

TRANSMISSION MECHANISM OF SHARIA FINANCING IN MALAYSIA

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ABSTRACT

A country that adopts dual banking system provides options to their customers to choose their modes of financing. When interest rate increases, sharia financing instrument might become an option to the conventional method. Sharia financing to the real sector could create equilibrium condition between monetary and real sector. This study aims to show the transmission sharia channel (sharia financing) with vector error correction model (VECM) approach. The result of impulse response function shows that sharia financing reduces negative effect of interest rate to inflation after sixth months. However sharia financing is unable to substitute conventional credit, when interest rate increases.

Keywords: Transmission Mechanism, Sharia Financing, VECM

Introduction

Background

Monetary policy is directed to adjust monetary instruments to achieve price stability, low unemployment rate as well sustainable economic growth (Bofinger, 2001). Monetary policy employ three main instruments namely; reserve requirement, open market operation (OMO) and discount rate. However, these instruments could not achieve the intention of monetary policy immediately. Instead, it passed through intermediaries known as monetary transmission mechanism before achieving its intended effects. The transmission mechanism of monetary policy is a mechanism that explain stages by the policy instrumens to reach the final objective of a monetary policy (Maski, 2006).

Generally, the transmission mechanism starts with central bank interest adjustment which is transmitted through the transmission channels. The channels through which the effects of monetary policy pases through are interest rate, credit, asset price, balance sheet, exchange rate as well as expectation. In conjunction with the operation of interest free banking sistem (Islamic banking system), this transmission mechanism would have an opportunity to pass sharia channels (Hardianto, 2005).

Islamic banking in the Islamic world started quite recently. In Malaysia, it was initiated in the mid-1940s while Pakistan in the late 1950. In Egypt, Islamic banking started with the Mit Ghamr Saving Banks in 1963-67 followed by Nasser Social Bank in 1971. This interest free banking are also established in other regions of Asia. The Philippine Amanah Bank (PAB) was initiated in 1973 and followed closely later by the establishment of the Islamic Development Bank (IDB) in 1974. The establishment of IDB became stimulant for other Islamic banking to develop concurrently such as the Dubai Islamic Bank in 1976, Faisal Islamic Bank of Egypt in 1997, Bahrain Islamic Bank in 1979 and other government institutions such as the Kuwait Finance House (1997). This positif developments continues until today.

In Indonesia, this system was implemented since 1992 with refer to Indonesia constitutions No. 7 1992. This constitution became an impetus for the establishment of Bank Muamalat Indonesia (BMI). The development of Islamic banks in Indonesia was relatively slow in the beginning. However, its development became significant since the Dual Banking System was launched through Constitutions No. 10 1998 which allow

conventional commercial banks to operate *profit-loss-sharing* (PLS) banking system beside the conventional system. Until the end of 2008, the market share of Islamic banking in Indonesia reached three percent. This number considered small compare to the total of national banking industry. This could be the reason why syariah transmission mechanism in Indonesia do not work properly (Hardianto, 2005).

The same phenomenon occurs in Malaysia. Having introduced Islamic Banking Act (IBA) in 1983, Bank Islam Malaysia Berhad (BIMB) was established. However no significant growth in the Islamic banking industry is observed until 1993. Its development was significant when Islamic Banking Scheme/Windows System (as Dual Banking System in Indonesia) was launched by the government. Until Januari 2007 the market share of Islamic banking in Malaysia reached 15 percent and forecast to reach 20 percent in 2010 (www.btimes.com.my).

As stated earlier, sharia transmission mechanism in Indonesia is still absent (Hardianto, 2005). One reason that adressed in his research is there was no substitution mechanism between interest rate and *profit-loss-sharing* (PLS), even there was positif correlation between PLS and inflation rate (an increase in sharia financing would then initiate high inflation rate). This could be caused by the fact that Islamic banking sector in Indonesia considered small compare to the total national banking industry. This research would trying to analyze the work of transmission mechanism in Malaysia especially through sharia financing since sharia market share has reached 15 percent.

Problem Statement

Problem statement of this research could be formulated as follow:

- 1) Is there exist substitution mechanism between conventional credit with that *profit-loss-sharing* financing?
- 2) Is there any influence of incresing sharia financing to the inflation rate in Malaysia

Research Hypothesis

Total sharia bank financing keep on increasing together with the rapid growth of sharia banking industry. This research would have hypothesis as stated below:

1. H_1 : If interest rate increases, people tend to shift to the PLS system.
2. H_2 : An increase in total sharia bank financing would lead to a decrease in inflation rate.

Literature Review

Monetary Policy

Monetary policy is governmental policy taken as a means to reach a balance macroeconomy (output, price and unemployment). This could be done partly by adjusting macroeconomy condition through money market or in other words through money creation or circulation money management (Djohanputro: 2006). The same idea was stated by Bofinger (2001), "*monetary policy is manipulating of monetary instruments in order to achieve price stability, low unemployment and sustainable economic growth*". The authority of this policy is usually in the hand of central bank as a government representative.

2.1.1 Monetary Policy Instruments

In order to influence money supply, the central bank employs policy instruments either directly or indirectly (Siamat, 2005). Direct monetary policy instruments such as credit ceiling (in full limit of credit resolution which allowed to be distributed by appointed commercial), interest rate ceiling (interest rate resolution undertaken by banking side to their customers), decreasing currency value and direct loan (credit program).

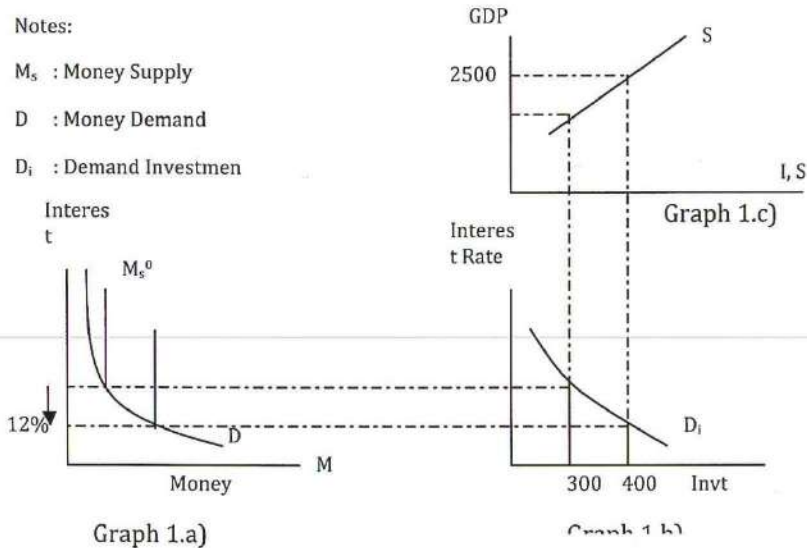
While indirect instruments would be in the form of:

- 1) *Reserve requirement* (certain percent charged to the third party fund available in commercial bank that should be allocated in central bank in the form of clearing account. The higher reserve requirement, the smaller third party fund that could be disbursed by commercial bank, and vice versa.
- 2) *Discount rate* (provided by central bank to the commercial bank as a return of buying its money market instruments. This instrument could be in the form of *discount rate* at *Treasury Bill* issuance, Bank Indonesia Certificate (SBI). *Open market operation* (trading activity that undertaken by central bank to the money and capital market instruments). This instrument is commercial paper that might be in the form of obligation, certificate and others. The purchasing of this commercial paper by central bank subject to the expansion of money circulation. While on the contrary, selling of this instruments would decrease money circulation since people money pooled in central bank. Through out this mechanism, central bank could instill interest rate and money supply by means of *discount rate* OMO. *Rediscount facilities* (financing facility provided by central bank for bank that might need additional fund by means of rediscounting their commercail papers),

3) and last but not least is moral persuasion.

