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Sharia Banking Dynamics and the Macroeconomic Responses: Evidence from Indonesia

(Kedinamikan Perbankan Syariah dan Tindak Balas Makroekonomi: Bukti dari Indonesia)

Alfan Mansur
Indonesia's Ministry of Finance

ABSTRACT

Sharia banking industry in Indonesia has been established since early 1990s and growing remarkably after 1998. How the industry contributed to the Indonesian economy and what shocks drove the sharia banks' credit in Indonesia were investigated in this paper using a Structural Vector Auto-regression (SVAR) model with recursive short run restrictions as its identification strategy. The results showed that GDP growth, core inflation, and business activity responded to increase in sharia banks' financing positively, but with lags. Expanding sharia financing by 1 percent boosted up GDP growth by 0.06 percent. In the short-run, the contribution of sharia banks' financing to the macroeconomic variables was limited, but it then escalated in the long run with the main channel of transmission through its ability to drive people's purchasing power. Another result showed that sharia banks' financing had a negative relationship with the central bank's monetary policy. In order to improve the performance of sharia banking in Indonesia, the demands of domestic sharia financing have to be strengthened with regards to the large number of Moslems in Indonesia. At the same time, Islamic banks have to improve their business processes. Rather than capping their profit margins or murabahah-based financing, they should promote more profit sharing mudharabah-based financing with prioritizing principle of mutual help among Moslems.

Keywords: Sharia banks' financing; Structural Vector Auto-regression (SVAR); macroeconomic variables; shock

ABSTRAK

Industri perbankan syariah di Indonesia telah ditubuhkan sejak awal tahun 1990-an dan berkembang pesat sejak 1998. Bagaimana sumbangan industri perbankan syariah terhadap ekonomi Indonesia dan jenis kejutan yang mempengaruhi pembiayaan perbankan syariah di Indonesia telah diselidik dalam kajian ini dengan menggunakan model Vektor Auto Regresif Berstruktur (SVAR) rekursif jangka pendek sebagai strategi identifikasi. Hasil kajian menunjukkan bahawa pemboleh ubah makroekonomi seperti pertumbuhan ekonomi, inflasi teras dan aktiviti perniagaan memberikan respon secara lat kepada kejutan pembiayaan syariah. Peningkatan pertumbuhan pembiayaan syariah sebanyak 1 peratus telah meningkatkan pertumbuhan ekonomi sebanyak 0.06 peratus. Dalam jangka pendek, sumbangan pembiayaan syariah ke atas pemboleh ubah makroekonomi masih terbatas, tetapi dalam jangka panjang sumbangannya telah meningkat sebagai salah satu saluran transmisi dasar monetari dalam menggerakkkan kuasa beli masyarakat. Dapatan lain menunjukkan bahawa pembiayaan syariah mempunyai hubungan yang negatif dengan dasar monetari. Dalam usaha untuk mengembangkan lagi perbankan syariah di Indonesia pada masa hadapan, permintaan domestik terhadap pembiayaan syariah perlulah diperkukuhkan lagi memandangkan jumlah populasi muslim yang terbesar berada di Indonesia. Selain itu, bank-bank syariah juga perlu memperbaiki proses perniagaan. Daripada mengehadkan margin keuntungan atau pembiayaan berasaskan murabahah, perbankan Islam harus menggalakkan lebih banyak perkongsian keuntungan berasaskan kepada pembiayaan mudharabah dengan mengutamakan prinsip bantuan bersama dalam kalangan orang Islam.

Kata kunci:Pembiayaan syariah; Vektor Auto Regresif Berstruktur (SVAR); pemboleh ubah makroekonomi; kejutan

INTRODUCTION

Islamic finance has grown rapidly in recent years. By the end of 2014, the total assets of Islamic finance accounted for approximately USD 2 trillion worldwide with the average annual growth rate of 17.5 percent between 2009 and 2013 (Ernst & Young 2015). Indonesia and Turkey experienced the highest growth rate of about 43 percent and 19 percent respectively within the same period (Hussain et al. 2015). In the longer horizon periods of time, the number of Islamic financial institutions had grown from just one institution in 1975 to over 410 institutions globally by the end of 2013 (Elmawazini et al. 2015; Hussain et al. 2015). Similar to this trend, the number of Islamic financial institutions in Indonesia had also increased considerably from merely one in 1991 to 13 of sharia commercial banks and 21 of sharia business unit owned by conventional banks by the

end of 2016. With such notable growth, how the impact of sharia banking on economic growth is appealing to study.

On the one hand, sharia banking is claimed to be more resilient to shocks due to its characteristics. Two important features of sharia banking that make it conceptually more advantageous than conventional banking are its limited engagements in speculative transactions and risk-sharing balance sheets (International Monetary Fund 2017). In sharia banking risk-sharing concept, sharia banks are funded mainly by non-interest-bearing current accounts as well as risk and return sharing of investment account. Meanwhile, in conventional banking risk transfer concept, banks take all the risks by assuring a pre-specified return and guaranteeing deposits. Goaied and Sassi (2010) also highlight that sharia banking has a better economic stability compared to conventional banking. They argue that in case of bank-specific or macroeconomic crises, investment depositors of sharia banks share the risks automatically and this will allow the liability adjustments.

This study aims to investigate two questions. First, it explores to find out whether the sharia banking in Indonesia contributes to the economic growth of Indonesia both in the short- and the long-run. Second, it attempts to find out whether macroeconomic dynamics have impacts on the sharia banking development in Indonesia. Furthermore, this paper argues that as part of the overall financial system, sharia banking is not immune to either domestic macroeconomic shocks or external shocks from abroad, particularly through monetary policy and exchange rate shocks.

The result of this study is expected to contribute to the existing literature on Islamic finance. First, it presents two-way impact analysis of sharia banking development and macroeconomic variables. It also underlines the importance of monetary policy shocks to the development of sharia banking with underlying assumption consistent with the standard macroeconomic theory of monetary policy in which monetary policy shocks cannot have instantaneous impact on macroeconomic variables, such as GDP and inflation. Lastly, this study offers some empirical analysis on the elasticity of sharia banking development against macroeconomic shocks.

The rest of this paper is structured into four sections. Section II provides a brief literature review on the relationship between financial sector and economic growth, and it also discusses the previous studies regarding the impact of sharia banking on the economic development. Section III presents the methodology including theoretical framework, data collection and model specification. Meanwhile, the results and discussion of the analysis are presented in Section IV afterwards; and it is finally followed by Section V which summarizes and concludes the study.

LITERATURE REVIEW

It is generally believed that financial sector has an important role in promoting economic growth of a country. This sector is able to do so if it can direct financial resources to the whole economy. On the other hand, what happens with the macroeconomic variables also influences the development of financial sector. Hence, there are three possibilities of relationships between financial sector development and the macroeconomy: (i) development of financial sector determines economic growth –"supply leading"; (ii) economic growth determines development of financial sector –"demand following"; and, (iii) both have bidirectional causation (Furqani & Mulyany 2009). Investigations to those relationships end up with mixed results. Some of them support "demand following" theory (Furqani & Mulyany 2009; Masih & Masih 1996), some other results take the "supply leading" theory (Fase & Abma 2003; Xu 2000), and the rest found that financial development would not even promote growth (Galindo & Micco 2004; Harris 1997).

