

## **Empirical Study on Monetary Policy Shock Using Structural Vector Autoregression: Case of Indonesia**

Cheng-Wen Lee

Department of International Business, Chung Yuan Christian University, Taiwan

Andrian Dolfriandra Huruta\*

Ph.D. Program in Business, Chung Yuan Christian University, Taiwan

— *Review of* —  
**Integrative  
 Business &  
 Economics**  
 — *Research* —

### **ABSTRACT**

This study aims to investigate the relationship between money supply shocks and interest rate shocks in Indonesia. The analysis was conducted by Structural Vector Autoregression (SVAR). The results show that the Bank of Indonesia interest rate (BI Rate) shocks have a greater influence than the money supply shocks on the BI Rate. Moreover, the money supply shocks have a greater influence than the BI Rate shocks on the money supply. These findings indicate that the money supply in Indonesia does not affect interest rates, and vice versa. It also implies that the Indonesian government is unable to use money supply as a policy instrument for adjusting interest rates, and vice versa. In Indonesia, interest rates can be adjusted by strengthening the role of the regional and national inflation monitoring teams. As such, managing the level of inflation enables the government to control interest rates. In addition, we provide evidence showing that liquidity is closely related to national security and sustainability issues such as money laundering, terrorism financing, corruption, and taxation.

Keywords: Interest rate; Liquidity preference; Money supply; SVAR; Indonesia.

Received 2 November 2019 | Revised 17 January 2020 | Accepted 13 February 2020.

## **1. INTRODUCTION**

Interest rate plays an important role in achieving the ultimate goal of a country's monetary policies (see, for example, Caldara and Herbst, 2016; Cesa-Bianchi, Thwaites, and Vicendoa, 2016; Chen, Chow and Tillmann, 2017; Dong, Hauschild, Sørup, Rousselet, and Fantke, 2018; Fan, Yu and Zhang, 2011; Gong and Dai, 2017; Gupta, Chevalier, and Sayekti, 2000; Huruta, 2018; Kamber and Mohanty, 2018; Mansour, Sghaier, Banour and Jabeur, 2019; Sasongko and Huruta, 2018; Vizmanos-Batac and Tatlonghari, 2017). Since July 2005, monetary policies set by the Bank of Indonesia have been implemented by adjusting interest rates (Bank of Indonesia, 2017b; Huruta, 2018; Sasongko and Huruta, 2018). Duff (2019) showed that when a bondholder sells bonds to make profits from rising bond prices, the proceeds from such bond selling activities enter the monetary system in the form of an increase in reserves held by banks and brokerage firms (Langan and Kumar, 2019). The resulting increase in the amount of money in the banking system lowers interest rates (Gong and Dai,

2017; Lash, 1975). Figure 1 shows that the Bank of Indonesia interest rate (BI Rate) was fluctuating along a downward trend over the period of July 2005 to July 2016.

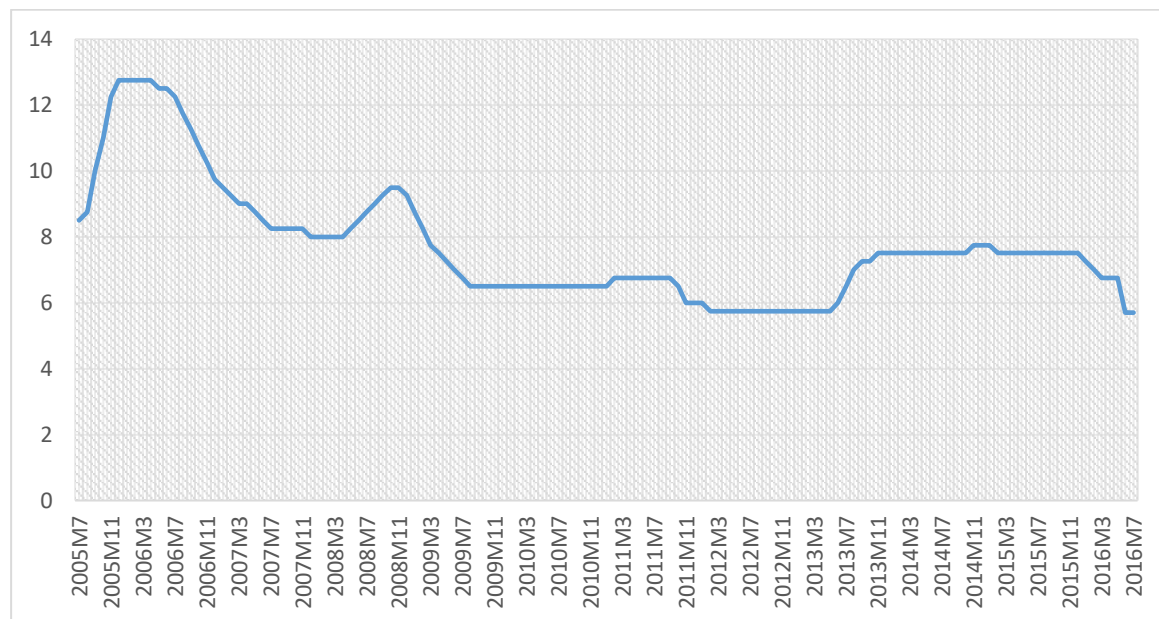


Figure 1: BI Rate from July 2005 to July 2016

Source: Bank of Indonesia (2017)