Among the numerous monetary policy instruments, three main instruments are usually utilised are reserve requirement, discount rate as well as open market operation (OMO). It is discount rate that would become reference for conventional banking industry to determine interest rate for their products (Bank Indonesia, 1999). The alteration in interest rate (*discount*), would then expected to have an effect on the interest rate. With high rate of interest it is expected that people would be encouraged to save their money in the bank culminating in reduction in money supply. On the contrary, low interest rate provides incentives for people to hold cash and business to borrow, thereby increasing the supply of money in the economy. Hence, low interest rate would bring about an increase in investment sector (see Graph 2.1).

Graph 2.1 Monetary Policy Mechanism and GDP



The three graphs depicting the money market (Graph 1.a), investment (graph 1.b and GDP (Graph 1.c) in graph 2.1 shows the mechanism policy from monetary sector to real sector. A decrease in interest rate from 12% to 8% in Graph 1.a) will cause saving return decreases. Therefore, people are not interested in saving because of the decreasing return. In contrast, declining of interest rate will cause decrease on cost of investment, as the cost of credit return goes cheaper, that it will increase investment from 300 to 400 (Graph 1.b). An increase in investment would then rise up GDP from 2000 to 2500 (Graph 1.c).

Transmission Mechanism of Monetary Policy

The implementation of monetary policy directed to have an impact to the real sector. This process would certainly known as transmission mechanism of monetary policy. It is a mechanism that explains stages or channels which would be passed by policy instruments to reach the last target of policy (Maski, 2006). While Taylor (1999) defines transmission mechanism as a channel that link monetary policy and the economy.

Bofinger (2001) emphasizes transmission mechanism through three channels. **Quantity Theory Channel**, transmission mechanism that emphasizes on the quantity of money through decreasing or increasing money supply by cntral bank. This channel refers to the quantity theory of money which describe clearly the frame work of an analysis of sistematic direc relationship between money supply and inflation. This is based on the transformation of equation below:

$$MV = PT$$

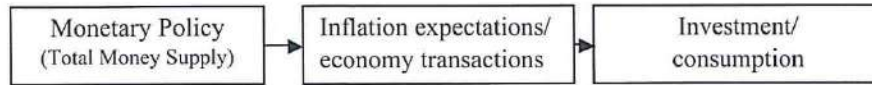
Where,

- M : The total of money
V : The velocity of money
PT : Total output (nominal) which being transacted

The growth of money supply only affect the development of output in short term, stimulate price increase in medium term and at the end would cause to the decrease in output in original amount. Hence, this growth would increase inflation proporsionally in the long term. It is believed that this direct channel could not explain other factors except money to the inflation such as interest rate, exchange rate, asset price, credit as well as expectation (Maski, 2006).

Expectations Channel, transmission channel which emphasizes that monetary policy could be directed to have certain inflation as well as economic activity expectation. This could be done by having any activity that might be instilled the expectation of public or economic agents to the future of inflation as well as economic performance. By having such expectation, it would be then affected economic agents in their consumption and investment decision. After all, it it would encouraged the transformation of aggregate demand as well as inflation rate.

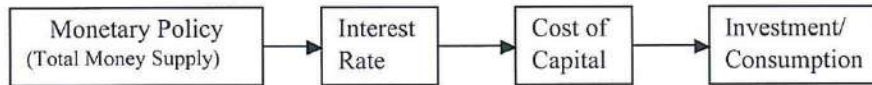
Graph 2.2 Transmission Mechanism with Ekspektations



Source: Warjiyo in Lina 2005

Interest Rate Channel, transmission mechanism that gone through by central bank by means of increasing or decreasing interest rate. The channel of interest rate would be started from the short term then transmitted afterward to the medium one and ended by long term through the balancing mechanism of supply and demand in money market. The growth of interest rate would influence cost of capital so as to the investment and consumption behaviour.

Graph 2.3 Transmission Mechanism through Interest Rate Channel

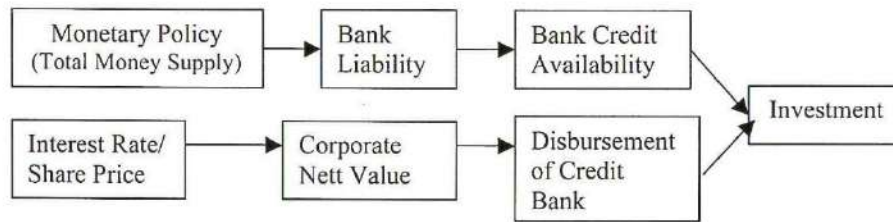


Source: Warjiyo in Lina 2005

In line with the development of economics, Bernanke and Gertler emphasize monetary transmission mechanism on credit channel. While, Obstfeld and Rogoff emphasize more transmission mechanism concept on exchange rate policy (McCallum, 2004).

Credit Channel, transmission mechanism through banking credit channel or money market mediation which expected to be a transmission to the real sector. Banking Intermediary system has an important role in the policy mechanism through credit channel. Transmission mechanism through credit channel could be distinguished into two, namely bank lending channel and balance sheet channel. Banking credit channel emphasizes the effect of monetary policy to the bank performance especially on its asset. While balance sheet channel emphasize on the effect of monetary policy on the institution financial performance which in turn affect institutional access to have a credit.

Graph 2.4 Transmission Mechanism through Credit Channel



Source: Warjiyo in Lina 2005

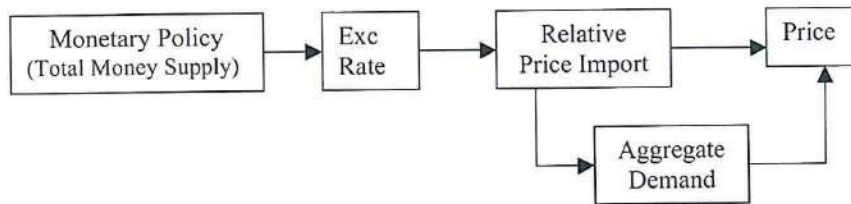
Asymmetric information has always been a problem creates an imperfect market condition. In fact, this condition would definitely affect policy mechanism through the credit channel. In the context of credit market, debtor knows their business risk information compare to the bank. This can be caused moral hazard where debtor use credit for their investment with high risk. Hence, debtor would obtain high profit when their business succeed while the bank would face losses when it businesses fail.

The asymmetric information also would caused a decrease in the quality of average debtor in the contex of proposing credit application. When interest rate increases, for example, there will be a debtor with low quality (high risk debtor) that want to pay high interest. However, for a debtor with high quality (low risk debtor) would not interested to propose credit.

Exchange Rate Channel, this kind of transmission mechanism is the extension of monetary policy (interest transition) in the short term. This interest transition would then affect trade balance. When trade balance changes, it would has an impact to national exchange rate. Once this exchange rate changes, the following will affect to the relative price of import. This price can be fluctuated according to the exchange rate either appreciated or depreciated. At the end, the change of relative price import will affect supply and development of output as well as price.

The impact size of exchange rate movement depends on exchange rate regime of a nation. In the contex of floating exchange rate, for example, expansion monetary policy would stimulates depreciation of domestic currency and rises imported good price. This condition would sistematically increases the price of domestic goods even no expansion in aggragate demand. While in the contex of controlled exchange rate, monetary policy impact to the development of real output and inflasi would even more sluggish (with time lag/long-time period)), especially if there exist imperfect substitution between domestic asset and foreign asset.

