in parentheses are p-values. *, **, ***denotes significance at the 1, 5 and 10 percent levels, respectively

Table III.
Results of the multi-variate Toda-Yamamoto causality test

comparable to that of the CIMMR, the study calls for further development of the Islamic money market to gradually dominate the role of the CIMMR.

The findings of this study further imply that the monetary policy indicator would have to be continuously monitored owing to the dynamic nature of the financial system. The greater role played by the Islamic monetary instruments have resulted in these instruments becoming increasingly relevant in monetary policy considerations in the Malaysian economy. In this regard, an area for extension would be to provide a mechanism that could continuously take into account the latest economic and financial development, so as to ensure the most relevant policy indicators were being considered in the implementation of monetary policy. This study provides an avenue towards this effort. The importance of ensuring the adoption of the most relevant policy indicators and targets cannot be over-emphasized, particularly in a rapidly changing economic and financial environment.

Notes

1. This methodology involves transforming the suggested relationship into an Error Correction Model and identifies the parameters associated with causality. If the case involves more than two cointegration vectors, this would be more complex.

2. Further, there is growing concern among applied economic researchers that the cointegration likelihood ratio (LR) test of Johansen (1998) and Johansen and Juselius (1990) often, have not provided the degree of empirical support that might reasonably have been expected for a long-run relationship.

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