In a developing country like Indonesia, interest rate movements can be caused by both internal or external factors. Therefore, in order to determine the direction of its monetary policy (e.g., the BI Rate), the Bank of Indonesia has to take the internal and external factors into consideration. This is the case because the Indonesian economic system is actually an open economic system with a free-floating exchange rate system (Huruta, 2018). Money supply is another monetary policy instrument considered by the Indonesian government (Osisanwo, Tella, and Adesoye, 2019; Samimi, Rasekhi, and Asadi, 2019). Figure 2 shows that the money supply in Indonesia was continuously expanding during the period of July 2005 to July 2016.

The positive trend of the money supply from July 2005 to July 2016 was caused by several factors. For instance, the Bank of Indonesia increased the supply of foreign currencies to the market, accelerated the bank credit distribution, and increased the country's net foreign assets (Sasongko and Huruta, 2018) during that particular period. However, Duff (2019) argued that the tight money supply and high interest rate policies tend to slow down economic activities and lead to recession. During the periods of tight monetary policies, firms lay off employees and consumers cut back their spendings. Also, house prices decline because fewer people are able to afford the boom-time prices and the lower liquidity level implies a higher expected payoff to postponing investment and consumption (Blau, 2017; Ennis and Keister, 2003). Thus, a lower liquidity is expected to have an adverse impact on the economy (Bathaluddin, Nur and Wibowo, 2012; Bongini, Iwanicz-Drozowska, Smaga, and Witkowski, 2017; Duff, 2019; Ennis and Keister, 2003; Grob ty, 2017).

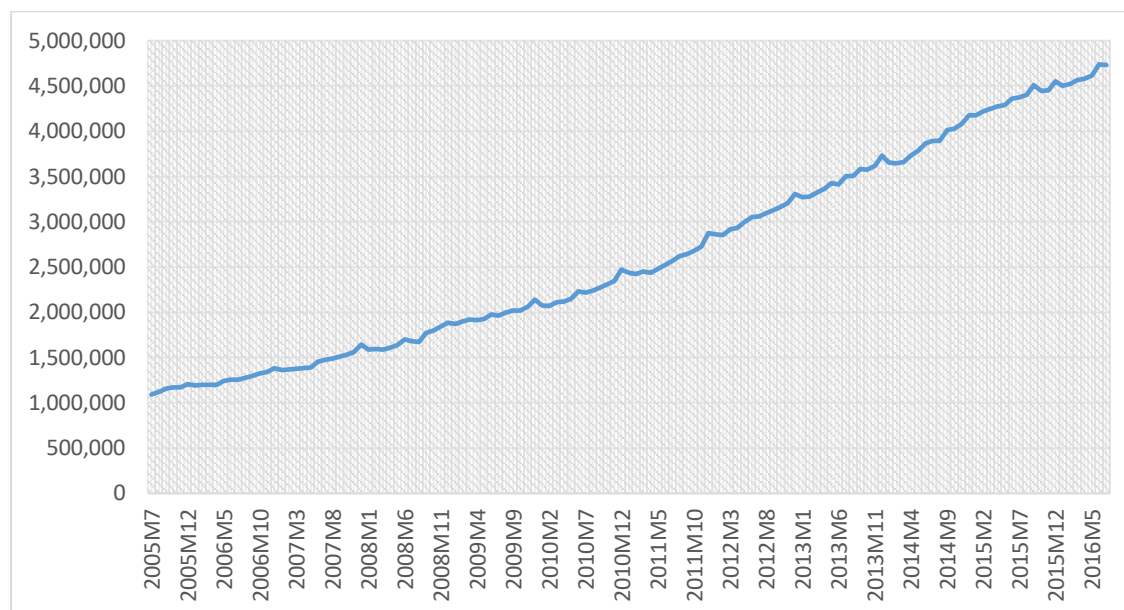


Figure 2: Money Supply from July 2005 to July 2016  
Source: Bank of Indonesia (2017)

Along with economic development, Bathaluddin *et al.* (2012) stated that the persistence of a liquidity excess can reduce the effectiveness of the monetary policy transmission mechanism (e.g., in terms of managing the demand side to reach the inflation target). In addition, the liquidity excess raises the risks of the real sector (Blau, 2017; Johnson, Brick and Price, 1987). Consequently, the amount of the real sector funds is limited, and the price for these funds will become higher even if they are still available on the capital market. Moreover, the high liquidity insufficiency level implies a higher expected payoff to postponing investment and consumption (Ennis and Keister, 2003).

