RESEARCH ARTICLE

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Effects of Monetary Policy on the Real Economy: The Case of Indonesia

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Monetary policy is expected to affect the real economy through transmission mechanism of selected channel in accordance to the changes in the global development of the domestic economy, such as credit channel, exchange rate channel, and asset price channel. The aim of this study was to examine the effect of monetary policy on aggregate output and sectoral output of the Indonesian economy by using vector auto regression (VAR) model. Based on quarterly data covering the period of 2000.1 to 2014.4, we found that the effect of monetary policy surprise at the sectoral level is heterogeneous. Some sectors are more sensitive and some others are less susceptible to monetary policy surprise. In order to achieve the desired objectives of monetary policy, we showed that there is a need of certain monetary policy to some sectors which are more focused in Indonesia. Indonesia's economic growth and effect of monetary policy through transmission mechanism also need to be seen from expectation channel.

Keywords: Monetary Policy, Transmission Mechanism of Monetary Policy, GDP, Sectoral Output, VAR Model.

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1. INTRODUCTION

Indonesia's economic growth in the second quarter of 2015 was recorded at 4.67% (yoy), which experienced a slowdown shown by the performance of most sectors of both tradable and non-tradable slowed (Fig. 1). Meanwhile, in line with the high degree of uncertainty in the global economy, the exchange rate was still experiencing downward pressure, which in turn, could potentially disrupt Indonesia's macroeconomic stability.

The monetary crisis in July 1997 made banks experiencing liquidity problems as a result of money market interest rates soared, and in addition to that, rupiah continued to decline sharply. People panicked and trust in banks began to decline, resulting in the withdrawal of bank funds on a large scale.

The effectiveness of monetary policy is largely determined by the operation of the transmission mechanism of monetary policy in influencing the economic and financial activities. UU No. 23 of 1999 and amendments to UU No. 3 of 2004 mandated Central Bank of Indonesia to implement the monetary policy framework known as the Inflation Targeting Framework.

The effects of monetary policy on inflation and real output require a deadline (*lag*) and work through the various channels of monetary transmission, then the strategy of monetary policy should be formulated in forward looking. Therefore, it is imperative that a clear understanding of the channels of monetary transmission mechanism would bring monetary policy affects financial markets, output, and prices. There are six channels of monetary transmission;[6] direct monetary channel, interest rate channel, exchange rate channel, asset price channel, credit channel, and expectation channel.

2. LITERATURE REVIEW

Several studies have focused on sectoral effects of monetary policy given that the sector responds differently to monetary policy shocks. The implication is that monetary authorities should consider the consequences of the measures taken to various sectors of the economy. According to Alam and Waheed,[1] understanding the sectors affected by monetary tightening will provide information to reveal the underlying nature of the monetary policy transmission mechanism.

Frankel (2008) have shown that if monetary policy is expected to increase real interest rates, it will lower the price of commodities and if monetary policy is expected to reduce inflation, it will drive the commodity prices lower. The main cause of high interest rates is high inflation, through the expected rate of inflation.

Research on the relationship between inflation and economic growth has experienced a long history. Started from Latin America in 1950s and it has resulted in eternal debate between structuralists and monetarists. Structuralists believed that inflation is very important to the economy, while the monetarists perceive inflation as detrimental to economic progress.[2]

A series of studies in IMF Staff Papers around 1960 found no evidence of negative effects of inflation.[5] Therefore, the popular view in the 1960s was that the effects of inflation on growth are not too important. This view was valid until the 1970s

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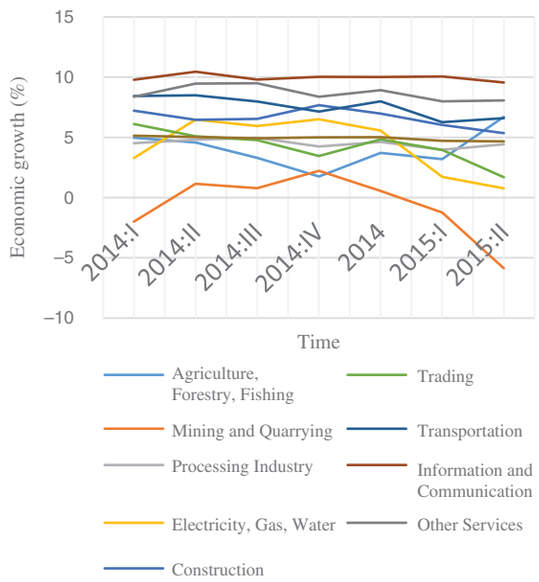

