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Dynamic Analysis of Islamic Bank and Monetary Instrument towards Real Output and Inflation in Indonesia¹

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Abstract

Islamic banking industry in Indonesia has demonstrated positive growth for the last two decades. This paper attempts to investigate the impact of this convincing performance of Islamic bank on two major macroeconomic variables, namely output and inflation, by using VAR/VECM analysis. The research utilizes monthly data of industrial production index, consumer price index, total Islamic deposit and its return, total Islamic financing and its return, money in circulation and Islamic Central Bank Certificate, from January 2004 until December 2009. The findings suggest that all Islamic variables have significant impact on the real sector growth. As for inflation, the study finds that none of the variables affect the inflation. However, the use of interest rate as benchmarking for Islamic deposit and Islamic Central Bank Certificate is not suggested.

Keywords

Islamic bank, output, inflation, VAR-VECM analysis

I. Introduction

The immense growth of Islamic banking industry in Indonesia for the last two decades has proven their role as financial institutions in resembling resource utilization, allocation, and mobilization. Similar to its conventional counterpart, Islamic banks also depend on depositors' money as the major source of fund (Haron and Wan Azmi, 2005). Furthermore, this fund has to be channelled to the investors. As institution that performs financial intermediary function, Islamic bank's role in the process of implementing government monetary policy cannot be left behind. The Islamic vision of achieving equitable wealth and income distribution has been the stimulus for Islamic bank to bridge the monetary sector with the real sector of the economy.

In the absence of interest rate combined with the existence of some other financial institutions, such as Zakat institution, Chapra¹²⁹ argues that Islamic economics can minimize the speculative demand for money and make total demand for money in an economy more stable. Islamic bank and other financial institutions consider shariah-compliance profit rate to attract prospective customers and allocate money in their daily operation.

When Islamic economics views money as medium of exchange, it represents purchasing power that is considered as the only proper use of money. This purchasing power (money) cannot be used to make more purchasing power (money) without undergoing the intermediate step, i.e. being used for the purchase of goods and services. Muslim jurists consider money as potential capital rather than capital. Money becomes capital only when it is invested in a business. Thus, Islamic financial institutions encourage transfer of funds to be invested in the real sector.

¹²⁹ Toward a just monetary system, in Kiaee (2007)

In order to analyze the impact, Balamoune-Lutz (2003) argued that financial development in developing countries refers to the development of money and financial intermediation, not the development of capital markets which is predominant in developed countries. Therefore, in the context of developing (and some emerging) economies, most of the studies tend to focus on the activities of financial intermediaries, such as savings institutions and commercial banks.

Islamic bank in Indonesia has depicted consistent and remarkable growth. As per February 2009, total financing has reached 40.2 trillion Rupiahs and it has been growing up for about 47.3 percent. The non-performing financing (NPF) also demonstrates good performance by having figure below 5 percent. The industrial growth of Islamic bank achieves the average of 46.32 percent during the last five years¹³⁰. This is expected to stimulate real sector growth, because one of the objectives of Islamic economics is to support productive activities and to help society in raising equity in the allocation and distribution of wealth for promoting the well-being of all.

On the other hand, conventional theory has used interest rate as its major instrument of monetary policy, while in Islamic system, it is forbidden. Thus, it uses return of the business as the substitute for interest rate. This should have some implications towards the performance of both real sector and monetary sector of the economy. Therefore, this paper attempts to elaborate Islamic monetary transmission mechanism that has been practiced in Indonesia towards the real output growth and inflation.

II. Literature Review

Industrial Production Index (IPI) has been a very important macroeconomic indicator to monitor progress and fluctuation of industrial sectors in the Indonesia economy (Rosidi, 2000). Industrial Production Index is employed as the proxy to income, a major macroeconomic indicator potentially affecting Islamic banking growth. The index is commonly used as proxy for economic activity or national income primarily due to the unavailability of real GDP or GNP measures on monthly basis (Kasri and Kassim, 2009).