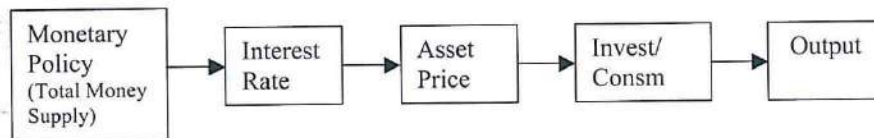
Graph 2.5 Transmission through Exchange Rate Channel



Source: Warjiyo in Lina 2005

Asset Price Channel, transmission mechanism which emphasizes on the changes of customers' asset. If central bank executes tight monetary policy by means of increasing interest rate, it will squeeze the price of institution asset (market value). A decrease in asset price will cause a decrease of institution ability to expand and to consume. In aggregate, this condition would affect to a decrease in aggregate spending (output).

Graph 2.6 Transmission Mechanism through Asset Price Channel



Source: Warjiyo in Lina 2005

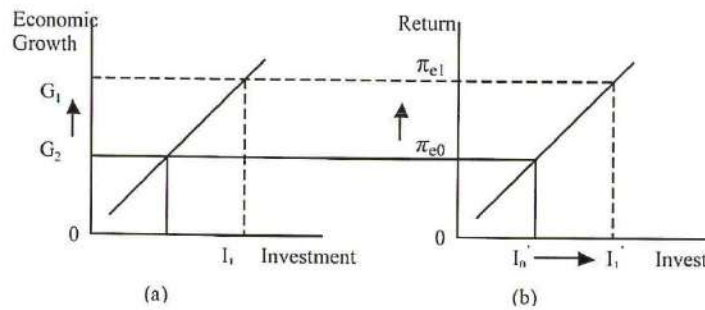
Transmission Mechanism through Sharia Financing

Compare to conventonal banking practice which employing interest rate as an instrument to reach their monetary policy objection, Islamic economy propose profit and loss sharing (PLS) system. PLS system implemented in the whole economic activity including financial practices. Financing and account depocit are considered as investment. If expected return of PLS increase, so it would encourage people to increase their account depocit as well their investment (financing). This condition described in graph 2.2 (b). Hence, the relationship between PLS return and invetment is positif (Ascarya, 2007). In general, economic growth in Islamic perspective influenced by level of investment, while investment influined by PLS return. At the end of the day positive relationship between PLS return and investment would increase economic growth. (Graph 2.2). An increase in PLS return would increase investment, and at the end would increase economic growth. Positive reallationship between PLS return and invstment would also happen between investment and economic growth.

An increase of PLS return from π_{e0} to π_{e1} (graph 2.2) would encourage an increase in investment (syariah financing) as showed in (b) from I_0 to I_1 . When investment (syariah financing) in point I_0 it would give return π_{e0} . Hence, when investment in I_1 level, return would be give π_{e1} .

Additional investment (syariah financing) would be followed by an increase in public economic activity so as economic growth would increase from G_0 to G_1 ((a)). When economic growth at level G_0 , investment would needed at level I_0 . Thus, if the expected economic growth at level G_1 , it would need investment at level I_1 . Generally, an increase in investement (total sharia bank financing) would be followed by an increase in real sector and at the end creating equilibrium between monetary sector and real sector.

Graph 2.2 Relationship between PLS System, Investment and Economic Growth



Source: Ascarya (2007)

It could be concluded that PLS return and economic growth has positive relationship. Such theses being the opposite to the interest rate system, where an increase in interest rate (credit) would create inflation from cost push side since institution or produser has to pay higher cost in their business activities. More over, their will incur higher loss if their face loss in their business (Antonio, 2001). Such condition would certainly not occur in PLS return system since either high or low return would tentatively conformed by the last result of business. If such business loss, there is no obligation that should be given to the investor (Antonio, 2000). This system would certainly ascertain transmission mechanism happened compare to interest rate system.

Data and Research Methodology

Research Methodology

This research is using analysis tool of Vector Autoregression (VAR) – Vector Error Correction Model (VECM) to answer this problem of research. This method was developed by Sims (Thomas, 1996) which assumed that all variable in the model are endogenous. Hence this model concluded as invalid model. The superiority of this method is its ability to forecast variables in the VAR. However, this method could be used as policy analysis since it invalid in nature. Thus, output that produced by VAR could be used as an alternative transmission mechanism in Malaysia.

General model of VAR is shown below:

$$Y_t = \gamma_1 Y_{t-1} + \gamma_p Y_{t-p} + \beta X_t + \varepsilon_t \quad (3.1)$$

Where Y_t is test variabls, consist of

- br_t** : Bank Negara Bill rate
- r_t** : Interest interbank money market
- bis_t** : Interest free banking scheme
- ir_t** : Islamic interbank rate
- shr_t** : Total sharia bank financing
- inf_t** : Inflasi rate
- $\gamma_1, \gamma_p, \beta$: Estimated Parameter
- X_t : Exogenous Variable
- ε_t : White noise (error terms)
- t : Time lag (t = 1, 2, 3, ... p)

Thus, equation model of variables that will be tested through VAR become:

$$\begin{aligned} br_t &= \gamma_1 br_{t-1} + \gamma_p br_{t-p} + \beta r_t + \varepsilon_t \\ r_t &= \gamma_1 r_{t-1} + \gamma_p r_{t-p} + \beta_1 br_t + \beta_2 inf_t + \varepsilon_t \\ shr_t &= \gamma_1 shr_{t-1} + \gamma_p shr_{t-p} + \beta_1 ir_t + \beta_2 r_t + \beta_3 br_t + \beta_4 inf_t + \varepsilon_t \\ ir_t &= \gamma_1 ir_{t-1} + \gamma_p ir_{t-p} + \beta_1 r_t + \beta_2 bis_t + \varepsilon_t \\ inf_t &= \gamma_1 inf_{t-1} + \gamma_p inf_{t-p} + \beta_1 br_t + \beta_2 r_t + \beta_3 shr_t + \varepsilon_t \end{aligned}$$

Next part will be the stages of VAR analysis:

Stationary Test

Stationarity of data is an important part of time series data analysis. It is expected that all variables test would be stationar. Stationary test will be proceed using unit root test. In fact, unit root test could be detected visually either having trend or not. Another method could be done using Enders approach (2004), by means of testing possibility data movement.

Specifically, this research will employ Augmented Dickey-Fuller (ADF) Test and Philip Perron to test each of data stationarity. Basically, ADF test doing the estimation to the equation below:

$$\Delta y_t = a_0 + \gamma y_{t-1} + \sum_{i=2}^p \beta_i \Delta y_{t-i} + \varepsilon_t \quad (3.2)$$

Where y_t are variables test ($br_t, r_t, bis_t, ir_t, shr_t, inf_t$). a_0, β_i are parameters that will be estimated while ε_t is error model. Data stationerity will be tested through out hypothesis if $\gamma = 0$, accept H_0 . Meaning which data is not stationer.

The result of ADF test will be compared with McKinnon Critical Value. While, data which has structural break will be tested using Philip Peron. If statistical value of ADF higher than Mac Kinnon Critical Value, it can be denoted that series are stationer.