Fig. 1. Economic growth on sectors (%,YOY).
Source: BPS, 2015.

when many countries, particularly Latin America, experienced hyperinflation.

Tobin[4] predicts a positive relationship between inflation and the rate of capital accumulation, which in turn, means a positive relationship with economic growth. He argued that as money and capital are substitutable, an increase in the inflation rate increases capital accumulation with a portfolio shift from money to capital, and thus, stimulates higher levels of economic growth.

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3. DATA AND METHODOLOGY

We used quarterly data from 2000:1 to 2014:4 to examine the effect of monetary policy shock on aggregate output and sectoral output. We did the analysis with a standard vector auto regression (VAR) followed by impulse response functions to evaluate the response of aggregate output and sectoral output to monetary policy surprises. Then, we also added a basic VAR model with multiple channels of monetary transmission.

In the VAR model, all the variables both endogenous and exogenous were included in the model. The VAR model can be represented as follows:

$$\sum_{t=0}^{v} \theta_i Y_{t-1} = \varphi X_t + \delta_t \tag{1}$$

Y_t is the vector of endogenous variables within the country and X_t is a vector of exogenous variables (foreign variables). θ and φ polynomials and δ is the term of innovation. The basic model can be written as follows:

$$Yt = [\text{total GDP, sectoral GDP, CPI, M, SBI}] \tag{2}$$

$$Xt = [\text{US GDP, Oil}] \tag{3}$$

Where, GDP is Gross Domestic Producsts, CPI is Consumer Price Index, Money Stock (M), and interest rate of Bank Indonesia (SBI)

Furthermore, we also added a basic VAR with three channels of monetary policy transmission. Transmission Channel Models:

$$Y_t = [\text{total GDP, sectoral GDP, CPI, M, SBI, Credit /Exchange rate/price of assets}] \tag{4}$$

$$X_t = [\text{US GDP, Oil, Credit/Exchange rate/price of assets}] \tag{5}$$

4. EXPERIMENTAL RESULT

4.1. Estimation Results

The results discussed the total output and sectoral output response to monetary policy surprises in the absence of the transmission line. Figure 2 illustrates that total output and sectoral output (except S9 and S3) tends to increase with the change in