In order to increase economic growth, Suyuan and Khurshid (2015) suggested that a larger demand for investment is needed. Through an increase in investment, there will be an increase in aggregate demand. Consequently, national income will increase. The amount of investment made is influenced by interest rates. High interest rates will increase the interest expenses of investment and hence private investment will decrease, whereas low interest rates will encourage private investment. In the capital market, an increase in interest rates will compete with the bond market. Therefore, a rise in interest rates will lower the demand for bonds. From the macroeconomic perspective, a decline in the bond market will hamper economic growth. Moreover, Jelilov (2016) noted that a larger money supply accompanied by fixed national incomes will increase the price levels. Based on the quantity theory of money, an increase in price levels is a consequence of an increase in the money supply (i.e., a monetary phenomenon). An excessive increase in prices will eventually threaten the economy as a whole (Mild, Waitz, and Wöckl, 2015) in terms of instability and uncertainty for businesses, households, and the government. It means that the development of the economy would suffer if these macroeconomic issues remain untackled.

Monetary policy is also related to security and sustainability issues such as money laundering (Kordík and Kurilovská, 2017), terrorist financing (Kordík and Kurilovská, 2017), corruption (Luzgina, 2017), and taxation (Bikas, Bagotyrius, and Jakubauskaitė, 2017; Giriūnienė and Giriūnas, 2016; Luzgina, 2017). Terrorism financing is an

essential part of the implementation and development of a national anti-money laundering policy (Kordík and Kurilovská, 2017). Moreover, corruption and tax evasion also cause incomes to go higher than the level it should be, which will in turn affect money supply (Luzgina, 2017). In the context of sustainability, taxation plays a significant role in the fiscal system. For instance, the value-added tax revenues significantly impact a country's state budget (Bikas *et al.*, 2017; Giriūnienė and Giriūnas, 2016).

This study contributes to the literature by explaining how a low and/or an excess liquidity can respectively affect the development of an economy. In particular, we show that liquidity problems can hinder the progress of economic development and thus adversely affect the economic activities and welfare of businesses, households, and the government. Moreover, we highlight the role played by the regional and national inflation monitoring teams in managing the level of inflation. Effectively managing the level of inflation enables the government to control the interest rates. This study conducts monetary policy analysis, particularly the possible policy effects on liquidity, and discusses related national security and sustainability issues such as money laundering, terrorism financing, corruption, and taxation.

## 2. THEORETICAL BACKGROUND

The liquidity preference framework developed by Keynes is a model for determining an interest rate equilibrium in terms of money demand and supply rather than the demand and supply of bonds. Keynes assumed that the total wealth of an economy equals the total amount of bonds and money. In equilibrium, the amount of bonds supplied ( $B^s$ ) plus the amount of money supplied ( $M^s$ ) must be equal to the amount of bonds demanded ( $B^d$ ) plus the amount of money demanded ( $M^d$ ). This relationship can be expressed by Equation (1) as follows.

$$B^s + M^s = B^d + M^d \quad (1)$$

Collecting the bond and the money terms gives rise to Equation (2) as follows.

$$B^s - B^d = M^d - M^s \quad (2)$$

Equations (1) and (2) imply that the markets for money and bonds are in equilibrium (i.e.,  $M^s = M^d$  and  $B^s = B^d$ ) (Mishkin, 2016). Studies have been conducted by researchers to look into the relationship between interest rates and money supply. Gbenedio, Ayadi, and Okpala (1999) found that there was a one-way causality from money supply to interest rates. This happened due to the implementation of the structural adjustment programs carried out in the context of Nigeria that included an economic liberalization policy to turn the economy into a free market system. The main strategy was to implement a market-based floating exchange rate system, which was then followed by an interest rate deregulation. Also in Nigeria, Wuyah and Amwe (2016) found that money supply has a negative effect on interest rates. This indicates that the monetary authority (i.e., Central Bank of Nigeria) needs to pay special attention to money supply (M2) in managing instruments such as the liquidity ratio and the minimum mandatory reserve ratio that directly affects money supply. Malliaris and Stefani (1991) also found

that money supply has a positive effect on interest rates. In some European countries, an increase in money supply resulted in an increase in inflation and nominal interest rates.