Lag Optimum Selection

The selection of *lag* that will be used in VAR model could be obtained acording to Akaike Information Criterion (AIC) and/or Schwarz Information Criterion (SC) criteria. Lag that will be chosen in the model is a model which has the lowest AIC and SC value. The decision of AIC could be obtain by the following:

$$AIC = \log(\sum \varepsilon_t^2 / N) + 2k / N \quad (3.3)$$

Where:
 $\sum \varepsilon_t^2$: Quadratic residual
N : Sample
k : Variable

Co integration Test

If stationary phenomena obtained in the level of first difference or I(1), it need another test to see possibility of having cointegration. This test is intended to see is there any stationer linear relationship from two or more variable which do not stationer (Verbeek, 2000). Below is Cointegration test with *Johansen* approach using mathematical model:

$$y_t = \alpha_1(L)y_{t-1} + \alpha_2(L)y_{t-1} + \dots + \alpha_p(L)y_{t-p} + \varepsilon_{t-p} \quad (3.4)$$

Where y_t are variables test that consist of $br_t, r_t, bis_t, ir_t, shr_t$ and inf_t in the form of colour matrix with lag p . While α is a parameter being estimated and ε_t is *error model*. This test will be followed by looking at *trace statistic* value with equation below:

$$\tau_{trace} = -N \sum_{i=r+1}^M \ln[1 - (r_i^*)] \quad (3.5)$$

With N as total observation and M as total variable test. While r_i^* is a correlation between i variable τ_{trace} in chi-square (X^2) distribution with M- degree of freedom r . The value of τ_{trace} will explain either exist or not cointegration inter-variable.

Vector Error Correction Model (VECM)

Having confirmed that there exist cointegration, the following test would be using error correction method. If there is a different in term of integration degree among the variables, Mehra (1994) suggested that the test should be done jointly between long term equation and error correction one. Lee dan Granger (Enders, 2004) named such different degree of integration as multicointegration.

Error correction equation from variables test are as follow:

$$\begin{aligned}
 \Delta br &= a_o + \sum_{i=1}^m \gamma 1i \Delta br_{t-1} + \sum_{i=1}^m \gamma 2i \Delta r_{t-1} + \sum_{i=1}^m \gamma 3i \Delta ir_{t-1} \\
 &\quad + \sum_{i=1}^m \gamma 4i \Delta bis_{t-1} + \sum_{i=1}^m \gamma 5i \Delta shr_{t-1} + \sum_{i=1}^m \gamma 6i \Delta inf_{t-1} + \varepsilon_t \\
 \Delta r &= a_o + \sum_{i=1}^m \gamma 1i \Delta r_{t-1} + \sum_{i=1}^m \gamma 2i \Delta br_{t-1} + \sum_{i=1}^m \gamma 3i \Delta ir_{t-1} + \sum_{i=1}^m \gamma 4i \Delta bis_{t-1} \\
 &\quad + \sum_{i=1}^m \gamma 5i \Delta shr_{t-1} + \sum_{i=1}^m \gamma 6i \Delta inf_{t-1} + \varepsilon_t \\
 \Delta ir &= a_o + \sum_{i=1}^m \gamma 1i \Delta ir_{t-1} + \sum_{i=1}^m \gamma 2i \Delta br_{t-1} + \sum_{i=1}^m \gamma 3i \Delta r_{t-1} + \sum_{i=1}^m \gamma 4i \Delta bis_{t-1} \\
 &\quad + \sum_{i=1}^m \gamma 5i \Delta shr_{t-1} + \sum_{i=1}^m \gamma 6i \Delta inf_{t-1} + \varepsilon_t \\
 \Delta bis &= a_o + \sum_{i=1}^m \gamma 1i \Delta bis_{t-1} + \sum_{i=1}^m \gamma 2i \Delta br_{t-1} + \sum_{i=1}^m \gamma 3i \Delta ir_{t-1} + \sum_{i=1}^m \gamma 4i \Delta ir_{t-1} \\
 &\quad + \sum_{i=1}^m \gamma 5i \Delta shr_{t-1} + \sum_{i=1}^m \gamma 6i \Delta inf_{t-1} + \varepsilon_t \\
 \Delta shr &= a_o + \sum_{i=1}^m \gamma 1i \Delta shr_{t-1} + \sum_{i=1}^m \gamma 2i \Delta br_{t-1} + \sum_{i=1}^m \gamma 3i \Delta r_{t-1} + \sum_{i=1}^m \gamma 4i \Delta bis_{t-1} \\
 &\quad + \sum_{i=1}^m \gamma 5i \Delta ir_{t-1} + \sum_{i=1}^m \gamma 6i \Delta inf_{t-1} + \varepsilon_t \\
 \Delta inf &= a_o + \sum_{i=1}^m \gamma 1i \Delta inf_{t-1} + \sum_{i=1}^m \gamma 2i \Delta br_{t-1} + \sum_{i=1}^m \gamma 3i \Delta r_{t-1} + \sum_{i=1}^m \gamma 4i \Delta bis_{t-1} \\
 &\quad + \sum_{i=1}^m \gamma 5i \Delta ir_{t-1} + \sum_{i=1}^m \gamma 6i \Delta shr_{t-1} + \varepsilon_t \tag{3.6}
 \end{aligned}$$

However, if do not find any cointegration phenomena, the test will be continued by using first difference variable.

Causality Test

In the VAR model contain causality test which intend to see how far the relationship among the variable. VAR causality test is generalization from that of Granger causality methodology. Granger causality test is bivariat in nature, while VAR causality test multivariat one. Thus, causality implication that obtained by Granger Test do not fit well with the real phenomena since the biasness of parameter estimation caused by removing other relevance independent variable if included in the equation model.

By considering time element in the model, this causal relationship base on Granger's thought. Granger causality test stated that X variable influences Y variable if X values

either current and past period can precisely predict Y variable compare to not employing X variable.

This causality test could be presented as follow:

$$\begin{aligned} y_t &= \sum a_i y_{t-i} + \sum b_j x_{t-j} + v_t \\ x_t &= \sum c_i x_{t-i} + \sum d_j y_{t-j} + \mu_t \end{aligned} \quad (3.7)$$

Where:

y_t, x_t : Variable (br_t, r_t, bis_t, ir_t, shr_t, inf_t)

v_t, μ_t : Independent random vector with zero on average and limited matrix covariance

Instrument of Vector Autoregression (VAR)

In the process of analysis, VAR has specific instrument in explaining the interaction inter-variable within a model. This instrument consist of Impulse Response Function (IRF) and Forecast Error Variance Decompositions (FEVD), or Variance Decompositions (VD). IRF is an application of vector moving average which intended to see how long a shock from one variable affect to other variable. While VD within VAR intended to analyze how big the shock of one variable affect other variable.

Data

Data used in this research is monthly time series data from January 2003 - November 2006 obtained from statistical data of Central Bank of Malaysia website, www.bnm.gov.my, and alternative sources obtained from Internasional Financial Statistics, www.imfstatistics.org or other statistical data which can be used as secondary data:

1. Total sharia banking financing (Loans by Type and Sector-Banking System)
2. Interest rate; employing Bank Negara Bill Rate (3 months) as Central Bank of Malaysia interest rate and Interest Interbank Money Market (3 months) as interest rate of money market inter-conventional bank.
3. PLS rate; employing Interest Free Banking Scheme Rate (3 months) as interest free deposit rate and Islamic Interbank Rate (3 months) as PLS rate of money market inter-sharia bank.
4. Inflation rate; Consumer Price Index (CPI)

Subject to certain data missing (missing value), there is some data that represented according to proxy approach by having a closer data alternative (1 month data). This step should be taken unless a test could not be proceeding if some data remain empty (not available).