Kasri and Kassim (2009) analyzed the importance of real rate of return on Islamic deposit, interest rate on conventional deposit, real income and number of Islamic bank branches in determining the level of savings/investment in the Islamic banks by employing the Vector Autoregressive (VAR) models. The study shows that the *mudharabah* investment deposit – the proxy for the level of savings/investment in the Islamic banks – has positive relationship with the real rate of return on Islamic deposit and negative relationship with the real interest rate on conventional deposit. This implies that higher rate of return and lower interest rate are associated with higher level of the Islamic deposits, while the two other factors under consideration, which are number of Islamic bank branches and real income are shown to be insignificant in affecting the level of Islamic deposit in the long run.

Another study conducted by Haron and Wan Azmi (2005), by using VAR-VECM analysis found evidence to suggest that Islamic bank depositors are influenced by both financial and economic variables (money supply, composite index, inflation rate, and gross domestic product ratio), which is in contrast with the Islamic saving theories. For example, all Islamic bank depositors are sensitive to movement in the financial variables. Therefore, the study suggested that Islamic banks should pay more attention not only in managing their profit rates but also to the movement in the interest rates of conventional banks.

Moreover, Kassim and Majid (2009) determined the impact of monetary policy changes on Islamic banks vis-a-vis conventional banks. The study explores the dynamic inter-relationships between deposits and loans of the Islamic and conventional banks with monetary policy variable using two major tests. The Auto-Regressive Distributed Lag (ARDL) model is used to examine the long-run relationship among the variables and the Vector Error-Correction Model (VECM) is adopted to explore the short- and long-run dynamics between the variables. The study found that the Islamic banks' balance sheet items were relatively more sensitive to monetary policy changes, compared to the conventional banks balance sheet items. This implied that the impact of monetary policy is more de-stabilizing on the Islamic banks than on the conventional banks.

¹³⁰ Bank Indonesia (2010) http://www.bi.go.id/NR/rdonlyres/2FA608A9-DDFE-4551-884D-D0B9D5965572/17639/Perbankan_Syariah_Lebih_Tahan_Krisis_Global.pdf

To study the banks' implication to the real sector, Balamoune-Lutz (2003) explored the links between economic growth and financial liberalization. The study used financial depth and intermediation effectiveness as its indicators. Vector error-correction model (VECM) was used to support the demand-following view of financial development. The study failed to find significant evidence in favour of supply-side view of financial development. It may cast doubt on the policy recommendation from international financial institutions and policymakers advising countries to liberalize financial markets. Liberalizing financial sector per se may not necessarily promote economic growth. Moreover, the study suggested that economic growth leads financial development. As economic growth proceeds, the demand for financial services will cause financial development.

In the sense of dual banking system, Ascarya (2009) investigated the pass-through between policy rate and conventional bank interest rates (funding and lending), as well as between policy rate and Islamic bank profit-loss sharing or margin (funding and financing) in Indonesia, with respect to their degree and speed of adjustment, using two-step error correction model and time-series monthly data of January 2002 to September 2009. The study shows that the transmission of monetary policy from conventional part of Certificate of Bank Indonesia (SBI) is linked through inflation, while its Islamic counterpart is not linked directly with the interbank profit-loss sharing and financing, not through inflation. In the short term, almost all conventional variable (credit, interest rate, Certificate of Bank Indonesia) are significant, while all Islamic variables (financing, profit-loss sharing, interbank profit-loss sharing, and Islamic Certificate of Bank Indonesia) are not having significant influence the inflation. However, in the long term, conventional variables (credit, interbank rate, and Certificate of Bank Indonesia) and Islamic variables (financing and Islamic certificate of Bank Indonesia) are significantly affecting the inflation. Meanwhile, the profit-loss sharing and interbank profit-loss sharing are not significant in both short term and long term. In the impulse response function (IRF), the conventional variables (credit, interest rate, and Certificate of Bank Indonesia) are higher (and positive) than the Islamic variables (financing, profit-loss sharing, and Islamic Certificate of Bank Indonesia). This implies the existence of speculation in the conventional system.

III. Methodology

3.1. Sources of Data

This research utilizes monthly data that is taken from various secondary sources including Indonesia's Economic and Financial Statistic of Bank Indonesia, Banking Statistic of Indonesia, Islamic Banking Statistic of Indonesia, CEIC and IFS (International Financial Statistics) from January, 2004 until December, 2009.

3.2. Model and Variables

Below are the general models that are going to be analyzed in this study.