In addition to an one-way causality, Bello and Abdullahi (2013) found that there is a two-way causality between money supply and interest rates. The returns to investment decrease as the saving interest rates rise (Lash, 1975). As such, the increased saving interest rates result in a serious liquidity crisis (Agliardi, Agliardi, and Spanjers, 2016). Therefore, the monetary authorities in Nigeria controlled the money supply and interest rates to curb inflation. This showed that the Nigerian Central Bank remained consistent in maintaining stable interest rates. Similarly, Abakpa, Purokayo, and Asaph (2018) also found a two-way causality between money supply and interest rates. The reason is that Nigeria carried out its economic reforms by strengthening its financial institutions and structurally transforming its economy. In this context, the Nigerian government must increase the distribution of money in the productive sectors not only for salary payments but also for other routine expenses. With a large-scale production, the country could generate more exports to increase the value of its domestic currency, create employment opportunities, and reduce inflation due to the entry of imported goods. Like others, Urbanovský (2017) also found a two-way causality between money supply and interest rates. It was found that changes in price levels caused changes in interest rates in the Czech Republic. Therefore, the Czech National Bank intervened in the economy by adjusting interest rates. This implied that managing interest rates could be effective by controlling money supply. Bilquees, Mukhtar, and Sohail (2012) also noted the existence of a two-way causality between money supply and interest rates. Their results highlighted the effectiveness of interest rates and money supply as instruments of monetary policy in influencing the economic activities in Pakistan. Monnet and Weber (2001) also found a two-way relationship between money supply and interest rates, and noted that an increase in money supply growth would lead to a future growth of money, which ultimately would lead to lower interest rates in both developed and developing countries.

In addition to the findings of one-way and two-way causalities, Ali, Mahmood, and Bashir (2015) found that money supply has no causality relationship with interest rates. They mentioned that a high money supply and increased interest rates in Pakistan would only increase prices and the exchange rates volatility. Moreover, Favara and Giordani (2009) found that money supply did not have any causality relationship with interest rates and observed that monetary policy shocks in the United States resulted in uncertainties in future output, prices and interest rates.

Overall, past studies found mixed results concerning one-way causality, two-way causality, and the absence of a causal relationship between interest rates and money supply. This signifies an uncertain relationship between interest rates and money supply.

### **3. METHODOLOGY**

This study conducted a time-series data analysis on the Bank of Indonesia Rate (BI Rate) and money supply from July 2005 to July 2016. The data on both variables were obtained from the Bank of Indonesia's publications. The BI rate is measured by the policy interest rate reflecting the direction of the monetary policy set by the Bank of

Indonesia, while money supply is measured by the savings and time deposits with commercial banks.

The time-series analysis has to meet the stationarity assumption. The model used a stationarity assumption and can be written as Equation (3) as follows (Brooks, 2008).

$$\Delta Y_t = \varphi Y_{t-1} + \mu t \quad (3)$$

Moreover, the selection of the optimal lag length is based on the Akaike Information Criterion (Ivanov and Kilian, 2005). If the BI Rate and money supply are non-stationary, the Granger causality test can be carried out by estimating the following regression using the second-differenced time series (Yoo and Kwak, 2004).

$$\Delta \Delta Money_t = \alpha + \sum_{i=1}^m \beta_{1i} \Delta \Delta Money_{t-i} + \sum_{i=1}^n \beta_{2i} \Delta \Delta BI Rate_{t-i} + \varepsilon_i \quad (4)$$

$$\Delta \Delta BI Rate_t = \alpha + \sum_{i=1}^n \beta_{1i} \Delta \Delta Money_{t-i} + \sum_{i=1}^m \beta_{2i} \Delta \Delta BI Rate_{t-i} + \varepsilon_i \quad (5)$$

The above equations imply that if both variables are non-stationary and both of them are not co-integrated, the Granger causality test could be performed by using the same order of integration for both series and transforming the model to meet the order of the differenced series. Lütkepohl (2005) stated that Vector Autoregression can be used to analyze the dynamic impact of random disturbances on the variable system as follows:

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + Cx_t + \varepsilon_t \quad (6)$$

Finally, we developed a short-term restriction in a Structural Vector Autoregression that can be written as follows:

$$A\varepsilon_t = B u_t \quad (7)$$

$$\begin{bmatrix} 1 & 0 \\ a_{12} & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ a_{12} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{y1} \\ \varepsilon_{y2} \end{bmatrix} \begin{bmatrix} \varepsilon_{y1} \\ \varepsilon_{y2} \end{bmatrix} = \begin{bmatrix} b_{11} & 0 \\ 0 & b_{22} \end{bmatrix} \begin{bmatrix} b_{11} & 0 \\ 0 & b_{22} \end{bmatrix} \begin{bmatrix} u_{y1} \\ u_{y2} \end{bmatrix} \begin{bmatrix} u_{y1} \\ u_{y2} \end{bmatrix} \quad (8)$$

$$\varepsilon_{y1} = b_{11} u_{y1} \quad (9)$$

$$\varepsilon_{y2} = -a_{21} \varepsilon_{y1} + b_{22} u_{y2} \quad (10)$$

The restrictions on  $A$  and  $B$  take the forms of variables in the SVAR and the correlation structure of the assumptions of the error term (Amisano and Giannini, 1997; Martin, Hurn, and Harris, 2013; Rubio-Ramírez, Waggoner, and Zha, 2010). As such, we can investigate whether money supply is simultaneously related to interest rates and instantaneously affected by monetary structural disturbances.