As part of the financial sector, Islamic banking or sharia banking should have the same nexus with macro-economic development. A number of studies have been conducted to research this relationship. Furqani and Mulyany (2009) examined relationships between sharia banking and economic growth in Malaysia using a Vector Error Correction Model (VECM). They find that increase in GDP initiates sharia banking to develop, but no evidence that sharia banking supports GDP growth. In other research, Kassim et al. (2009) examined the effect of monetary policy shocks on both sharia and conventional banks in Malaysia in a Vector Auto-Regression (VAR) framework. They found that the sharia banking was more sensitive to the monetary shocks compared to the conventional banking. One drawback of their research is the strong assumption by putting overnight rate variable, monetary policy instrument, at the first order in the Cholesky ordering they apply on their model. By this order, monetary policy is treated more exogenous than the other macroeconomic variables such as industrial production, inflation, and exchange rate in their model. As a result, their monetary shocks may be over-estimated. This is also inconsistent with a number of studies which find that monetary policy shocks cannot have instantaneous impact on some macroeconomic variables, like GDP and inflation (Clarida et al. 1998; Estrella 2015; Peersman 2005; Uhlig 2005).

In Indonesia, sharia banking industry has been established since early 1990s with Bank Muamalat Indonesia as the pioneer (Ascarya & Yumanita 2005). Starting in 1992, the Indonesian Government has been committed to support the development of sharia banking in Indonesia, but the Government did not give more commitment with greater supports until 1998. Before 1998, operation of the sharia banking in Indonesia was under Law no. 7 of 1992 which introduced dual banking

system (Ascarya & Yumanita 2005). Although sharia banking was not mentioned explicitly in the law, it in fact regulated about business with profit sharing system. Under the law, sharia banks still met difficulties regarding the operational procedures for sharia transactions. What was understood at that time was that sharia banking operated with profit sharing system, but they still complied with conventional banking regulations.

In 1998, the Government started to be fully committed in supporting sharia banking in Indonesia by amending Law no. 14 of 1967 on Banking Principles with Law no. 10 of 1998. This new law was enacted with both institutional and operational fundamentals for comprehensive development of sharia banking in Indonesia (Ascarya & Yumanita 2005). Under this law, dual banking system has been fully adopted with both the conventional and the sharia banking under the surveillance of the central bank, Bank of Indonesia. Still under the new law, conventional banks were allowed to operate sharia business units. Amendment of Law no. 13 of 1968 with Law no. 23 of 1999 on Bank of Indonesia has strengthened the existence of sharia banking in Indonesia. A number of sharia business units have grown enormously thereafter.

In terms of assets and third-party funds, sharia banks have improved remarkably. Sharia banks' assets grew from IDR 7.9 trillion in December 2003 to IDR14.2 trillion in November 2004 or increased by 79.75 percent. As a comparison, overall banks assets only grew by 13.4 percent within the same period (Ascarya & Yumanita 2005). In 2016, the amount of sharia banks' asset was IDR 356.5 trillion, so between 2004 and 2016 their asset rose by 2,411 percent or 201 percent per annum within the period of 14 years. Contribution of sharia banks' asset to the total asset of banks was accounted for 1.11 percent per November 2004 and it became 5.33 percent per November 2016. On the other hand, third-party funds of the sharia banks contributed to 0.64 percent of total banks' third-party funds in 2003 and it became 4.35 percent in 2016 (*Indonesia Banking Statistics* 2017). As the sharia banking has been growing considerably, its contribution to the Indonesian economy should have increased accordingly.

A number of studies regarding the relationship between sharia banking dynamics and macroeconomic responses have been done previously. One among others was the study of Abduh and Omar (2012) which reported that Islamic financial development in Indonesia had a significant relationship with the Indonesian economic growth both in short run and long run periods. Another research of Abduh et al. (2012) argued that Islamic financial deepening in Bahrain demonstrated a significant positive relationship too with the Bahrain's economic growth, but only in the long run. Al-Oqool et al. (2014) found a similar evidence in a case study of Jordan. Furthermore, Boukhatem and Moussa (2018) concluded that Islamic financial development stimulated the economic growth of Middle East and North African countries, although stalled by the immature institutional framework. In their study, they already used multiple control variables, namely conventional and Islamic banking system activity, real GDP per capita, inflation, education, government consumption expenditure, trade openness, and quality of institutions.

Most of the previous studies, however, do not reckon key macroeconomic variables like GDP, inflation, interest rates and exchange rates simultaneously. Sharia banking should be affected by either domestic macroeconomic shocks or external shocks from abroad, particularly monetary policy shock and exchange rate shock. These two influential shocks were missing in the previous studies. Moreover, some studies like Kassim et al. (2009) treat monetary policy variable too exogenous. They set overnight interest rate variable more exogenous than the other macroeconomic variables, such as industrial production, inflation, and exchange rate in their model. As a result, their monetary shocks may be over-estimated. The existing belief that sharia banking is more resilient to economic shocks is also still underexplored.

METHODOLOGY

THEORETICAL FRAMEWORK

Regardless the debate which comes first between financial development and economic growth, financial intermediaries, either conventional or sharia, are favorable for economic growth. They are able to promote growth through five functions: (i) allocating resources; (ii) organizing savings; (iii) helping goods and services exchange; (iv) exercising corporate control and monitor managers; and, (v) facilitating investment activities and risk pooling (Levine 1997). Through those functions, financial intermediaries take on the transaction costs and develop resource allocation which then have an effect on saving rates and investments (Imam & Kpodar 2016). The saving rates and investments subsequently influence the economic growth as well as the economic activity.

According to the capital structure irrelevance theory, the cost of capital is not independent to capital structure (Modigliani & Miller 1958). By this meaning, in the event of sharia and conventional banking finance common projects, they will have indistinctive effects to the economy as their capital structures are alike. However, Imam and Kpodar (2016) identify that sharia banks have unique features and more advantages compared to the conventional banks. First, sharia banks offer risk-sharing attributes implying that it can encourage financing to individuals without underlying assets or collaterals. For corporates or businesses, financial capital providers and business owners share risks together with profits.

Second, sharia banks raise savings as devoted Muslims are not willing to put their money into the conventional banks which are against their religious principles. Sharia banks can attract their money to the financial system so that financial intermediation improves. Third, the risk-sharing concepts of sharia banking have made the sharia banks less prone to financial crisis. Also, they do not have asset-liability mismatches, as short-term needs are financed by short-term deposits and long-term investment is financed by long-term deposits. Fourth, sharia banks finance projects which are morally acceptable so as to unhazardous for society, for instance, the sharia banks will not finance a casino.

Nonetheless, sharia banking also have some disadvantages compared to the conventional banking, namely lack of economies of scale and lack of liquid instruments (Imam & Kpodar 2016). In terms of economies of scale, sharia banks tend to be newer and smaller than conventional banks, which makes their cost structures higher. Also, due to its younger age, their instruments are less developed and therefore less liquid compared to the conventional instruments.

DATA COLLECTION

This study used secondary data collected from Central Bureau of Statistics, Bank of Indonesia, and Indonesia's Financial Services Authority. The data was a quarterly data with sample period of 2005q3 to 2017q1 (47 observations). Table 1 shows the data description.

Unit roots tests of the raw data and constructed variables were performed using Augmented Dickey Fuller (ADF) and Phillips Perron tests. The results showed that all raw data were integrated processes of order one (I (1)) at 1 percent significance level, except money market rate which was I (0) at 5 percent significance level. After constructions, all were I (0) or stationary.