1. IPI Model

$$V_t = \sum_{i=1}^1 A_i \ln_IPI_{t-i} + \sum_{i=1}^1 B_i \ln_TIF_{t-i} + \sum_{i=1}^1 C \ RS_TIF_{t-i} + \sum_{i=1}^1 D_i \ln_TID_{t-i} + \sum_{i=1}^1 E_i \ RS_TID_{t-i} + \sum_{i=1}^1 F_i \ M0_{t-i} + \sum_{i=1}^1 G_i \ sbis_{t-i} + \varepsilon_{it}$$

2. CPI Model

$$V_t = \sum_{i=1}^1 A_i \ln_CPI_{t-i} + \sum_{i=1}^1 B_i \ln_TIF_{t-i} + \sum_{i=1}^1 C \ RS_TIF_{t-i} + \sum_{i=1}^1 D_i \ln_TID_{t-i} + \sum_{i=1}^1 E_i \ RS_TID_{t-i} + \sum_{i=1}^1 F_i \ M0_{t-i} + \sum_{i=1}^1 G_i \ sbis_{t-i} + \varepsilon_{it}$$

where as:

V_t	=	Analytical variables that consist of IPI, total Islamic financing, return on total Islamic financing, total Islamic deposit, return on total Islamic deposit, M0 (money in circulation) and SBIS (Islamic Central Bank Certificate).
W_t	=	Analytical variables that consist of CPI, total Islamic financing, return on total Islamic financing, total Islamic deposit, return on total Islamic deposit, M0 (money in circulation) and SBIS (Islamic Central Bank Certificate).
A, B, C, D, E, F, G	=	Parameter in the form of finite order matrix with operator <i>lag</i> i.
ε_u	=	Vector white noise
I	=	Order <i>lag</i>

Variables which are used by this study are as below:

- a. IPI = Industrial Production Index, which is used as proxy for real sector economic growth.
- b. CPI = Consumer Price Index, which is used for inflation.
- c. TIF = total Islamic financing.
- d. RS-TIF = return on total Islamic financing.
- e. TID = total Islamic deposit.
- f. RS-TID = return on total Islamic deposit.
- g. M0 = money in circulation.
- h. SBIS = Islamic Central Bank Certificate.

3.3. Empirical Framework

3.3.1. Unit Root and Cointegration Tests

The first step in this study is to determine stationarity of variables of the models. Briefly stated, classical regression techniques may be invalid if applied to variables that do not meet the stationarity property (Thomas, 1997).

This paper uses the most commonly used test, which is Augmented Dickey Fuller (ADF) test. It is “augmenting” a random walk with drift around a stochastic trend by adding the lagged values of the dependent variable ΔY_t (Gujarati, 2003). The test will be based on following model:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^m Y_{t-1} + \varepsilon_t$$

Where β_1 and β_2 are parameters, t is the time or trend variable, δ represents drift, ε_t is a pure white noise error term and $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$, etc. If the null hypothesis exists, i.e. $\delta = 0$; then there is a unit root. Hence, the time series is non stationary. If the alternative hypothesis exists, i.e. δ is less than zero, then the time series is stationary.

The next step is to test cointegration. It aims at determining whether or not the non stationary variables are cointegrated, i.e. they share a long run and stable relationship. In order to achieve this objective, Johansen (1991 and 1995) and Johansen-Juselius (1990) tests are employed. The test is run under the following form:

$$\Delta Y_t = \beta_0 + \pi Y_{t-1} + \sum_{i=1}^p \Gamma_i \Delta Y_{t-1} + \varepsilon_t$$

Cointegration exists if trace statistics is greater than the critical values. After we know the number of cointegration equations, then we can proceed to the VECM (Vector Error Correction Model) analysis.

3.3.2. Vector Error Correction Model (VECM)

This method is used when variables of the research are cointegrated at the first difference. In general, this method is based on the following formula:

$$\Delta Y_t = \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-1} + \mu_0 + \mu_{1t} + \alpha \beta Y_{t-1} + \varepsilon_t$$

where:

$$\Delta y_t = y_t - y_{t-1},$$

$k-1$ = order of VECM from VAR,

Γ_i = regression coefficient matrix ($b_1, ..b_1$),

μ_0 = intercept vector

μ_1 = regression coefficient vector,

t = time trend,

α = loading matrix

β = cointegration vector,

y = variable used in the analysis

3.3.3. Impulse Response Function (IRF)

Impulse Response Function (IRF) is a method that is used to determine the response of an endogenous variable on a certain shock, because this shock maybe transmitted to the other dependent variables through a dynamic structure or lag structure in the VAR model. IRF essentially maps out the dynamic response path of a variable due to a one-period standard deviation shock to another variable.