Results and Discussion

This research using analysis method of Vector Autoregression (VAR), while data processing techniq employing microsoft excell and Eviews 4.1. version as a quantitative software. Data being used in this research are data log of sharia financing, Islamic Interbank Rate (IR), Interest-Free Banking Scheme (BIS) and Interest Rate Interbank Money Market (R), Bank Negara Bills Rate (BR) and Inflation (INF) calculated from Consumer Price Index (CPI) from January 2000 - November 2006.

It could be seen from graph 4.1 that the pattern of financing data tend to increase over time, while data patern of R, IR, BIS dan BR experience almost the same patter with only BR variable which occasionally declined. However, monthly inflation shown fluctuate sistematically.

Analysis Vector Autoregression (VAR)

Stasionarity Test

Any resesarch using time series data should pass the stationery test since variables being used are stasioner variable. Stasionarity test would be undertaken per-variable using unit root test and specially using Augmented Dickey Fuller (ADF) as well as Philip Peron to test data which has structural break.

Unit root test result in a level indicates that only inflation variable which experience stationar, while other five variables are not stationar. (Table 4.1). This is denoted by the ADF absolute value of inflation variable which is higher than an absolute critical value of its Mc Kinnon, while the ADF absolute value of other five variables are lower than an absolute critical value of its Mc Kinnon. Since all the variables are not stationary, the next test would be in the level of first difference. Result test in the level of first difference perform the stationarity of all the test variables. Since data are not stationary in a level, the next test would be cointegration test. This test is intended to see is there any stationer linear relationship from two or more variable which do not stationar.

Graph 4.1 The Development of Sharis Financing, Islamic Rate, Interest Rate and Inflation

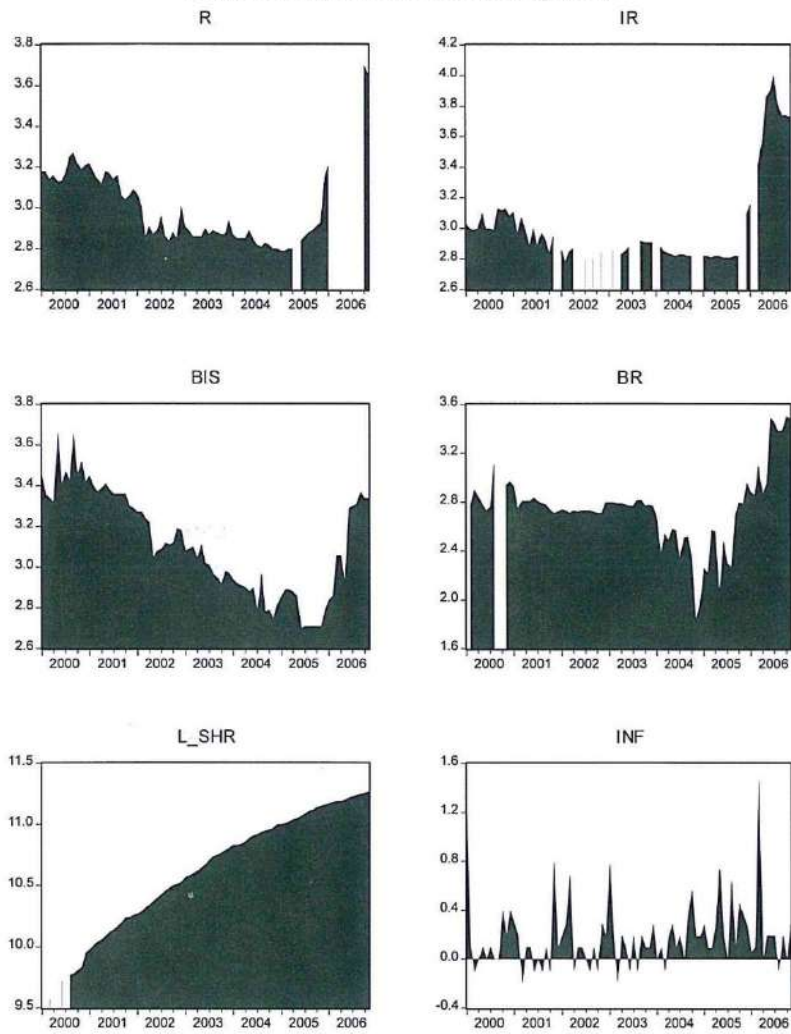


Table 4.1 Unit Root Test¹

Variable		ADF/PP statistics	Explanation
Symbol	Explanation		
BR	<i>Bank Negara Bills rate</i>	-1.672901	unit root
D(BR)		-3.269817**	Stationer
R	<i>Interest rate Interbank Money Market</i>	-1.500796	unit root
D(R)		-8.457676*	Stationer
IR	<i>Islamic Interbank rate</i>	0.066249	unit root
D(IR)		-7.722719*	Stationer
BIS	<i>Islamic Banking Scheme rate</i>	-1.823086	unit root
D(BIS)		13.53163*	Stationer
L_SHR***	<i>Sharia Bank Financing</i>	-0.837016	unit root
D(L_SHR)		-4.549420*	stationer
INF	Inflation	-10.20989*	stationer
D(INF)		-9.619081*	stationer

Where:

- ¹ Using intercept and max lag 11
- D Using *first difference*
- * Stationer at $\alpha = 0.01$ (-3.513344)
- ** Stationer at $\alpha = 0.05$ (-2.933158)
- *** Using trend and intercept

Lag Optimum Selection

The precise Lag selection pertaining to the VAR analysis would determine gradually. Firstly, lag optimum selection would be examined at a stable VAR system through the inverse roots value of its AR polinomial character. VAR system is considered stable if all it roots has modulus lower than one (< 1) and located within unit circle. The test result that has been done generate a stable VAR at lag 1.

The second step would looking for the lengthy of lag optimum using available information criteria. The choosen lag candidate is the lag length according to Likelihood Ratio (LR) criteria, Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), Hannan-Quinn Information Criterion (HQ). If information criteria only refer to a lag candidate, it is such candidate which is optimum. However if it is obtained more than one candidate, another lag optimum selection would be carried out accordingly. The result of lag selection at information criteria shows that lag which has been selected is lag 1 or 3 (Table 4.2). The lag that has been selected in this case is lag 1, since VAR system unstable in lag 3.

Table 4.2 Step of Lag Selection (information criterion)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	153.2373	NA	1.09E-12	-10.51695	-10.23148	-10.42968
1	276.3377	184.6506*	2.31E-15*	-16.73841	-14.74010*	-16.12751
2	313.0036	39.28491	3.28E-15	-16.78597	-13.07483	-15.65144
3	369.9244	36.59189	2.73E-15	-18.28031*	-12.85634	-16.62215*

* indicates lag order selected by the criterion
 LR: sequential modified LR test statistic (each test at 5% level)
 FPE: Final prediction error
 AIC: Akaike information criterion
 SC: Schwarz information criterion
 HQ: Hannan-Quinn information criterion

Cointegration Test

Data phenomena which is not stationar at level would lead to equilibrium in the long run known by cointegration. Using Johansen Cointegration Test, this test would analyze possibility of cointegration relationship inter variables. The result of cointegration test would determine either using unrestricted VAR or Vector Error Correction Model (VECM- *restricted* VAR).

Table 4.3 Johansen Cointegration test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.981759	202.2502	94.15	103.18
At most 1 **	0.940666	114.1603	68.52	76.07
At most 2 *	0.685154	52.01978	47.21	54.46
At most 3	0.487271	26.59504	29.68	35.65
At most 4	0.319324	11.89887	15.41	20.04
At most 5	0.144603	3.436168	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
 Trace test indicates 3 cointegrating equation(s) at the 5% level
 Trace test indicates 2 cointegrating equation(s) at the 1% level

The result shows that there exist three cointegration inter-variables. This is denoted by trace statistics value which higher than critical value. Hence, VAR analysis at co integrated would be treated using Vector Error Correction Model (VECM).