MODEL SPECIFICATION

In order to formulate the dynamic relationship between sharia banking and macroeconomic variables, a Structural Vector Autoregression Regression (SVAR) model was adopted in this study with structure as follows:

$$Y_t = c + \Sigma_{i=1}^{n} A_i Y_{t-i} + B\varepsilon_t \quad (1)$$

where Y_t consists of GDP (y_t), core consumer price index (p_t), money market rate (r_t), real effective exchange rate ($reer_t$), business condition (bus_t), and sharia banks' financing (fin_t) in order. GDP is chosen to reflect aggregate supply shock in the Indonesian economy, while core consumer price index is aimed to capture aggregate demand shock. Core consumer price index is included in the overall consumer price index in order to eliminate effects of volatile foods and to administer prices since they do not mirror people's purchasing power. Meanwhile, money market rate is chosen to be put in the model to capture overall monetary condition in Indonesia which is believed to have significant influence to the conventional banking financing including sharia financing. It is also believed that exchange rates as well as business environment have noteworthy impacts on the sharia banking financing. Positive numbers of the business condition indices show business' expansion, conversely negative numbers indicate business' contraction.

All variables are expressed in percentage log return form except for the money market rate and business condition as they are already in percentage. Those variables other than money market rate and business condition enter in log-differenced forms with a number of considerations. Using a Monte Carlo simulation, Ashley and Verbrugge (2009) investigate the question of 'to difference or not to difference' in vector autoregression models exploiting a range of estimation techniques. The simulation results then suggest that estimating a VAR model in levels can be problematic to perform statistical inference, such as Granger causality testing and the results may be spurious. Conversely, VAR in differences estimation method yields high power causality tests. Moreover, their results also suggest that in terms of impulse response functions, VAR model in levels indeed yields impulse response function confidence interval converging more properly. However, VAR model in differences still yield appropriate impulse response function confidence intervals when the sample size is small. In their study, they use number of observations of 50, 200, 400 and 2000, while this paper uses 47 observations.

TABLE 1. Data Sources

No	Variable	Unit	Description	Source
1	GDP	IDR billion	Seasonally adjusted using census X12.	Central Bureau of Statistics
2	Core consumer price index	Index 2010=100	Seasonally adjusted using census X12.	Central Bureau of Statistics
3	Money market rate	Per cent p.a.	Seasonally adjusted using census X12.	Bank of Indonesia
4	Real effective exchange rate	Index 2010=100	Seasonally adjusted using census X12.	Bank of Indonesia
5	Business activity weighted net balance	Per cent	Seasonally adjusted using census X12.	Bank of Indonesia
6	Sharia banks' financing	IDR billion	Seasonally adjusted using census X12.	Indonesia Financial Services Authority

In equation (1), c is a ($n \times 1$) matrix of deterministic component which is constant and exogenous. A_i contains autoregressive coefficients of ($n \times n$) matrix and ε_t is vector of mutually and serially uncorrelated structural disturbances. In sum, the full set of constructed endogenous variables is

$$Y_t = \{100\Delta\ln(y_t), 100\Delta\ln(p_t), r_t, 100\Delta\ln(reer_t), bus_t, 100\Delta\ln(fin_t)\} \quad (2)$$

Considering the number of quarterly observations and to preserve the degrees of freedom, the SVAR model is estimated using two lags. Likelihood Ratio (LR) and Final Prediction Error (FPE) also suggest two lags to be used. The model estimated has satisfied the stability condition. Under the model structure, six principal shocks identified are supply shock, demand shock, monetary shock, exchange rate shock, business shock, and sharia money demand shock.

$$\varepsilon_t' = [\varepsilon_t^{supply}, \varepsilon_t^{demand}, \varepsilon_t^{monetary}, \varepsilon_t^{exchange\ rate}, \varepsilon_t^{business}, \varepsilon_t^{sharia\ money\ demand}] \quad (3)$$

One important thing in a VAR model is the identification (Inoue & Kilian 2013; Kilian 1998; Martin et al. 2012). In general, the identification strategies in the VAR model can be divided into four, namely: (i) short-run restrictions; (ii) long-run restrictions; (iii) a combination of the short- and the long-run restrictions; and, (iv) sign restrictions (Martin et al. 2012). Some studies that use short-run restrictions are conducted by Christiano et al. (1999) studying monetary policy shocks, Kilian (2009) investigating the impact of oil price shocks, Kim and Roubini (2000) finding out the exchange rate anomalies in industrial countries, and Mansur (2015) studying the impact of oil price shocks on Indonesia. Meanwhile, some researches using the long-run restrictions are conducted by Blanchard and Quah (1989) studying demand and supply shocks, and by Fry et al. (2008) and Mansur, Liu, & Zaman (2015) studying the role of portfolio shocks to the Australian economy. Studies using a combination of the short- and the long-run restrictions were then carried out by Gali (1992) who studies IS-LM model and Peersman (2005) who models the oil price shocks. Finally, the sign restrictions are used in studies, for instance, by Baumeister and Kilian (2014), Dungey and Fry (2009) and Uhlig (2005).

In this study the identification strategy of short-run restrictions is used with the recursive ordering or known as Cholesky ordering. It was firstly proposed by Wold (1951) as an identification method of structural equation parameters. This Cholesky–recursive identification is recommended to be considered first and asked if there is something unreasonable (Ouliaris et al. 2016). If the ordering can be justified on economic grounds, then the Cholesky identification is appropriate (Kilian & Lütkepohl 2017). The Cholesky ordering applied in the model used in this paper is GDP (y_t), core consumer price index (p_t), money market rate (r_t), real effective exchange rate ($reer_t$), business condition (bus_t), and sharia banks' financing (fin_t) respectively. By this order, it assumes that a shock in the GDP has an instant effect on the other variables, while a shock in the core consumer price index, for example, has an impact to the GDP with some lags. As an instance, when there are capital inflows, GDP rises quickly and relative price of consumption drops in consequence of interest rate's hike as a monetary policy adjustment. On the other hand, let's say there are capital inflows, real exchange rate appreciates before it finally affects trade balance and GDP after some time. REER therefore does not have immediate effect on the GDP, core consumer price, and money market rate. Variable of sharia banks' financing is put in the last order as it will not affect macroeconomic variables instantaneously, but it needs some time to have effects. In a matrix form, the reduced-form errors which are decomposed according to $e_t = B\varepsilon_t$ as in equation (1) under Cholesky – recursive decomposition can be written as follows:

$$e_t \equiv \begin{pmatrix} e_t^{gdp} \\ e_t^{core\ cpi} \\ e_t^{money\ market\ rate} \\ e_t^{reer} \\ e_t^{business\ conditon} \\ e_t^{sharia\ financing} \end{pmatrix} = \begin{bmatrix} a_{11} & 0 & 0 & 0 & 0 & 0 \\ a_{21} & a_{22} & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & a_{33} & 0 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & a_{44} & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & a_{55} & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & a_{66} \end{bmatrix} \begin{pmatrix} \varepsilon_t^{supply} \\ \varepsilon_t^{demand} \\ \varepsilon_t^{monetary} \\ \varepsilon_t^{exchange\ rate} \\ \varepsilon_t^{business} \\ \varepsilon_t^{sharia\ money\ demand} \end{pmatrix} \quad (4)$$

After estimating the parameters of structural reduced-form errors, the analysis of results is then conducted through impulse responses and variance as well as historical decompositions. The impulse responses are found from the MA form where are decomposed based on and are generated recursively according to the matrix. Whilst variance and historical decompositions decompose one shock versus others using the impulse responses.

RESULTS AND DISCUSSION

This section discusses the results of the study comprising Impulse Responses, Variance Decompositions, and Historical Decompositions.

IMPULSE RESPONSES

In this subsection, Figure 1 depicts responses of macroeconomic variables to sharia banks' financing shock, reported for 30 quarters, while Figure 2 shows responses of sharia banks' financing to macroeconomic

shocks, reported for 30 quarters. The responses were based on traditional short run restrictions with Cholesky ordering.