IV. Empirical Finding and Analysis

After all data are prepared, they are transformed into natural log, except for return on total Islamic financing, return on Islamic deposit and SBIS (Islamic Central bank Certificate); all of which are already in the form of rate or growth. Therefore, the data that is transformed comprises IPI (Industrial Production Index), CPI (Consumer Price Index), total Islamic financing, total Islamic deposit, and M0 (money in circulation). This aims at obtaining valid and consistent results.

4.1. Unit Root and Cointegration Tests

As stated earlier that the unit root test is conducted in order to determine stationarity of the data used in this research. It can be observed that all variables used in this research are not stationary at level, except in the IPI variable. However, they become stationary after first differencing. That is, they are integrated of order 1, or I (1). Given these results, we proceed to the cointegration test.

The cointegration test shows that more than one cointegration exist in each model and significant at 5 percent. This indicates that there is long run equilibrium relationship among the variables. Therefore, Vector Error Correction Model (VECM) will be used in order to obtain this long run relationship.

4.2. Analysis for IPI Model

4.2.1. Estimated VECM for IPI Model

Estimated VECM findings for real sector output for both short run and long run are depicted in the following Table 1.

Table 1. Estimation of VECM for IPI Model

Long Run		
Variables	Coefficient	T-Statistics
LN_TOTALFINANCING(-1)	0.469622	-2.931150**
RS_TOTALFINANCING(-1)	0.063502	-5.742340**
LN_TOTALDEPOSIT(-1)	-0.479279	3.002740**
RS_TOTALDEPOSIT(-1)	-0.046683	4.750530**
LN_MO(-1)	0.109793	-2.428620**
SBIS(-1)	-0.052592	4.587520**

Source: Author's own

Note: **: significance at 5%

From the table above, it is known that in the long run, total Islamic financing has significant impact to the economic growth (IPI). The two variables are positively related. A 1 percent increase in the total Islamic financing will increase the IPI by 0.469622 percent. On the other hand, return on Islamic financing also has positive significant impact to the IPI. A 1 percent rise in the return on Islamic financing leads to a 0.063502 percent increase in the industrial production index.

Moreover, total Islamic deposit is found to have significant impact on the real sector growth, although in the negative relationship. If it goes up by 1 percent, then the IPI will go down by 0.479279 percent. In line with this finding, return on Islamic deposit is also negatively related with the IPI. When this return on Islamic deposit rises by 1 percent, the IPI falls by 0.046683 percent. The former's impact on the latter is found to be significant. This situation is because of the displaced commercial risk. It means that the behaviour of the Islamic bank customers is still following the movement of interest rate in the conventional bank. This confirms the findings that have been found by Kasri and Kassim (2009) and Haron and Wan Azmi (2005).

Positive trend also exists in the relationship between money in circulation and the IPI. If M0 increases by 1 percent, the IPI will also increase by 0.109793 percent. In addition, unlike M0, Islamic Central Bank Certificate has negative relationship with IPI. A 1 percent increase in the certificate will produce a 0.052592 percent fall in the IPI.