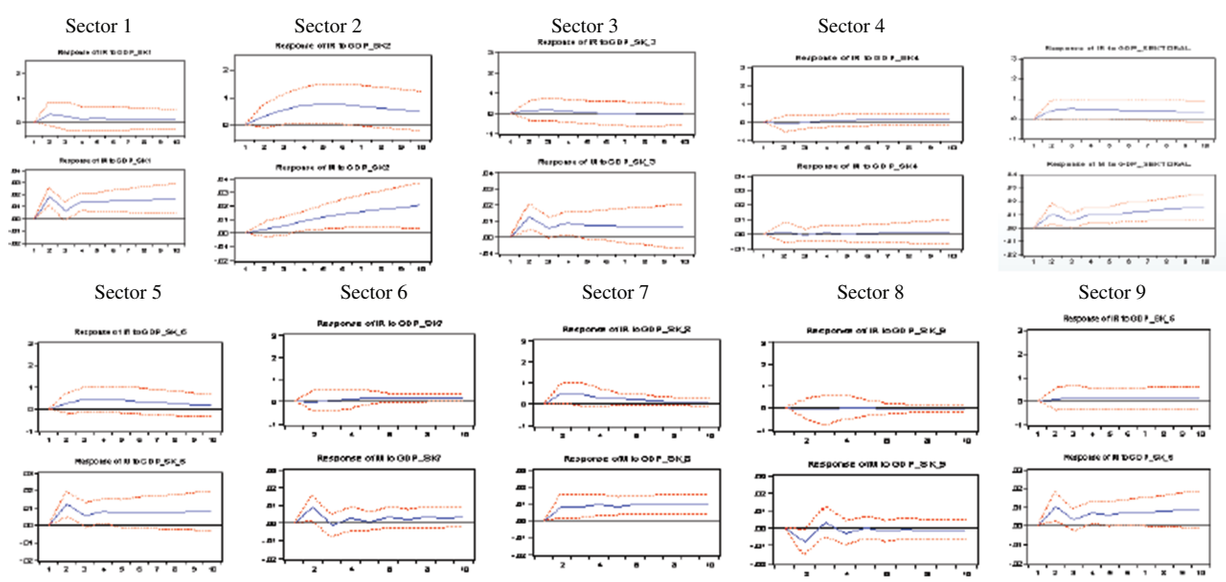

Fig. 2. Basic framework channel towards total GDP + sectoral output.

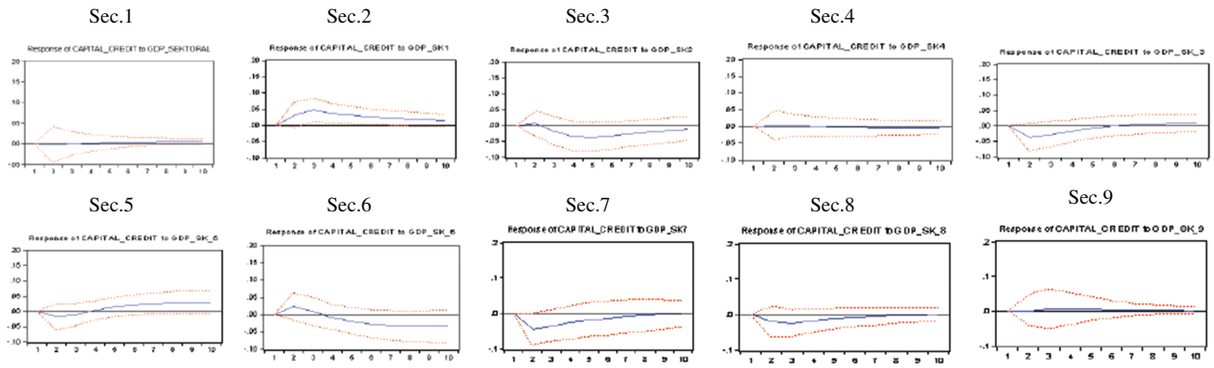

Fig. 3. Credit channel towards total GDP + sectoral output.

both the interest rate (SBI) and the money supply (M). Meanwhile, the sector that responds most quickly to monetary policy shock is S9 (services).

A monetary supply surprise in the form of changes in SBI had very little effect on changes in both total output and sectoral output, about 0.01 percent, the biggest was the services sector output that rose by 0.06 percent. In contrast, if the change was M, it would cause the output of the services sector (S9) declined by about 5.11 percent from the first quarter and further increased by about 4.05 percent in the fourth quarter. Other sectors that responded to more than the total output (GDP total) is S6 (trade, hotels and restaurants). The sectors that their respond were quite low were S1 (agriculture, livestock, forestry and fisheries), S2 (Mining and quarrying), S3 (manufacturing), S5 (building), S7 (transport and communication), and S8 (finance, leasing and corporate services). One possible reason for the S6 surprisingly moderate response could be attributed to the inclusion of the financial crisis period (2008–2010) in our study where monetary policy was less effective to affect output from S8.

4.2. Estimation Results of Transmission Channel

4.2.1. Credit Channel

Figure 3 is an impulse response of the total output and sectoral output over monetary policy shock through capital loan line. Total output (GDP) decreased by about 0.02 percent from the first quarter to the second quarter and began to recover after that. The decline in total output was the result of the reduced capital loan. Sector that was the most sensitive to the credit channel of monetary policy, namely S9, had its output reduced by about 0.15 percent, while other sectors reduced output ranging from 0.01 percent to 0.07 percent. Sectors that had a theoretical responses were S1, S6 and S9. In the case of S1 and S6, the output increased through the second quarter and then declined by monetary policy surprise through the credit channel. Whereas in the case of S9, output originally increased until the third quarter and then declined but remained positive. This was a sector whose behavior was not consistent with their credit channel.