As shown in Figure 1, the sharia money demand shock was indicated by 2.7 percent increase of sharia financing in the first quarter. All macroeconomic variables react with lags or they did not respond to this shock immediately. It was consistent with the logic that financing needs some time to be transmitted to the real economy. GDP growth, core inflation, and business activity responded positively due to the sharia banks' financing shock. Expanding sharia financing boosts up GDP growth by 0.15 percent in Quarter 2 and reaches the peak of 0.21 percent in Quarter 3 before the impact vanishes in the beginning of Quarter 4. Similar story happened on the response of business activity due to the sharia banks' financing shock. Expanding sharia financing by 2.7 percent drives the business activity to expand by 0.23 percent in quarter 2, peaking up to 0.45 percent in Quarter 3 and then the effect fades away since Quarter 4. In other words, one percent increase of sharia financing soars business activity by 0.09 percent in one quarter and it multiplies up to 0.17 percent in the next quarter.

In terms of response of people's purchasing power which was represented by core inflation, the impact of sharia banks' financing shock took a longer time to be transmitted to drive the people's purchasing power. A 2.7 percent increase of sharia financing in the first quarter was followed by an increase of core inflation by 0.03 percent in Quarter 3 and attains its peak of 0.06 percent in Quarter

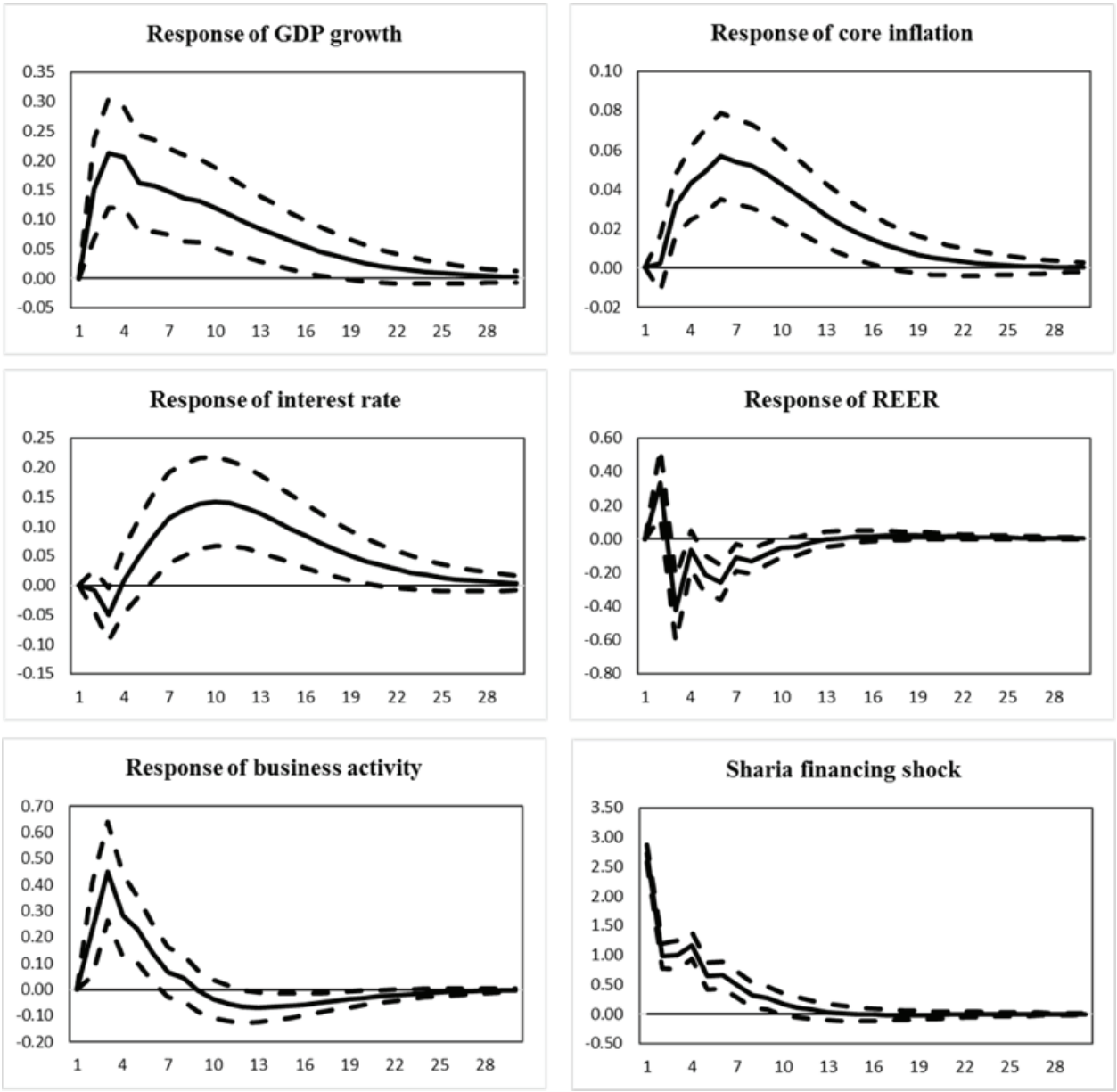

FIGURE 1. Responses of macroeconomic variables to sharia banks' financing shock ± 1 standard deviation

Source: Author's calculation

6 before the effect evaporates thereafter. Following the rise of core inflation, monetary policy responses with tightening interest rate after some periods. Another dimension of the results from the estimated model which became another main focus in this paper was how the sharia banking financing responded or reacted due to an unanticipated structural shock of each macroeconomic variable. These are shown in Figure 2.

As shown in top left of Figure 2, attributable to an unanticipated supply shock indicated by 1.56 percent increase of GDP growth in Quarter 1, sharia banks' financing growth rises promptly by just below 1 percent in the same quarter. It then reaches the peak of 1.28 percent in Quarter 2 before fading away after Quarter 7. By those numbers, it can also be said that the elasticity of sharia banks' financing to GDP is about 0.6 – 0.8. In other words, if GDP grows by 5 percent, sharia banks' financing may expand by 3 to 4 percent to the maximum.

Different story happens on the response of sharia banks' financing to an unanticipated demand shock as shown in top right of Figure 2. The unanticipated demand shock is indicated by 0.25 percent increase of core CPI in Quarter 1. Accordingly, sharia banks' financing growth falls by 1.03 percent in the same quarter. This result is somewhat puzzled since banks' financing should have positive correlation with people's purchasing power. Improving people's purchasing power should be followed by expanding financing or growing demand for financing. In order to investigate more, another specification of the same model is run by replacing variable of sharia