4.4.2. IRF (Impulse Response Function) Analysis for IPI Model

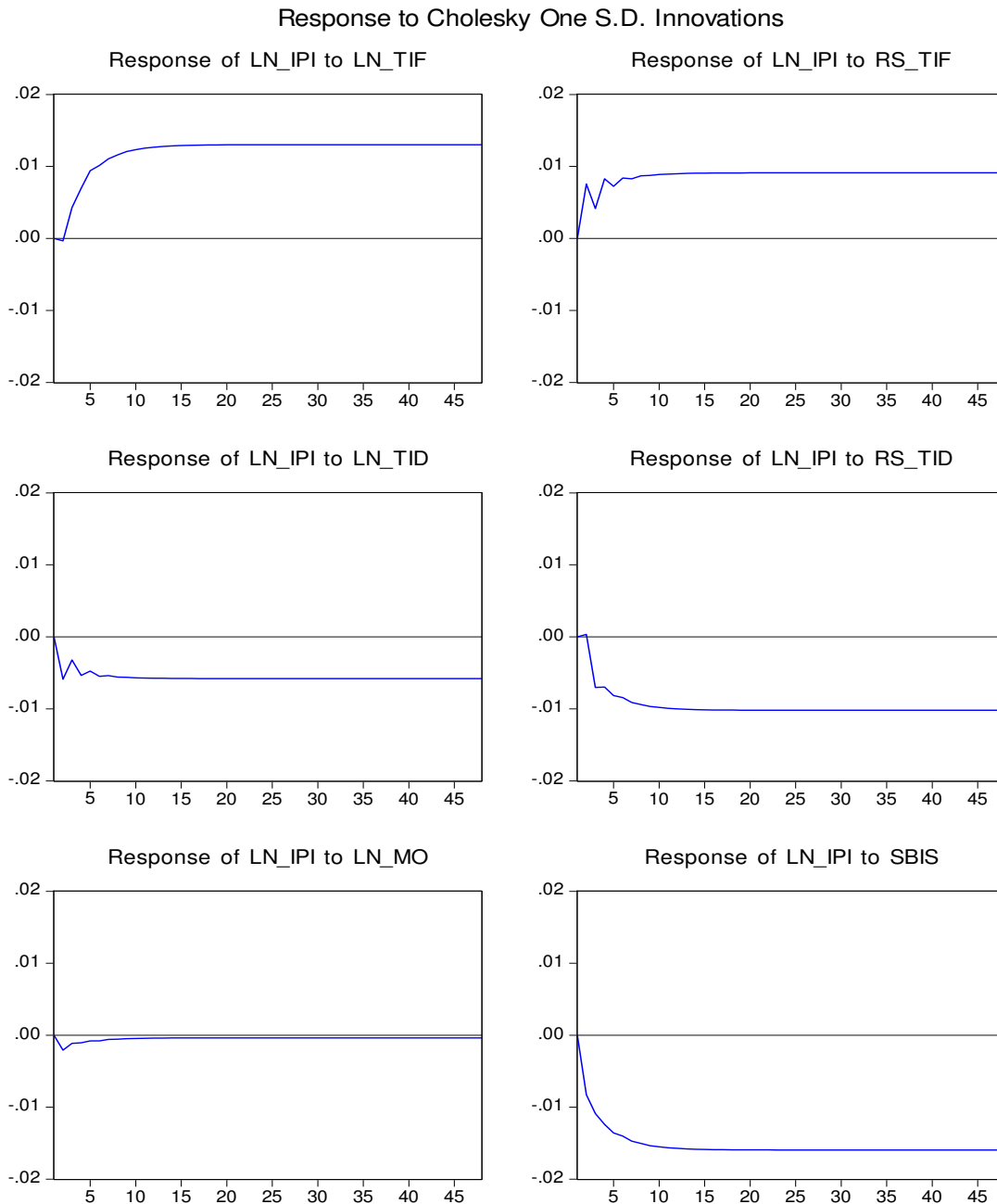


Figure 1. Impulse Response on IPI Model

Impulse Response Function (IRF) depicts how a variable reacts to the shocks that attack other variables. In this section, the IPI response towards the shocks – which disturb total Islamic financing, return on Islamic financing, total Islamic deposit, return on Islamic deposit, M0 and Islamic Central Bank Certificate – will be analyzed. The result can be shown in Figure 1.

When there is shock on total Islamic financing, IPI reacts negatively in the 2nd month with the value of -0.000330. And afterwards the trend becomes positive and increases until reaching the 16th month. Stability occurs in the 24th month with the value of 0.013023. On the other hand, the IPI reacts

positively to the disturbance-taking place in the return on Islamic financing. The fluctuation exists with positive trend until 12th month. Stability takes place on the 22nd month with the value of 0.009113.

Furthermore, IPI has negative response towards the shock disturbing total Islamic deposit. Output stability takes place in the 20th month by a permanent value of -0.005799. Similarly, negative response is shown by IPI to the return on total Islamic deposit since the 3rd month. However, output stability can be achieved in the 23rd month with a permanent value of -0.010199.