#### 4. RESULTS

It is important to check whether a time series is stationary or not before using it for estimation. The unit root test is a formal method for testing the stationarity of a time series. The results of a stationarity test on the time series data are presented in Table 1.

Table 1. Stationarity test

Variables	Degree of integration	p-value	Conclusion
DD(BI_Rates)*	I(2)	0.0000***	Series has stationary
DD(Money)**	I(2)	0.0000***	Series has stationary

\*DD(BI\_Rates) implies the Bank of Indonesia's Interest Rates at the second difference.

\*\*DD(Money) implies the Money Supply at the second difference.

\*\*\*Indicates the rejection of the null hypothesis at the significance level of 1%, 5%, and 10%.

Table 1 indicates that DD(BI\_Rates) and DD(Money) are stationary at the second difference, or I(2). This can be seen from the p-value of 0.0000, which is smaller than the significance levels at 1%, 5%, and 10%. The results of the lag-length test are given in Table 2.

Table 2. The Lag length test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1583.127	NA	1.61e+08	24.57562	24.61995	24.59363
1	-1554.371	56.17569	1.10e+08	24.19179	24.32481	24.24584
2	-1529.715	47.39902*	79867638*	23.87156*	24.09325*	23.96164*

\*Indicate the optimal lag

Table 2 reveals that the optimal lag length is 2, which means that lag=2 could be used to determine the direction(s) of causality between DD(BI\_Rates) and DD(Money). It is supported by the Akaike Information Criterion value of 23.87156, which is smaller than the values of the same criterion for other lag lengths. The results of Granger causality test are provided in Table 3.

Table 3. The Granger causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
DD(Money) does not Granger Cause DD(BI_Rates)	129	0.93830	0.3941*
DD(BI_Rates) does not Granger Cause DD(Money)		1.04791	0.3538*

\*Accepted the Null Hypothesis

Results from Table 3 support the hypothesis that there is no Granger causality between DD(BI\_Rates) and DD(Money). In other words, DD(Money) does not cause DD(BI\_Rates), and vice versa. The acceptance of the null hypothesis is based on the probability values of 0.3941 and 0.3538 that are higher than the significance levels at 1%, 5%, and 10%. The results of the VAR test are displayed in Table 4.

Table 4. VAR Model of DD(BI\_Rates) and DD(Money)

Statistics	DD(BI_Rates)		DD(Money)	
	Coefficients	t-stat	Coefficients	t-stat
DD(BI_Rates)(-1)	-0.311197	-3.22964	23861.31	1.13904
DD(BI_Rates)(-2)	-0.072049	-0.74543	-15957.48	-0.75939
DD(MONEY)(-1)	3.71E-07	1.07608	-0.849624	-11.3257
DD(MONEY)(-2)	4.49E-07	1.29448	-0.562083	-7.45635
C	-0.013713	-0.77786	830.5723	0.21671
R <sup>2</sup>	0.096308		0.526032	
F-statistic	3.303716		34.40522	
Log-likelihood	27.61189		-1557.737	
AIC	-0.350572		24.22849	
Swarz SC	-0.239726		24.33933	

Source: Authors' calculation

Table 4 indicates that if the change in DD(BI\_Rates) in the previous month increases by one percent, it would cause DD(BI\_Rates) in the next month to decline by 0.311196786177 percent. If the change in DD(Money) in the previous month increases by one billion rupiahs, it would cause DD(Money) in the next month to decrease by 0.84962393506 billion rupiahs. Furthermore, if DD(Money) increases by one billion rupiahs two months ago, it would cause DD(Money) in the next month to decrease by 0.562083373548 billion rupiahs. This relationship can be expressed in the following equation:

$$DD(BI\_Rates) = -0.311196786177 * DD(BI\_Rates)(-1) \quad (11)$$

$$DD(Money) = -0.84962393506 * DD(Money)(-1) - 0.562083373548 * DD(Money)(-2) \quad (12)$$

The estimates from the Vector Autoregression are supported by the results of the VAR stability test as illustrated in Table 5.