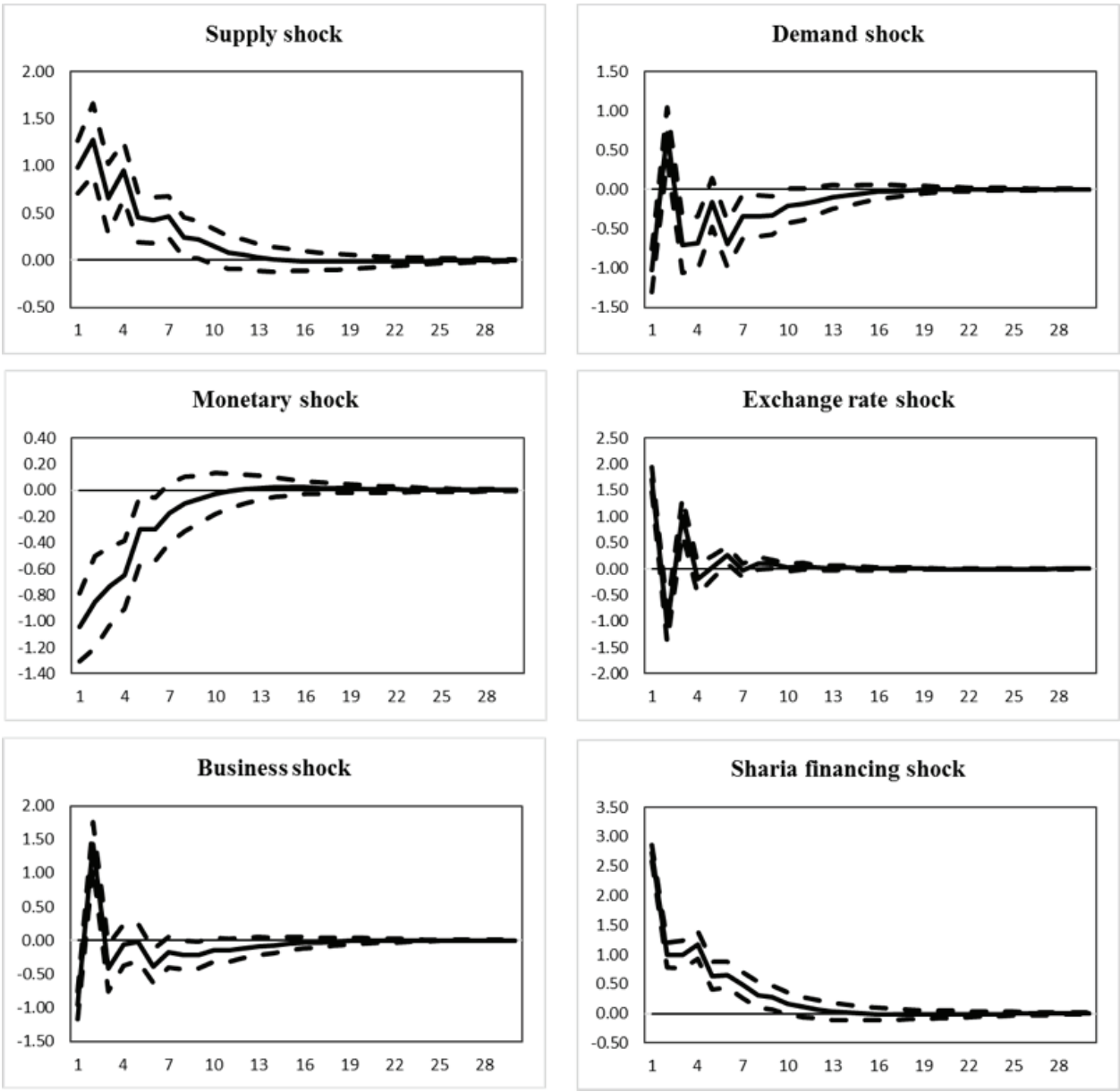

FIGURE 2. Responses of sharia banks' financing to macroeconomic shocks ± 1 standard deviation

Source: Author's calculation

banks' financing with conventional banks' credit. The results show that conventional banks' credit responds positively due to an unanticipated positive demand shock[1]. This finding implies that there is possibility of shifting consumer's preference to type of banks' credit. Consumer seems to prefer conventional credit to sharia financing under more accommodative macroeconomic environment. It also indicates that it is challenging for sharia banks to compete with conventional banks. However, a positive response of sharia banks' financing due to an unanticipated positive demand shock still appears in Quarter 2 by 0.72 percent which is also the highest impact.

Similar with response of sharia banks' financing to an unanticipated demand shock, response of sharia banks' financing to a business activity shock is also negative in Quarter 1 and then it turns into positive in Quarter 2. Again, this result is somewhat puzzled since banks' financing should have positive correlation with business activity. To investigate more, the other specification of the same model is run once more by replacing variable of sharia banks' financing with conventional banks' credit. The results show that conventional banks' credit responds positively to business activity. Again, this finding shows that business or industry seems to prefer conventional credit rather than sharia financing under more accommodative macroeconomic environment. However, positive response of sharia banks' financing is still seen in Quarter 2. As much as 2.57 percent growth of business activity in Quarter 1 is followed by 1.43 percent increase of sharia banks' financing in Quarter 2.

Figure 2 (row 2) indicates the response of sharia banks' financing to a monetary shock and exchange rate shock. It responds negatively due to a monetary shock. In contrast, it responds positively due to an exchange rate shock. As a result of an unanticipated monetary shock indicated by 0.61 percent surge of money market rate in Quarter 1, sharia banks' financing tightens by 1.04 percent in the same quarter and it lasts for at least five quarters. This result is consistent with what happens in Malaysia (Kassim et al. 2009). A rationale of this finding is that consumers do not want to lock-in their loans commitment during high interest rate regime. Besides, this significant negative relationship is almost the same with the relationship between conventional banks and monetary policy at which a tightening monetary policy is followed by the decreasing credit of conventional banks. This finding shows that the sharia and the conventional banks share the same business process which results in a very similar behavior. It makes sense since the sharia banks' financing are dominated by murabahah-based financing or capped to the profit margins, which is similar to the conventional banks' interest rates. In contrast, it is also somewhat consistent with the small portion of profit sharing financing mudharabah-based out of the total sharia financing in Indonesia. The proportion of mudharabah-based financing to the total financing was accounted for approximately 38 percent as of March 2017.

To support this argument further, series of sharia banks' financing and conventional banks' credits were tested in order to check their correlations. The test result showed that both series correlated by 43.30 percent with t-statistic value of 3.19 and p-value of 0.0026. In other words, their correlations were significant at 1 percent level. Since a number of sharia banks' in Indonesia are subsidiaries of Indonesian conventional banks, this finding is consistent with findings of Salleh et. al. (2018) who reported that Islamic subsidiaries of conventional banks in Malaysia have significant positive impacts on their Net Profit Margin (NPM).

ANALYZING PUZZLES AND ROBUSTNESS CHECK

It may be the case in doing SVAR that some puzzles show up, e.g., a prize puzzle where prices go up in response to a monetary policy shock or an output puzzle in which output increases in responding to a monetary policy shock. Another puzzle that may come up is an exchange rate puzzle where exchange rate depreciates following a monetary policy tightening. To ensure the validity of the model used in this paper, those puzzles are investigated through the respected impulse responses results. Figure 3 shows that a tightening monetary policy signified by an increase in interest rate is followed by a significant falling core inflation and REER appreciation; whereas the response of output to the tightening monetary policy is considered insignificant. All these results are as expected or in other words, the puzzles do not exist.

If the puzzles either a price puzzle or output puzzle come up, a number of studies have proposed some alternatives for remedies. Sims (1992) suggests inclusion of commodity price to get rid of the puzzles, while Giordani (2004)while an econometrician follows the common practice of including only output in the VAR. The omission of the output gap is shown to spuriously produce a price puzzle (and several other incorrect conclusions recommends replacing variable of output with output gap. In a more recent paper, Fry et al. (2008) find that the source of the price puzzle is due to misidentification of aggregate demand shocks as monetary shocks. So, the remedy proposed by the later is to correctly identify the aggregate demand as well as monetary shocks.

To check the robustness of the model further, a different specification is estimated by reordering the variables as GDP (y_t), business condition (bus_t), core consumer price index (p_t), money market rate (r_t), sharia banks' credit (fin_t) and real effective exchange rate ($reer_t$) respectively. By this order, it assumes that exchange rate absorbs all the shocks within the economy. The results show similar results as in Figure 1 and 2. There is only an insignificant difference in magnitudes of responses, but the directions do not change. Moreover, the puzzles do not appear either as shown in Figure 4.