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4.2.2. Exchange Rates Channel

Figure 4 is an impulse response of the total output and sectoral output over the monetary policy shock through the exchange rate channel. Total output (GDP) increased by approximately 0.003 percent through the first quarter and then slowly began to decline after that. When compared with the total output response in Figure 2, we found that the decline in total output through exchange rate channel was lower and the recovery was relatively slow in the exchange rate channel.

In the case of sectoral output, the impact of tight monetary policy through the exchange rate channel on S1, S2, S3, S6 and S8 was a decline in output of about 0.01 percent to 0.05 percent. Sector having the highest sensitivity to monetary policy surprise through the exchange rate channel was S9 (services), of approximately 0.05 percent. In the case of S9, the shock would

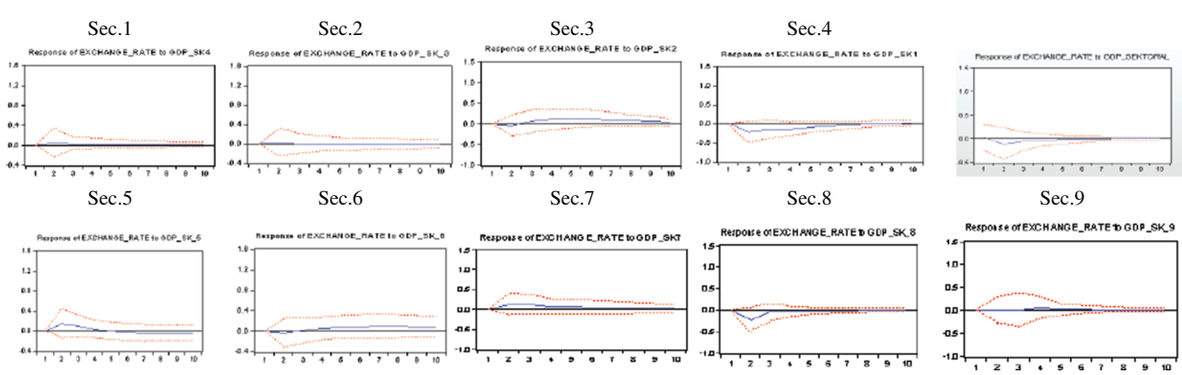

Fig. 4. Exchange rate channel towards total GDP + sectoral output.

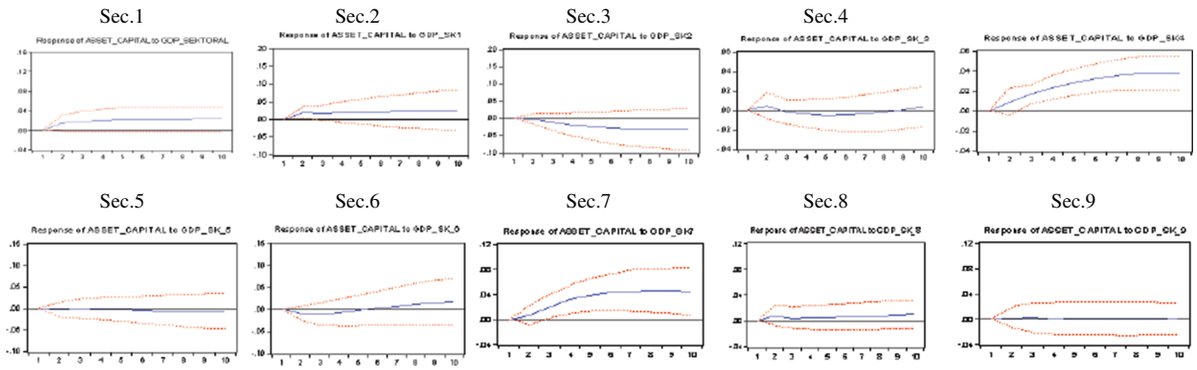

Fig. 5. Asset price channel towards total GDP + sectoral output.