When there is M0 shock, the output will also be shocked negatively from the 2nd month. Nevertheless, its values lie around equilibrium line. IPI stability is achieved in the 20th month with the permanent value of -0.000372. In addition, the shock on the Islamic Central Bank Certificate is responded negatively by IPI. IPI reaches stability in the 22nd month with the value of -0.015953. Given these findings, it can be concluded that real output stability reaches its stability on the 24th month in the presence of shocks disturbing those variables.

4.3. Analysis for Inflation Model

4.3.1. Estimated VECM for Inflation (CPI) Model

The results of estimated VECM for inflation (CPI) model through Islamic monetary mechanism for both long run and short run are presented in the following table.

Table 2. Estimated VECM for CPI Model

Long Run		
Variables	Coefficient	T-Statistics
LN_TOTALFINANCING(-1)	4.453058	-1.361270
RS_TOTALFINANCING(-1)	0.765159	-3.345160**
LN_TOTALDEPOSIT(-1)	-6.585119	2.014480**
RS_TOTALDEPOSIT(-1)	-1.122574	5.458380**
LN_MO(-1)	2.014555	-2.122370**
SBIS(-1)	-0.832001	3.493880**

Source: Author's own

Notes: **: significant at 5 percent

As can be observed in the table, the total Islamic financing has no significant impact on CPI. However, return on total Islamic financing does affect CPI significantly in a positive trend. A 1 percent increase in this return will push the CPI to move up by 0.765159 percent.

On the other hand, total Islamic deposit has significant impact on CPI and they are negatively related. If the former goes up by 1 percent, then the latter goes down by 6.585119 percent. Similar trend also occurs for the return on total Islamic deposit. A 1 percent increase in this return will be followed by a 1.122574 percent in the CPI.

In addition, M0 and Islamic Central Bank Certificate have different effect on the CPI. M0 is positively related with CPI, while Islamic Central Bank Certificate has negative relationship. A 1 percent increase in the M0 will push the CPI to go up by 2.014555 percent. On the other hand, if the Islamic Central bank Certificate increases by 1 percent, then the CPI will fall down by 0.832001 percent.

4.3.2. IRF (Impulse Response Function) Analysis for CPI Model

Figure 2 attempts to explain CPI's impulse response in the existence of shocks disturbing total Islamic financing and its return, total Islamic deposit and its return, M0 and Islamic Central Bank Certificate.

Based on the figure, CPI responds negatively in the presence of the shocks on total Islamic financing. Stability period takes place in the 32nd month with a permanent value of -0.016392 percent. Similar trend also occurs in the case of return on total Islamic financing in which the CPI's response is negative. Stability is achieved in the 30th month with a value of -0.003569 percent.

However, the CPI's response is positive in the existence of the shocks disturbing total Islamic deposit. Stable condition is reached in the 23rd month with a value of 0.005721 percent. Positive response is also demonstrated by the CPI when there is disturbance on the return on Islamic deposit. Stability can be achieved on the 32nd month with a permanent value of 0.016110 percent.

CPI's response becomes negative when M0 is disturbed. The situation is stable again after reaching the 28th month at the level of -0.003865 percent. Opposite trend exists when Islamic Central Bank Certificate is shocked. The CPI responds positively and it reaches stability period in the 32nd month by having a value of 0.006098 percent.