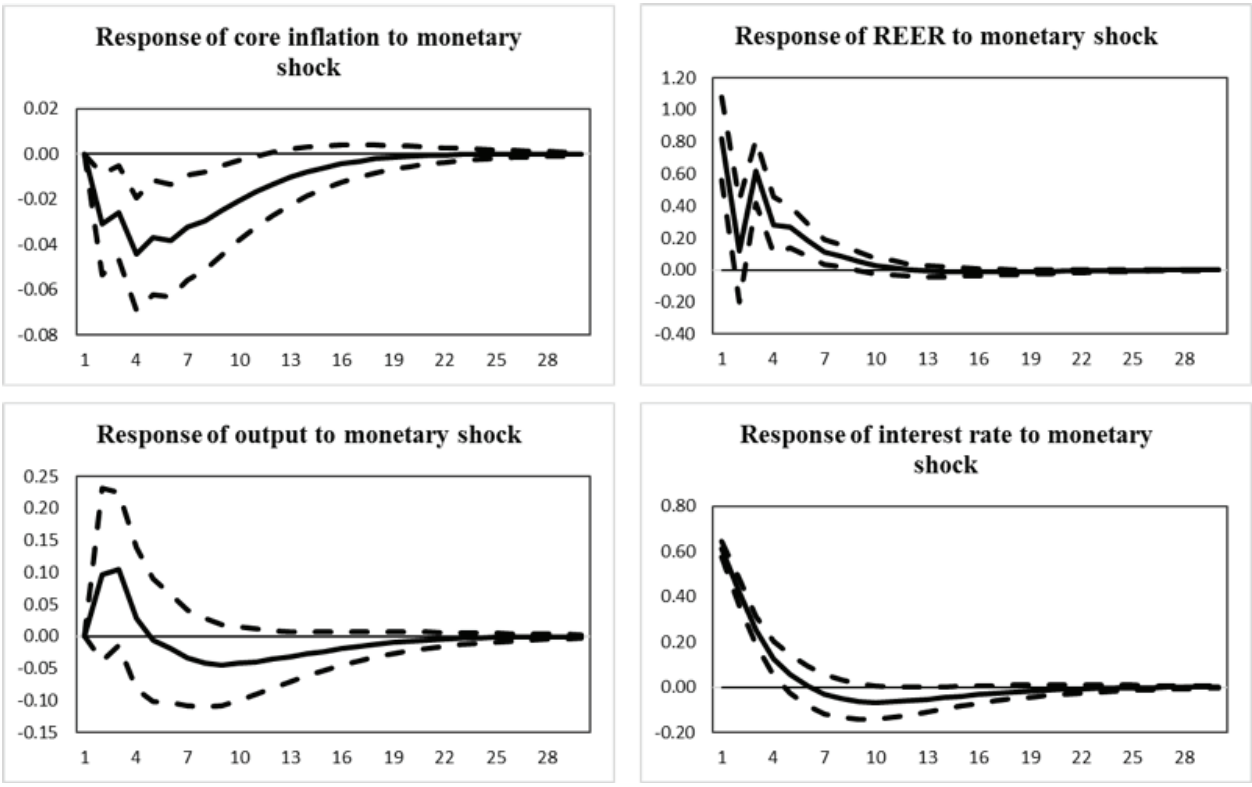

FIGURE 3. Responses of Core Inflation, Output, REER and Interest Rate to a Monetary Shock ± 1 Standard Deviation

Source: Author's calculation

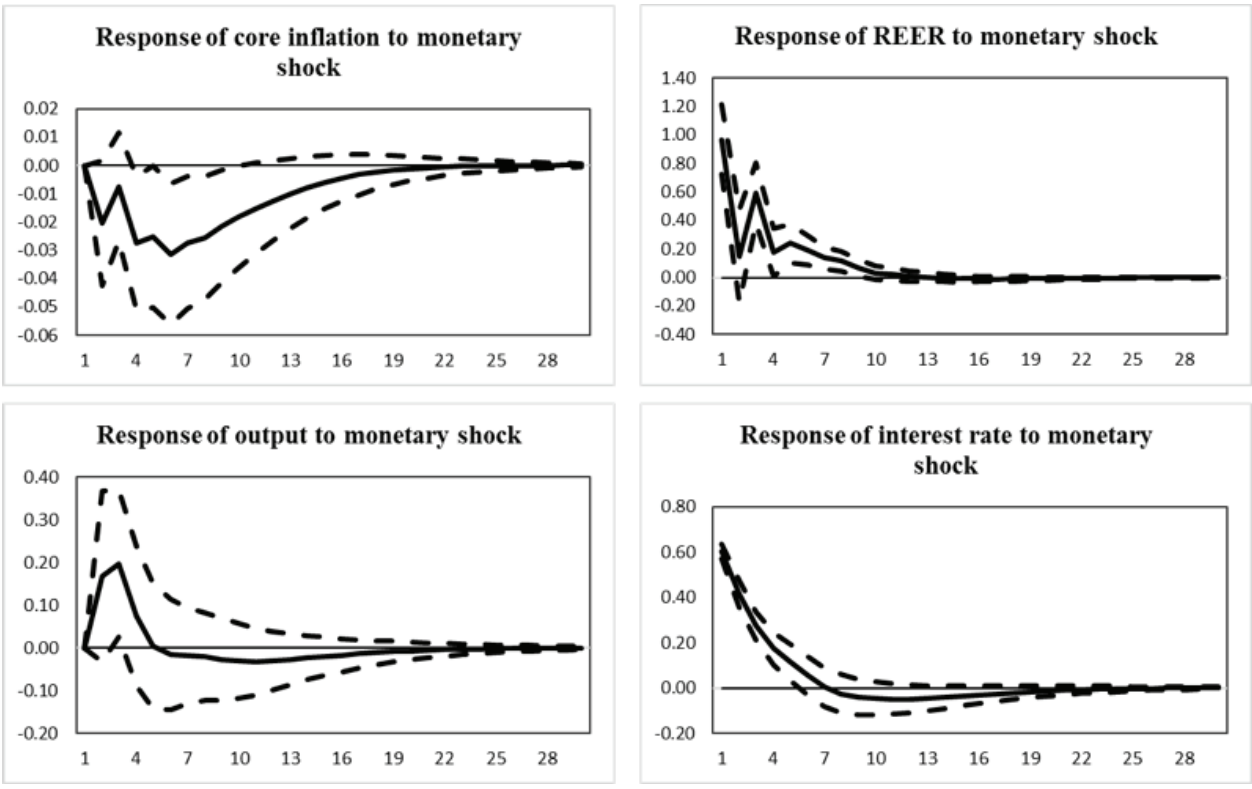

FIGURE 4. Responses of Core Inflation, Output, REER and Interest Rate to a Monetary Shock ± 1 Standard Deviation

Source: Author's calculation

In this subsection, a non-recursive identification is not used for robustness checking because non-recursively identified VAR models more closely bear a resemblance to traditional simultaneous equation models (Kilian & Lütkepohl 2017). They point out that with the similar structures, it implies that non-recursively identified VAR models are also susceptible to the weakness of simultaneous equation models, such as the likely appearance of liquidity effect. The liquidity effect is known where interest rates respond positively to innovations in monetary aggregates (for example M0, M1 and M2) (Kim & Roubini 2000). To avoid this risk, this paper still considers a recursively identified VAR model for robustness checking.

VARIANCE DECOMPOSITION

This second subsection discusses the shared contribution of sharia banks' financing to real sector of the economy as well as the decomposition of sharia banks' financing, both in the short- and the long-run. In the short-run, sharia banks' financing contributes to only 0.70 percent of GDP growth which starts in Quarter 2 and its contribution grows up to approximately 6 percent in the long-run. Similar to this result, sharia banks' financing also contributes to just 0.37 percent of business activity and it escalates a bit up to only 2.49 percent in the long-run.