Table 5. The VAR Stability

Root	Modulus
-0.440493 - 0.603032i	0.746781
-0.440493 + 0.603032i	0.746781
-0.139917 - 0.256680i	0.292337
-0.139917 + 0.256680i	0.292337

Source: Authors' calculation

Table 5 reveals that there is no root lying outside the unit circle, which means that the VAR satisfies the stability condition as can be seen from the modulus which ranged within an average value of smaller than one. Next, the short-term restriction in SVAR modeling using two endogenous variables can be written as matrices and equations as follows.

$$A = \begin{bmatrix} 1 & 0 \\ 62411.00 & 1 \end{bmatrix} \quad (13)$$



$$B = \begin{bmatrix} 0.199245 & 0 \\ 0 & 8.53E + 09 \end{bmatrix} \tag{14}$$

$$\epsilon_{y1} = 0.199245 u_{y1} \tag{15}$$

$$\epsilon_{y2} = -62411.00 \epsilon_{y1} + 8.53E+09 u_{y2} \tag{16}$$

The matrices and equations (12 and 13) showed that  $e_{y1}$  is the residual of DD(BI\_Rates), while  $e_{y2}$  is the residual of DD(Money). The ordering is based on the liquidity preference framework as proposed by Keynes. Moreover, we developed the Structural Impulse Response Functions (SIRFs) and Structural Variance Decomposition (SVD) as presented in Figure 3.

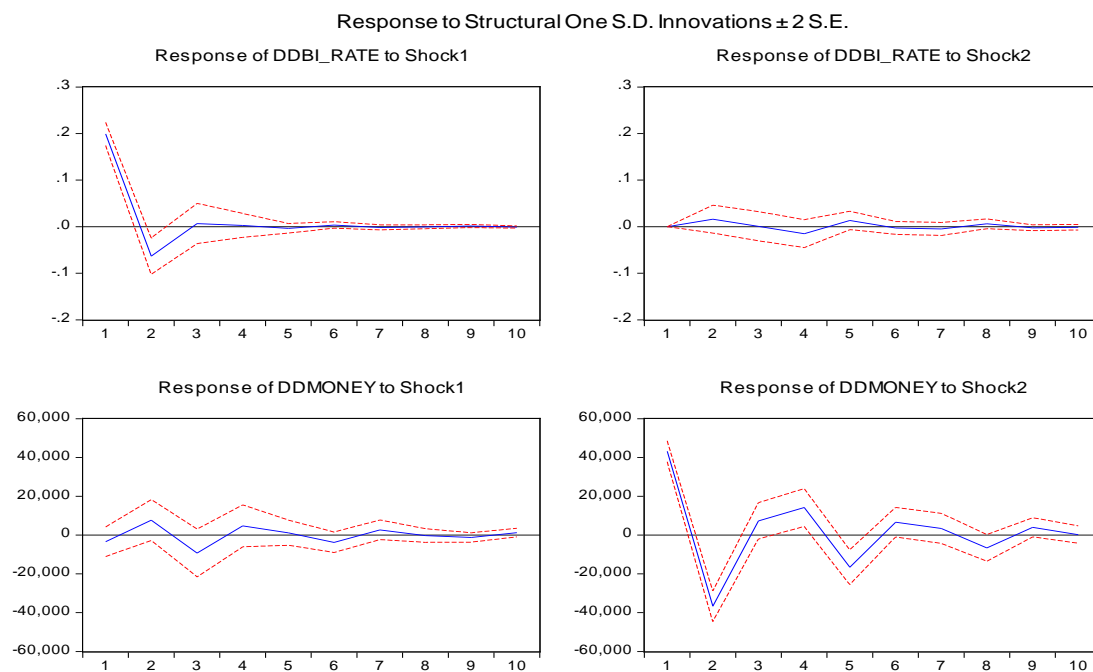


Figure 3: SIRFs of DD(BI\_Rates) and DD(Money) to Shock  
Source: Authors' calculation

From the first to the fifth month, the response of DD(BI\_Rates) to shocks 1 and 2 is still very volatile, while DD(BI\_Rates) starts to stabilize from the sixth month onwards. It means that DD(BI\_Rates) in later periods is no longer as volatile as those in the previous periods. In order words, since the sixth month onwards, DD(BI\_Rates) has reached an equilibrium. Moreover, from the first to the ninth month, the response of DD(Money) to shocks 1 and 2 is still very volatile, while DD(Money) starts to stabilize from the tenth month onwards. It means that DD(Money) in later periods is no longer as volatile as those in the previous periods. In order words, from the tenth month onwards, DD(Money) has reached an equilibrium. The SIRFs results are supported by the SVD as can be seen in Table 6.