Granger Causality Test

Having lag optimum as well as the existence of cointegration, it would also looked the causality relationship inter-variable before using VECM. This test would analyze the inter-variable causal relationship. Causality test is using Pairwise Granger

Causality by employing lag optimum. Null hypothesis of this test is x variable do not influence y variable and vice versa. Hence, null hypothesis would be rejected if probability result lower than alpha. The result of causality test shown in Table 4.4.

Table 4.4 Granger Causality Test

Causality	Probability
L_SHR → INF	0.04201
BIS* → INF	0.06166*
R → IR	0.02872
R → BIS	0.04288
IR* → BIS	0.08486*
BIS* → BR	0.08576*
BR ↔ L_SHR	0.00802 0.02897
IR* ↔ BR*	0.07833* 0.06651*
R ↗ L_SHR	0.84738
BR ↗ R	0.83206
IR ↗ L_SHR	0.84738
BIS ↗ L_SHR	0.86442
IR ↗ INF	0.49646
R ↗ INF	0.76245
BR ↗ INF	0.65853

Where (Significance at 5%):

- to cause (Uni-direction)
- ↔ mutually caused (Bidirection)
- ↗ No relationship

It is shown from causality test that sharia financing (L_SHR) has uni direction causal relationship in instilling inflation (INF), so as Islamic free banking scheme (BIS) as a rate of banking product within 10% level of significance. Meaning that more or less, sharia financing development has a role in rate of inflation. This can be happened since the fluctuation of sharia financing would lead to the fluctuation of economic activity in real sector.

Besides, this test shows that interest rate interbank money market (R) influences Islamic interbank rate (IR) as well as interest free banking scheme (BIS). While Islamic rate (IR) has a direct causal relationship that causes BIS at 10% level of significance, so as BIS to Bank Negara Bills rate (BR).

Direct relationship which is denoted by R in influencing IR as well as BIS shows that the existence of Islamic rate is still being influenced by the movement of interest rate. It could be explained that interest rate is being used as a basic reference to determine Islamic rate by sharia banking.

Meanwhile, bi-directional causation shows by Bank Negara Bill rate (BR) and sharia financing (L_SHR) as well as Islamic interbank rate (IR) with 10% level of significance. Meaning that the changes in BR could be a consideration of IR changes, vice versa. So as the changes of sharia financing could be a reason of discount rate (BR) changes, vice versa.

However, interest rate interbank money market (R) seemed insignificant. The result also indicated that discount rate of Bank Negara Bill (BR) is insignificant in influencing R. It could be explained that discount rate changes would not occur spontaneously followed by the changes in interest rate. It could happened if banking customers have their own expectation to the economic development or even efficiency reasons. Hence, it could be stated that discount rate of Bank Negara Bills (3 month) is not effective enough to become a stimulant for the banking industry to me as a tool of conventional monetary policy.

Before moving to VAR analysis or VECM using Impulse Response Function (IRF), it is need to look first ordering variable according to causality test. Ordering needed if majority of (> 50%) residual correlation value inter-variable within a system more than then 0.2. However if on the contrary happened, the precise ordering which is fit well with the economic theory will not be questioned.

Ordering result from residual correlation matrix at Table 4.5, shows that a number which is higher than 0.2 exceeds 50%. Hence, model ordering must be in line with an available economic theory. According to Gertler and Gilchrist in Lina (2005), variable that being used as a policy instrument allocated at the back, followed by variables which are connected within transmission mechanism then ended by real sector. Thus, variable ordering employed in the analysis of *impulse respon* is inflation (INF), sharia financing (L_SHR), interest free banking scheme (BIS), Islamic interbank rate (IR), interest rate interbank money market (R) dan discount rate Bank Negara Bills (BR).

Table 4.5 Residual Correlation Matrix

	INF	L_SHR	BIS	IR	R	BR
INF	1.000000	-0.649589	0.344313	-0.465778	-0.266204	-0.550322
L_SHR	-0.649589*	1.000000	-0.472929	-0.101307	-0.440769	0.097827
BIS	0.344313*	-0.472929*	1.000000	-0.060193	-0.119337	-0.326445
IR	-0.465778*	-0.101307	-0.060193	1.000000	0.791333	0.229626
R	-0.266204*	-0.440769*	-0.119337	0.791333*	1.000000	0.502367
BR	-0.550322*	0.097827	-0.326445*	0.229626*	0.502367*	1.000000

* > 0.2

Estimation Result of VECM

Having lag optimum selection, the equation of VECM for INF variable is as follow:

$$\Delta \text{inf} = a_0 + \gamma 1 \Delta \text{inf}_{t-1} + \gamma 2 \Delta \text{shr}_{t-1} + \gamma 3 \Delta \text{bis}_{t-1} + \gamma 4 \Delta \text{ir}_{t-1} + \gamma 5 \Delta \text{r}_{t-1} + \gamma 6 \Delta \text{br}_{t-1} + \varepsilon$$

VECM estimation result could be seen at table 4.6. IR and BR are significantly influence INF in the long run. IR influences INF positively with 8.820840. Meaning that if there is an increase 1% of IR, it will rise INF 8.820840 percent. It can be explained that basically IR still looking at R, so as an increase in IR which previously preceded by an increase in R has potential to raise the inflation.

Table 4.6 VECM Estimation Result of INF

Short Run		
Variable	INF	
	Coefficient	T-stat
CointEq1	-0.223321	-0.70765
CointEq2	0.210048	0.60875
CointEq3	1.038756	1.16386
D(INF(-1))	1.336837	2.74790*
D(L_SHR(-1))	-7.038575	-1.53548
D(BIS(-1))	-1.732584	-1.67822
D(IR(-1))	1.396967	1.10336
D(R(-1))	0.194454	0.11603
D(BR(-1))	-2.462493	-1.51860
Long Run		
IR(-1)	8.820840	5.13330*
R(-1)	-1.322845	-1.18875
BR(-1)	-8.709356	-4.19801*

* Significant at = 0.05

While BR influences INF negatively with 8.7. Meaning that if there is a decrease of BR 1%, so the inflation will be raise 8.7 percent. This phenomena could be explained that when discount rate of Bank Negara (BN) decreases, customer or banking industry would not interested to invest their money in the form of BN Bills. Thus, total money supply will not absorbed by the economy proportionally. Therefore, a decrease in BR will raise the inflation.

L_SHR, BIS, IR, R and BR are statistically do not significant in influencing INF in the short run. However, INF expectation positively significant in influencing INF in the short run 1.336837. Meaning that if inflation expectation increases by 1%, it will lead to inflation 1.336837 percent. It could be happened since inflation expectation become a basic consideration for practioners in doing their businesses.

Impulse Response Function (IRF)

Impulse Response Function (IRF) used to see the effect of one contemporary variable to another. The result of IRF depends on the ordering of variable series that employed in calculation.

This analysis is intended to; *first*, to know how sharia transmission mechanism will be through sharia financing in Malaysia. Second, to see the effect of interest rate shock to the sharia financing. Thirdly, this analysis also will looking at the response of inflation (INF) – caused by shock existence - from sharia financing.

The result of IRF shows the changes at one standard deviation from BR with 0.04 has not any implication to other variable. Shock phenomena in the form of BR decreasing is responded by an increase of R in the second month. However, this improvement is temporary in nature since R in the next period tend to respond BR shock in the same pattern (see Graph 4.2).