initially increase its output until the third quarter and then it would decline. A significant response to monetary policy through the exchange rate channel was covering all sectors. Initially, the response would increase its output until the second quarter and thereafter would decrease its output. When being compared to credit line, the average decline in output was about 0.15 percent (S9). Meanwhile, through the exchange rate channel, sectoral output declined for about 0.06 percent. From this result, it could be concluded that the effects of monetary policy through the credit channel was much larger than the exchange rate channel. S3 (manufacturing sector) was a sector with consistent response to exchange rate even though the response was low. The reason was that S3 especially small and medium industries marketed their output in the country; therefore, low response to changes in the exchange rate took place. Since the S6 consisting of some trading activities of companies had actively engaged in international trade, this sector was expected to be favorably affected by monetary tightening which passes through the exchange rate channel.

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4.2.3. Asset Price Channel

Figure 5 is an impulse response of the total output and sectoral output over the monetary policy shock through asset price channel. Total output (GDP) increased by 0.06 percent until the second quarter and subsequently remained largely the same until the twelfth quarter. When compared to the total output response in Figure 2, we found that the total output decline through asset prices channel was smaller.

The large sectoral responses were in S9 (0.55 percent) and S1 (0.37 percent). Sectoral response to the monetary policy through asset price channel was very diverse. S1 would respond with an increase in output through the second quarter, after which it would increase by about 5 percent to 10 percent. Interpretation of these results was that the S1 would be affected by asset prices, then it would reduce output. In the case of S3 and S8, we found that the response of the two sectors was almost identical, which would initially increase output until the second quarter, then fell to the third quarter to increase again afterwards. Other sectors also almost uniformly responded to an increase in output in the second quarter and then the percentage increase in output would increase in the following quarters. This meant that the monetary tightening that passes through asset prices was significantly effective.

In the case of S2, about 0.10 percent and 0.21 percent of the impact of tight monetary policy was derived from the price of assets in the second and third quarters respectively. This meant that S2 (mining and quarrying) response to tight monetary policy through asset prices was significant. The reason for this could be attributed to the fact that the companies involved in mining and quarrying activities were some of the largest in terms of both size and value. They largely depended on foreign investment to carry out their operations that required substantial investment and technology. To increase foreign investment, these companies had to get themselves registered on the stock exchange. Companies' investment activity was influenced by the companies' valuations, which in turn, depended on the capital markets. Similarly, in the case of S7, about 0.02 percent of the impact of tight monetary policy was derived from the price of assets at the beginning of the first quarter. Since S7 consisting of Finance, Insurance, Real Estate and Business services were mostly listed on the capital market, this sector was expected to be significantly affected by monetary tightening over the course of asset prices.

5. CONCLUSION

Our findings suggest, at the aggregate level, that there is a real effect of monetary policy surprises. At the sectoral level, we found that some of the sectors have more sensitivity while some others are less susceptible to monetary policy shock. Sectors such as S1 (agriculture), S2 (mining and quarrying), S3 (manufacturing), and S9 (services) appears to decline more than the aggregate production in response to money and interest rates shocks. It seems that these four sectors are the driving force behind fluctuations in aggregate. On the contrary, we observe the insensitivity of sectors such as S4 (electricity, gas and water), S6 (trade, hotels and restaurants) and S7 (transport and communication) to monetary policy shock. The remaining two sectors, S5 (buildings) and S8 (finance, leasing, and business services), are quite sensitive to monetary policy shocks. From the standpoint of monetary policy creation, SBI has been actively involved in achieving the goal of monetary policy that is price stability and output growth in the economy.

With regard to certain important sectors of the three channels of monetary transmission, we find that monetary policy is transmitted to the real economy through different channels for each sector. In most cases, more than one channel can affect changes

in both total output and sectoral output to monetary policy shock. In the case of S1, S2 and S9, monetary policy shock that passes through the credit channel and asset prices are stronger while the credit channel and the exchange rate channel is much effective in S4. In addition, the asset price channel is effective in most sectors.

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