Table 6. SVD of DD(BI\_Rates)

Period	Standard Error	Shock1	Shock2
1	0.199245	100.0000	0.000000
2	0.209668	99.41526	0.584735
3	0.209775	99.41451	0.585487
4	0.210336	98.89833	1.101675
5	0.210782	98.51073	1.489267
6	0.210830	98.49400	1.505997
7	0.210897	98.43771	1.562290
8	0.210983	98.35809	1.641909
9	0.211002	98.34477	1.655229
10	0.211007	98.34173	1.658273

Source: Authors' calculation

Table 6 indicates that from the first month, the SVD of DD(BI\_Rates) is strongly (100%) affected by shock 1, while shock 2 has no any significant effect. In that case, starting from the first to the tenth month, the proportion of shock 1 contributing to DD(BI\_Rates) was 98.34%. However, from the first to the tenth month, shock 2 contributes only 1.65% to DD(BI\_Rates). Therefore, it is concluded that the magnitude of shock 1 has a greater effect than shock 2 on DD(BI\_Rates). The SVD of DD(Money) is provided in Table 7.

Table 7. SVD of DD(Money)

Period	Standard Error	Shock 1	Shock 2
1	43317.44	0.633708	99.36629
2	57283.17	2.161761	97.83824
3	58485.04	4.591431	95.40857
4	60369.33	4.924126	95.07587
5	62601.72	4.612808	95.38719
6	63063.19	4.901611	95.09839
7	63211.62	5.060295	94.93970
8	63563.80	5.006193	94.99381
9	63701.58	5.024105	94.97590
10	63714.53	5.061637	94.93836

Source: Authors' calculation

Table 7 indicates that, from the first month, the SVD of DD(Money) is strongly (99.36%) affected by shock 2, while shock 1 has no any significant effect. From the first to the tenth month, the proportion of shock 2 contributing to DD(Money) was 94.94%. However, during the same period, shock 1 contributed only 5.06% to DD(Money). Therefore, it is concluded that the magnitude of shock 2 has a greater influence on DD(Money).

Overall, the results of SIRFs and SVD indicate that the DD(BI\_Rates) shock has a greater influence than the shock of DD(Money) on DD(BI\_Rates). Similarly, the shock of DD(Money) has a greater influence than the shock of DD(BI\_Rates) on DD(Money).

## 5. DISCUSSION

The results of this study are consistent with those of Ali *et al.* (2015) who found that an increase in interest rates only positively impacted prices and exchange rate volatility in Pakistan (see also Gupta *et al.*, 2000). Similarly, findings from Favara and Giordani (2009) suggest that the monetary policy shocks in the United States resulted in uncertainties in future output, prices and interest rates. The empirical findings from our study show that shocks to money supply and the BI Rate occurred in early July 2005 when the Bank of Indonesia implemented an interest rate policy through the Inflation Targeting Framework, which was also the time when the U.S. Fed implemented a contractive monetary policy before the subprime mortgage crisis during July 2005 to June 2006 (see also Huruta, 2018). The BI Rate cannot serve as a benchmark of interest rates because it requires a year to manifest any changes in it. Therefore, from August 19<sup>th</sup>, 2016 onwards, the Bank of Indonesia implemented a 7-Day Repo Rate monetary policy, which reflects the reality of interest rate movements on the money market in the short-term [e.g., the 24-hour (overnight) and 7-day tenor]. Strengthening the monetary operating framework is a common practice of many central banks (Gong and Dai, 2017), which is also an international best practice for monetary operations (Caldara and Herbst, 2016; Cesa-Bianchi *et al.*, 2016; Chen *et al.*, 2017; Fan *et al.*, 2011; Gupta *et al.*, 2000; Huruta, 2018; Kamber and Mohanty, 2018; Mansour *et al.*, 2019; Osisanwo *et al.*, 2019; Samimi *et al.*, 2019; Sasongko and Huruta, 2018). This monetary operation framework has been constantly refined to reinforce the effectiveness of monetary policies for achieving the inflation target. The 7-day Repo Rate of the Bank of Indonesia Instrument is used as the new policy interest rate because it quickly affects the money market as well as the banking and real sectors (Gong and Dai, 2017; Gupta *et al.*, 2000). The new policy instrument based on the 7-day BI Repo Rate has three main expected impacts. First, the monetary policy signal has become stronger with the 7-day Repo Rate as the main reference in the financial markets. Second, it has increased the effectiveness of the transmission of monetary policy through its influence on the interest rate movements in the money market and the banking sector. Third, it helps establish stronger financial markets for transactions and interest rate structure on the interbank money market for the 3-to-12-month tenor (Bank of Indonesia, 2018).

As the global economy was battered by the financial meltdown and the failure of regulatory control during the financial crisis, financial specialists and economists have started to consider the adoption of alternative ethical solutions aiming to undermine callous risk-taking activities (Johnson *et al.*, 1987; Mishkin, 2016). Recently, some forms of Islamic banking facilities are working well in Indonesia as summarized in Table 8.