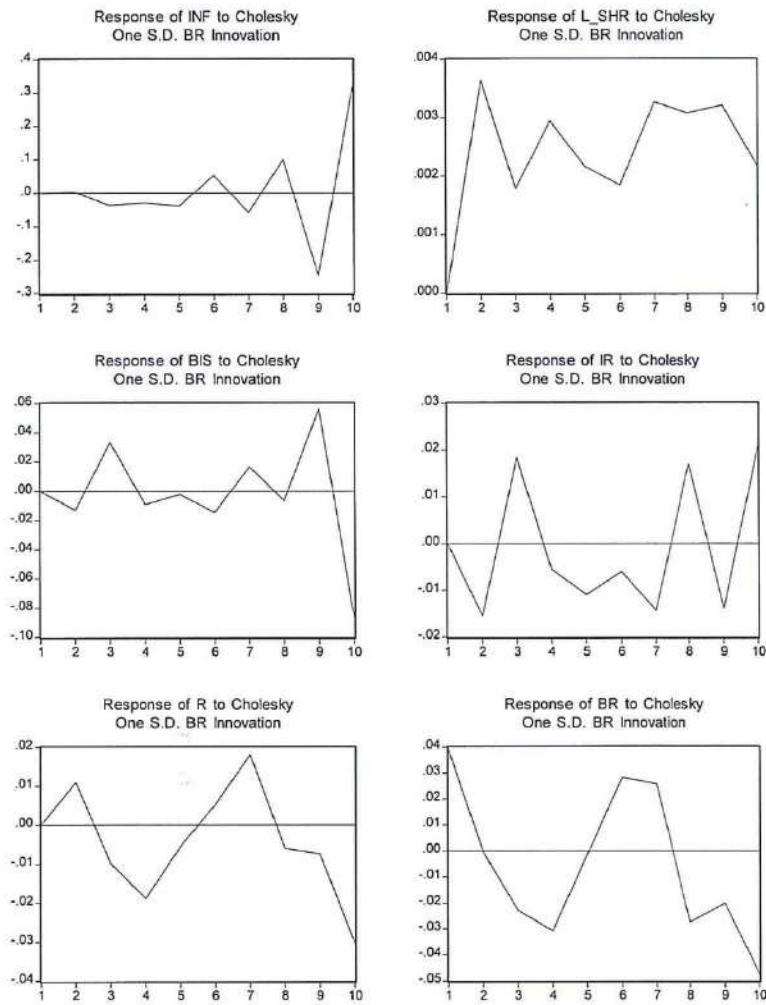
Compare to causality test result, a response of R to the BR shock is a bit different. This can be explained that the effect of BR shock to R is not happening directly so as the relationship could not be detected in the causality test.

It is seemed that BR shock responded faster by Islamic rate. A decrease in BR is responded by a decrease in Islamic rate. Thus, it is likely such condition which caused to an increase in sharia financing. However, this is not a permanent effect since in the next period Islamic rate has its own expectation so that its movement do not influence by discount rate (BR).

Meanwhile, discount rate Bank Negara bills shock is responded slowly by the inflation. However, inflation responds negatively but not statistically significance in the third period. In the medium run, a bit change in BR was responded quickly by inflation as a decrease in discount rate was directly responded by an increase in inflation. This phenomena could be explained when discount rate of Bank Negara (BN) decreases, customer or banking industry is not interested to invest in the form of BN Bills. finally, it will raise the inflation.

The IRF result of R could be seen visually at Graph 4.3. A change at one standard deviation of R with 0.02 has not any implication to other variables except has an effect to BR with 0.03. After one period with 0.019674 of standard deviation, R has implication to a decrease of sharia financing deviation standard with 0.0005 after being responded previously by an increase in Islamic rate. However, this phenomenon was relatively small and almost not felt so as its existence could not be detected in the causality test.

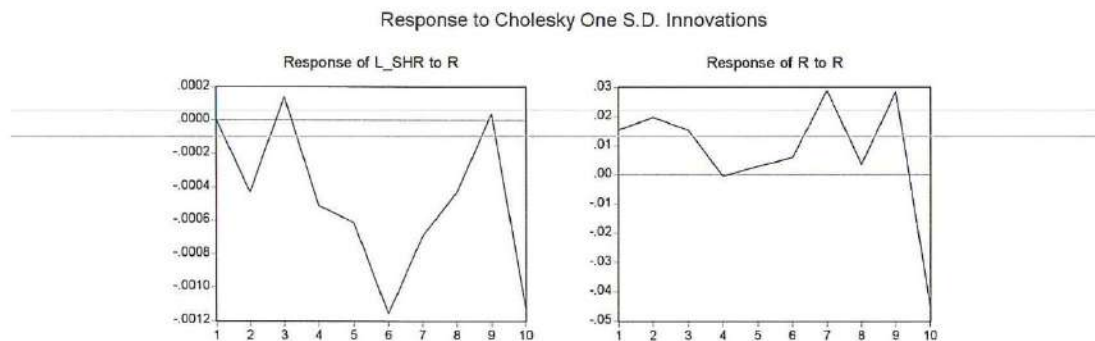
*Transmission Mechanism
of Sharia Financing in Malaysia*



Graph 4.2 Variable Response to the Shock 1 S.D. BR Variable

As such, negative response shown by R to R shock could be explained in the short run. An increase in interest rate will cause an increase in Islamic rate, so as for financing customers which still look at the rate will not spontaneously shift from conventional credit to sharia financing and even will shift from sharia to conventional one caused by an increase in financing rate. Hence, a decrease in interest rate will be followed by a decrease in sharia financing since customer should not pay higher cost of capital when they take conventional credit even in other side Islamic rate also decreases.

Having the result of causality test before, general phenomena of Islamic rate that using interest rate of conventional bank as a basic reference for policy decision is still happening in this period of research. As such, there is no substitution mechanism from conventional credit to sharia financing in this period of research. However, it is important to keep in mind that the response of L_SHR was very much small to the shock of R variable.



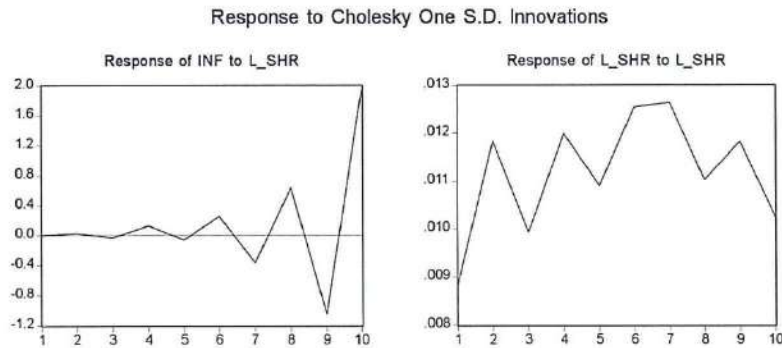
Graph 4.3 L_SHR Responses to the Shock 1 S.D. R Variable

The impulse analysis to the shock of L_SHR with 0.008864 has not any implication to inflation variable. The implication of sharia financing shock was responded by inflation in such a way until the fifth month (Graph 4.4). In the fifth period, an increase in L_SHR was responded by an increase in INF. It could be happened since sharia financing has not yet optimally distributed to the real sector as well as moral hazard practices. Meanwhile in the seventh period, a bit rise in R variable has enough implication in dampening the inflation. In fact, this response has an impact in the long run.