The biggest contribution of sharia banks' financing is through its ability to drive people's purchasing power. Although it is a small number, still, it is higher than the shared contribution to the GDP growth directly. In the short-run, sharia banks' financing contributes to 1.73 percent of people's purchasing power, represented by core inflation in the model. In the long-run, its contribution rises significantly up to just below 10 percent. This is also consistent with the fact that consumption financing dominates the overall sharia financing. According to the sharia banking statistics data published by the Indonesian Financial Services Authority as of March 2017, from the total of sharia banks' financing, 41.72 percent was for consumption, 34.20 percent for working capital, and 24.07 percent for investment.

Additionally, sharia banks' financing also contributes to the monetary policy determination in the long run, as part of overall banks' credit and financing to the economy, with an amount of about 6 percent. However, there is no contribution of sharia banks' financing to the monetary policy in short run.

Table 3 presents the shocks that determine sharia banks' financing both in the short- and the long-run. In the short-run, the shock of sharia financing itself and the exchange rate shock dominate sharia banks' financing with shared contribution of 51.60 percent and 20.21 percent respectively. It is quite normal that sharia banks' financing highly depends on financing demand, while the significant contribution of exchange rate shock reveals that sharia banks are not invulnerable to exchange rate fluctuations since exchange rate performance is generally associated with level of confidence of a country due to global shocks, such as capital flows.

The next significant shock which influences sharia banks' financing in the short-run is the monetary shock with contribution of 7.58 percent. This number is even higher than the contributions of demand, supply, and business shocks. It confirms the previous result of impulse response of sharia banks' financing to monetary policy. In other words, sharia banks' financing in Indonesia is not inelastic to the monetary policy changes, similar to sharia banks' financing in Malaysia which is also unaffected by their monetary policy rate changes. Again, the sharia

TABLE 2. Variance Decomposition: Contribution of Sharia Credit Shock to Macro-Economy (in percent)

Quarter	GDP growth	Core inflation	Interest rate	Exchange rate	Business activity	Sharia financing
1	-	-	-	-	-	51.60
2	0.70	0.00	0.01	0.71	0.37	39.18
4	2.67	1.73	0.16	1.59	2.08	37.98
12	5.49	9.19	4.20	2.32	2.36	37.72
40	5.98	9.89	6.02	2.33	2.49	37.68

Source: Author's calculation

TABLE 3. Variance Decomposition of Sharia Banks' (in percent)

Quarter	Supply shock	Demand shock	Monetary shock	Exchange rate shock	Business shock	Sharia credit shock
1	6.79	7.37	7.58	20.21	6.44	51.60
2	12.19	7.33	8.49	18.98	13.84	39.18
4	13.93	9.00	9.83	18.18	11.09	37.98
12	14.66	10.93	9.41	16.42	10.86	37.72
40	14.65	10.97	9.41	16.40	10.89	37.68

Source: Author's calculation

banks' margin looks capped to the conventional banks' interest rates.

In the long-run, aside from the contribution of demand for banks' financing itself, the most significant determinants of sharia banks' financing in Indonesia are exchange rate shock (16.40 percent), supply shock (14.65 percent), demand shock (10.97 percent), business shock (10.89 percent), and monetary shock (9.41 percent). Thus, from macroeconomic point of view, what the Government and Authority agencies can do to boost the sharia banks' financing are, for instance, providing a good business environment, keeping people's purchasing power high, and also managing a stable exchange rate performance. Hence, the benefits of sharia banks' financing will return to the economy itself accordingly.

HISTORICAL DECOMPOSITION

As shown in Figure 5 to Figure 7, historical decomposition analysis aims to investigate the contribution of sharia banks' financing to each of macroeconomic variables over time (2006q3 to 2017q1). Meanwhile, the shocks that drive sharia banks' financing during the time period are indicated in Figure 6.

To the GDP growth, sharia banks' financing had negative contribution before the global financial crisis in 2008, but then it contributed positively after the global financial crisis period, from 2009q3 to 2013q4. Since 2014q2 until 2017q1, sharia banks' financing had a negative contribution to the GDP growth. Along the period of sample (2006q3 to 2017q1), the GDP growth was dominantly determined by supply shocks (see Figure 5).

To the core inflation which is commonly associated with people's purchasing power, sharia banks' financing also had negative contribution before the global financial crisis in 2008, but then contributed positively after the global financial crisis period, from 2009q3 to 2014q2. Since 2014q4 until 2017q1, sharia banks' financing had a negative contribution to the core inflation as sharia banks' financing fell during the period. Along the period of sample (2006q3 to 2017q1), the core inflation was dominantly determined by demand shocks (see Figure 6).

To the business activity, sharia banks' financing also had a little negative contribution before the global