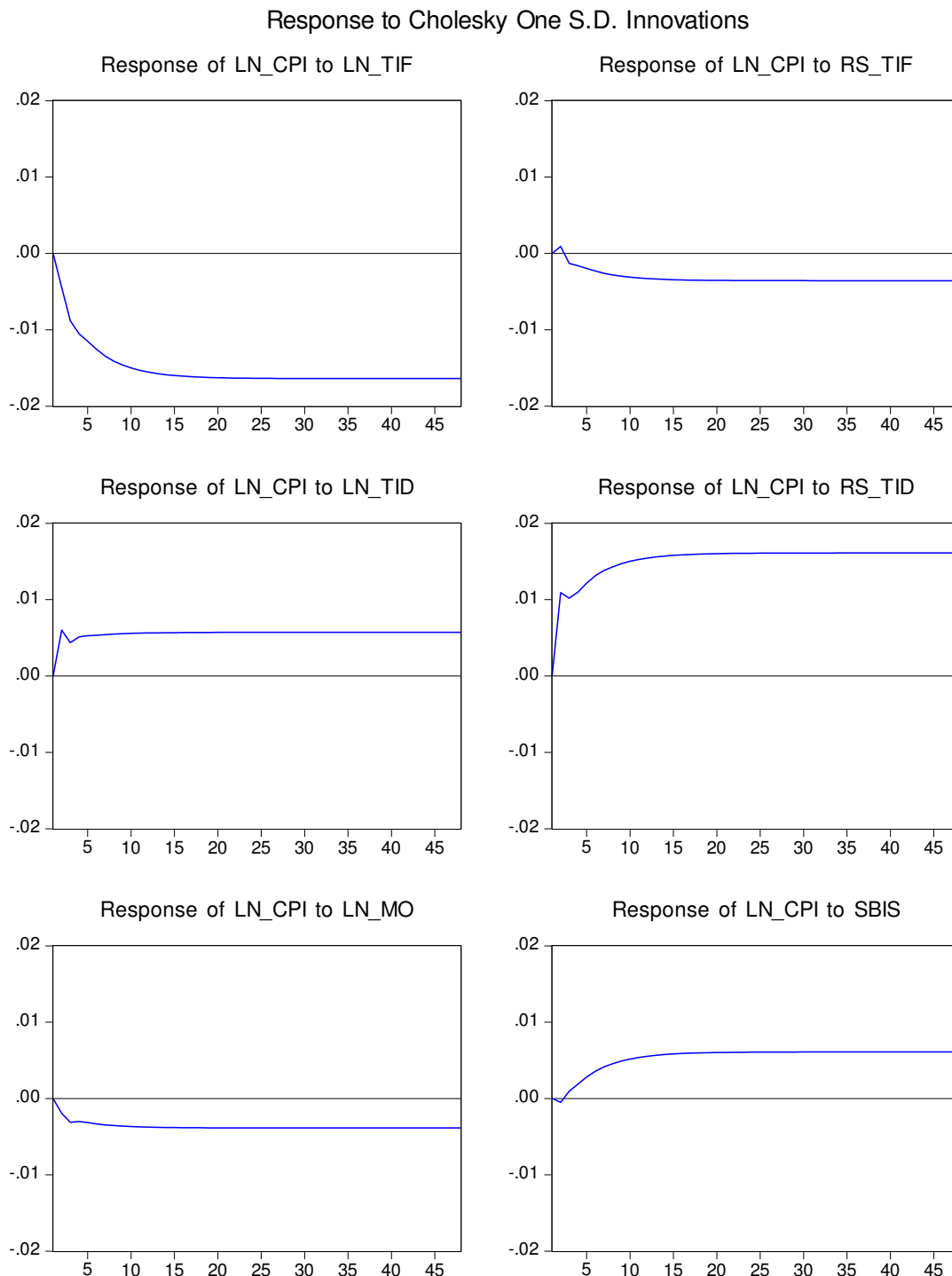


Figure 2. Impulse Response on CPI Model
V. Conclusion

This paper attempts to elaborate Islamic monetary transmission mechanism that has been practiced in Indonesia towards the real output growth and inflation. The findings suggest that all Islamic variables affect the growth of the real sector of the country's economy. Total Islamic financing, return on total Islamic financing and money circulation are affecting the real sector growth positively. This seems to suggest that theoretical expectation stating that there is no missing link between real

sector and monetary sector is proven empirically. However, the problem emerges on the side of deposit. Total Islamic deposits as well as return on Islamic deposit are inversely related with real sector growth. This proves that making conventional interest rate as benchmark is not effective. Therefore, we need a new formula in order to replace this interest-based benchmarking. Interestingly, the use of Islamic Central Bank Certificate is unable to stimulate economic growth. It is just used as an instrument of adsorbing idle fund that cannot be allocated to the real sector financing. As for inflation, the findings suggest that all Islamic variables are not affecting inflation in the country. This can be taken as evidence that there is strong link between monetary sector and real sector of the economy when Islamic-based practices are adopted. In the future, the government and the monetary authority should encourage the growth of Islamic financial industry in a faster rate for the benefit of the country.

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