Theoretically, an increase in sharia financing will cause to an increase in output either from supply side or demand side. An increase in output from supply side is caused by an increase in productive financing through mudharabah or musyarakah scheme. While, an increase in output from demand side is caused by an increase in consumptive financing as well as working capital through murabahah as well as ijarah scheme.

A decrease in sharia financing which responded by an inflation explains that sharia financing and inflation variable has negative relationship as denoted by previous residual correlation matrix. An increase in sharia financing will create an increase financial flow to the real sector. Thus, it will followed by an increase in real sector of economic activity.

At the end of the day inflationary problem could be dampen accordingly. However, a decrease in sharia financing will decrease the financial flow to the real sector. Meaning that sharia financing has a positive ability to reduce negative effect of interest rate through dampening inflation rate in the sixth period (month) and on.



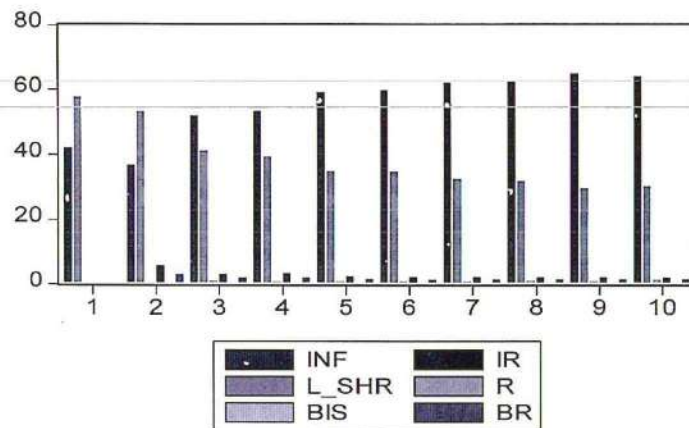
Graph 4.4 Inflation Response to the Shock 1 S.D. L_SHR Variable

Variance Decomposition (VD)

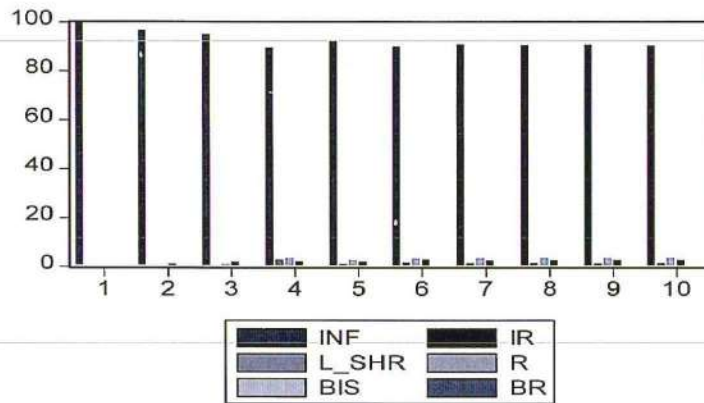
The Choleski Decomposition is forecasting system about error variance from certain variable. After having analysis the dinamic behaviour through impulse response, the following step would looking at model characteristic through variance decomposition. The decomposition result from L_SHR variable shown at Graph 4.5. It seemed that L_SHR is formed dominantly by its own variable at the early period. However, its contribution getting diminish at the third period and replaced by inflation variable over a long period. The existence of L_SHR which influenced by its own variable could be explained that the determinant factor of L_SHR is previous L_SHR or it might government factor which tend to ease the transaction of sharia financing. While for rate variable either conventional or sharia, it is seemed insignificance in the form of L_SHR since rate is not a basic consideration of sharia financing in Malaysia. In fact, it is inflation as a dominant factor that influence L_SHR. As such, it is shown that inflation factor still become an important consideration in the economic activity including sharia services.

Inflation factor during period of research was caused dominantly by inflation variable itself (Graph 4.6). Meaning that inflation rate in Malaysia mostly influenced by inflation expectation (Nugraha, 2006) instead of other variables. Other variable which influence

an increase in inflation was insignificant and tend to constant. The implication is Malaysian government should take care of inflation expectation more seriously either through out fiscal or monetary instrument. Other inflation factor might be come from out side of monetary sector. One of them was happening in the research period, there was a policy from fiscal side which has a role significantly in rising the inflation (CPI) like subsidy reduction, a rise in toll charge, a rise of cigarette tax and tobacco an even a rise in oil price (Asian Development Outlook, 2006).



Graph 4.5 Variance Decomposition of Sharia Financing (L_SHR)



Graph 4.6 Variance Decomposition of INF

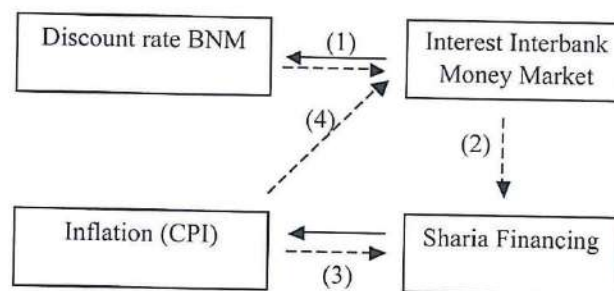
The investigation of transmission mechanism through sharia financing producing mechanism channel started from central bank policy in the form of central bank rate (interest rate). A transformation of central bank discount rate might become consideration

in conventional bank interest resolution. In other side, the policy of central bank discount rate would also looking at conventional bank interest as a means of controlling total money supply.

The result shows that the resolution of Islamic rate still employing conventional interest rate as a benchmark. Thus, a change in conventional interest rate would lead to a change to the total sharia financing. Impulse response shows that the absent of substitute mechanism between conventional credit and sharia financing when interest rate increases.

Hence, a change in sharia financing has an impact to the inflation within six months above. However below five months, a change in sharia financing would not affect inflation significantly and even no impact at all. The result of variance decomposition stated that inflation effect would be contagious to the sharia financing as well as banking interest rate.

As such, transmission mechanism through sharia financing in Malaysia would might involve central bank interest rate channel which become a trigger of conventional interest rate (1). It will then continue to the sharia financing market share which will be reaching CPI inflationary problem (2 dan 3). The transformation from CPI inflation, would be spread out to the sharia financing market share as well as conventional interest rate (Picture 4.1).



Picture 4.1 Sharia Transmission Mechanism in Malaysia

Source: Hardianto (2005) with adjustment

Conclusion

According to the research result using Bank Negara Bills rate (3 months), interest rate interbank money market, interest free banking scheme, Islamic interbank rate, sharia financing, and inflation from January 2000 - November 2006 with vector auto regression (VAR) or VECM, it is concluded that transmission mechanism through sharia financing channel in Malaysia was exist. The result of impulse response shows that sharia financing shock would be responded negatively by inflation six months later. Meaning which, that an increase in sharia financing would have an implication to a decrease in inflation. While, sharia financing channel has not yet influence directly within the past five months which might be caused by the growth of sharia financing in Malaysia less optimal. Besides, there is some financing product which less optimal distributed to the real sector (high *bai al-inah* scheme).

Basically, economic growth does not influenced directly by interest rate as well as Islamic rate of sharia bank as showed by causality test. However, the result of impulse response stated that a change in interest rate has negative implication to the sharia financing. Hence, substitution mechanism between conventional credit and sharia financing do not exist when there is an increase in interest rate. The result of impulse response and variance decomposition shows that transmission mechanism through sharia financing in Malaysia might involving BNM interest rate channel. Hence, this interest rate will then affecting a transformation of sharia financing market share and has a contagious effect to the creation of inflation rate (CPI).

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