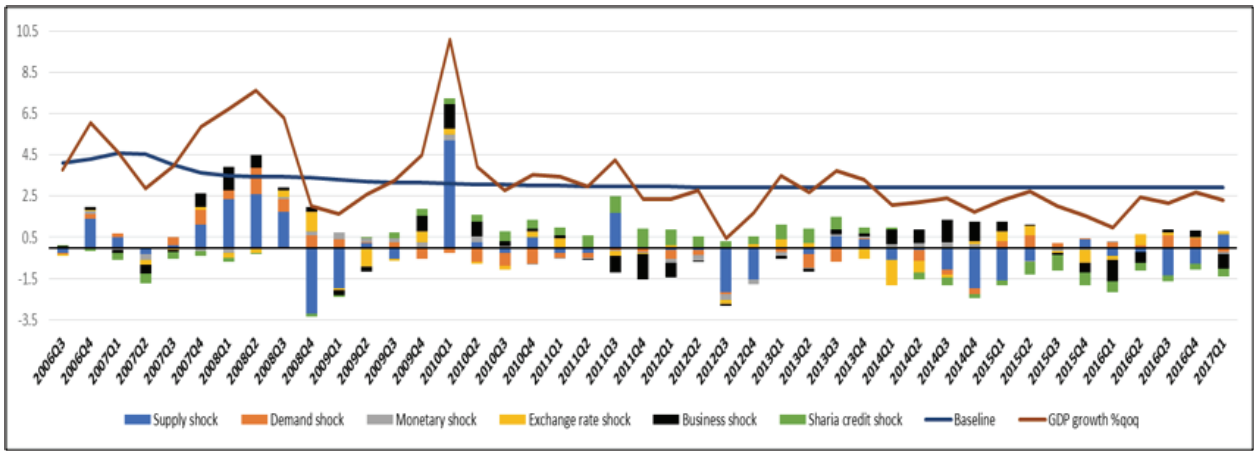

FIGURE 5. Contribution to GDP Growth

Source: Author's calculation

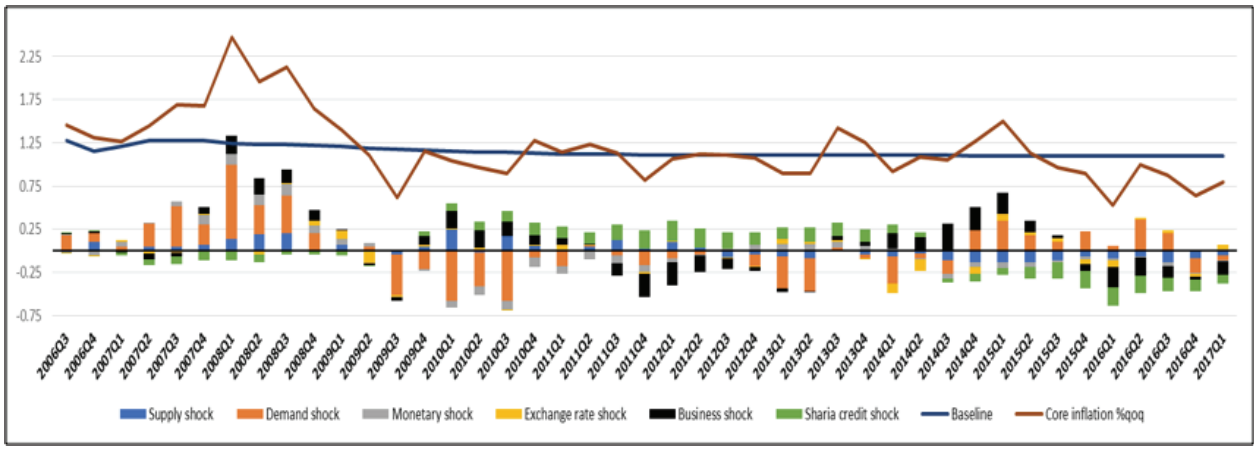

FIGURE 6. Contribution to Core Inflation

Source: Author's calculation

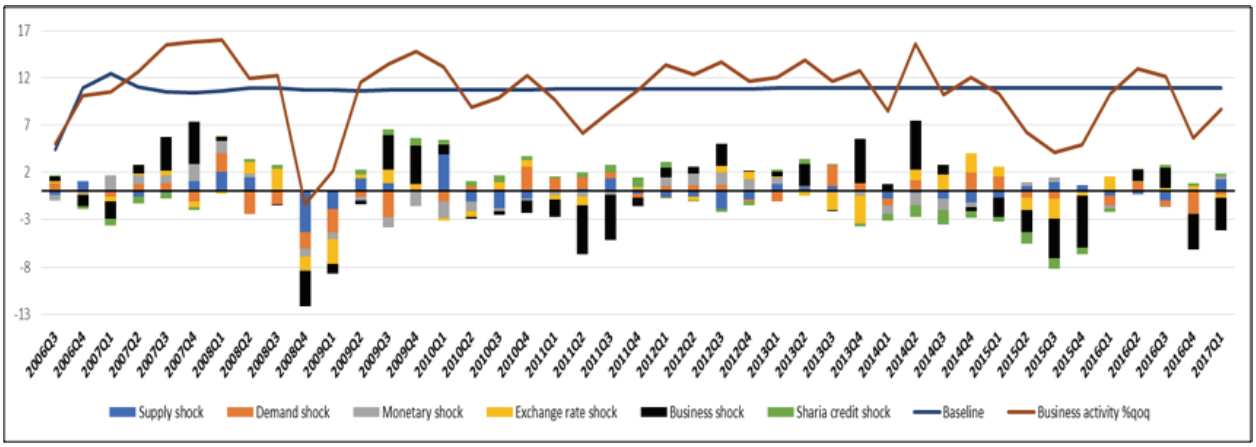

FIGURE 7. Contribution to Business Activity

Source: Author's calculation

financial crisis in 2008, but then contributed positively after the global financial crisis period, from 2009q2 to 2012q1. Yet, after fluctuating during 2012q3 to 2013q3, sharia banks' financing had a negative contribution to business activity again from 2013q4 until 2016q1. Along the period of sample (2006q3 to 2017q1), the business activity was dominantly determined by business shocks and exchange rate shocks (see Figure 7).

Meanwhile, Figure 8 displays the shocks that drive sharia banks' financing along the time period. Before the global financial crisis in 2008, monetary shock had positive contribution to the sharia banks' financing, which makes it surpass the baseline during 2007q3 to 2008q3. In 2008q4, however, sharia financing plunged away from its baseline because of exchange rate shock, which resulted from the global shock.

Between 2010q1 to 2011q4, sharia banks' financing grew above its baseline due to positive sharia financing shock itself, positive supply shock, and positive exchange rate shock, beating negative monetary shock. During this period, sharia banks' financing looked unaffected by monetary policy tightening. Nonetheless, from the period of 2014q1 to 2017q1, sharia banks' financing again grew below its baseline for a relatively long period of time due to low demands for sharia financing, negative exchange rate shock as well as negative supply and business shocks. The weak demand shock also played an important role during the period.

SUMMARY AND CONCLUSIONS

In the short-run, the contribution of sharia banks' financing to the macroeconomic variables is positive, albeit limited. Yet, it then escalates in the long-run with the main channel of transmission through its ability to drive people's purchasing power. Another important finding was that sharia banks' financing in Indonesia was elastic to the monetary policy changes. Similar to the conventional banks' credit, when the interest rates tighten, the sharia banks' financing falls. It shows that the sharia and the conventional banks share the same business process, which results in a very similar behavior.

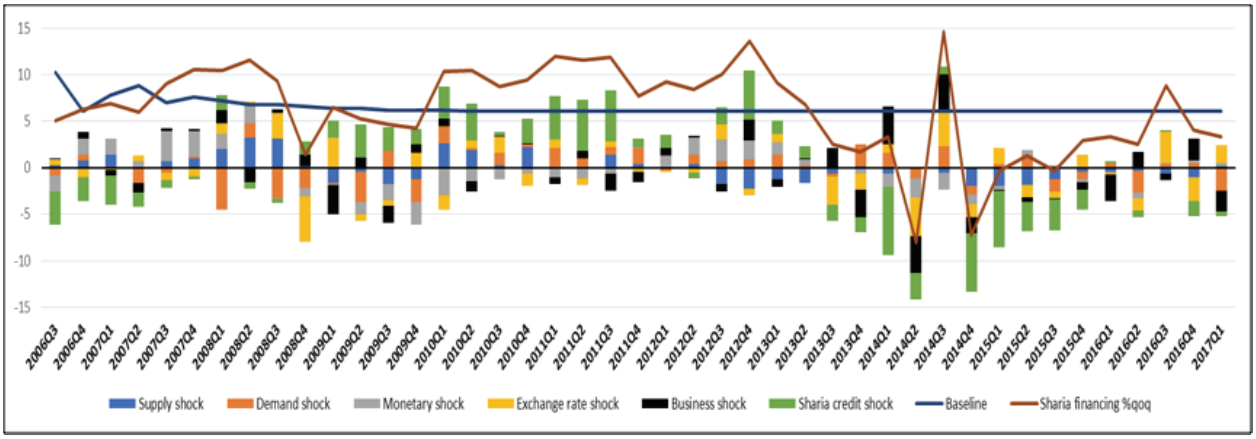

FIGURE 8. Contribution to Sharia Banks' Financing

Source: Author's calculation

Other findings reveal that in the short-run, sharia financing shock itself and exchange rate shock dominate sharia banks' financing. It is quite normal that sharia banks' financing really depends on its demand, while the significant contribution of exchange rate shock reveals that sharia banks are vulnerable to exchange rate fluctuations. In order to improve the performance of sharia banking in Indonesia, the domestic financing demands have to be strengthened with regards to the large number of Moslems in Indonesia. At the same time, Islamic banks have to improve their business processes. Rather than capping their profit margins or murabahah-based financing, they should promote more profit sharing mudharabah-based financing with prioritizing principle of mutual help among Moslems. Nevertheless, there were still some drawbacks in this study, one of which is the strong assumption of recursive short-run restrictions applied in the SVAR model. Another identified strategy, such as applying long-run restrictions or sign restrictions may give better estimates indeed.

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NOTE

Results of this specification are not presented in this paper, but they are available upon request to the author.

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Alfan Mansur*
Radius Prawiro Building 6th Floor
Jl. Dr. Wahidin 1
Jakarta – Indonesia
E-mail: alfan.mansur@gmail.com

*Corresponding author