Table 8. The Proportion of Islamic Bank Funds to Total Third Party Funds

Fund type	Year							
	2010	2011	2012	2013	2014	2015	2016	2017
Wadiah Giro	1.80	1.98	2.49	2.32	2.21	2.26	2.63	3.47
Rupiah	2.20	2.40	3.02	2.93	2.67	2.74	3.15	3.96
Foreign exchange	0.79	0.83	1.06	1.07	1.21	1.25	1.19	1.92
Mudharabah Deposits	4.15	5.78	6.20	6.92	7.25	7.11	7.86	8.65
Rupiah	4.57	6.35	6.89	7.71	7.90	7.74	8.52	9.52

Foreign exchange	1.36	1.83	2.10	2.96	3.48	3.36	3.66	3.09
Mudharabah Savings	3.10	3.60	4.15	4.68	4.90	4.86	5.43	5.72
Rupiah	3.31	3.80	4.34	4.94	5.23	5.24	5.86	6.09
Foreign exchange	0.04	0.55	1.21	1.32	0.70	0.78	0.79	0.89
Total Third Party Funds	3.30	4.22	4.66	5.13	5.43	5.33	5.88	6.51

Source: Central Bureau of Statistics (2017), processed

Table 8 indicates an increase in the proportion of Islamic bank funds in terms of the total amount of third party funds. This indicates an enhancement in the role of Islamic banks in the economy of Indonesia. Based on the three types of third-party funds of Sharia Banks, it can be seen that the one with the most significant growth was Mudharabah deposits which increased from 4.15% in 2010 to 8.65% in 2017. If the third-party funds were divided into different forms in terms of rupiah and foreign exchanges, it appears that the amount of third-party funds in terms of foreign exchanges was relatively small. However, the Mudharabah savings in terms of foreign exchanges experienced a very significant growth. This indicates an increasing trust from the foreign community towards the functioning of Islamic banking in Indonesia.

If we look into the monetary policy instruments, it can be noted that the ratio of the broad money to narrow money supply illustrates a high level of public monetization of monetary instruments. There was an increasing proportion of the population who are increasingly familiar with monetary instruments. Figure 4 indicates that the ratio of the broad money to narrow money supply in Indonesia has decreased. In particular, The ratio declined from 478.57% in January 2013 to 404.41% in December 2016, that is a 15.5% decrease in 4 years.

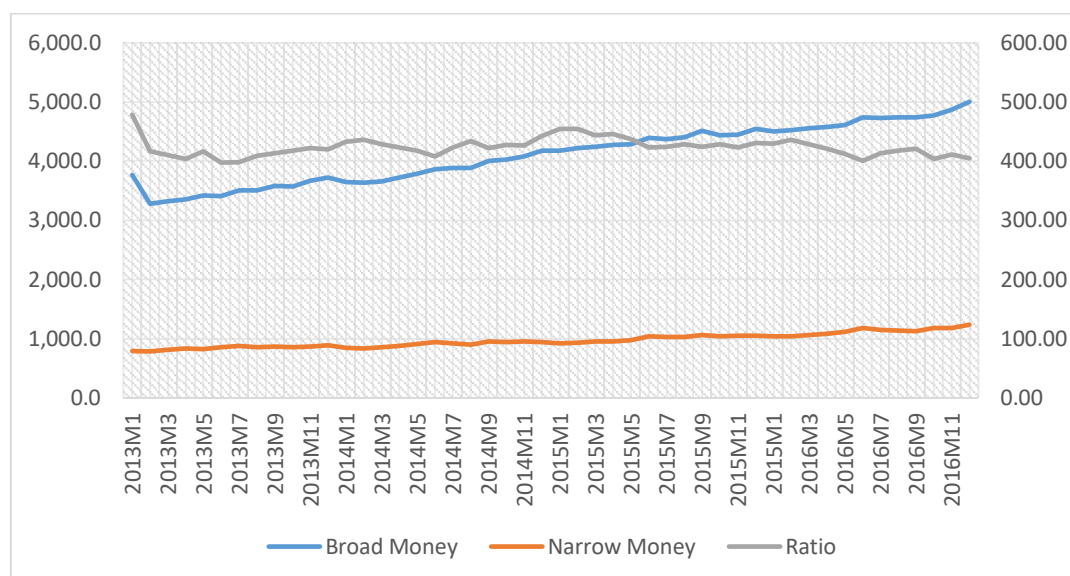


Figure 4: Broad Money and Narrow Money Ratio from January 2013 to December 2016

Source: Bank of Indonesia (2016), processed

In absolute terms, the broad money supply increased from 3,768.7 trillion rupiahs in January 2013 to 5,005 trillion in December 2016, which was an increase by 32.8%.

At the same time, the narrow money supply increased from 787.5 trillion in January 2013 to 1,237.6 trillion in December 2016, which was an increase by 57.2%. This implies that a smaller increase in the broad money supply leads to a smaller ratio of the broad money to narrow money supply. This also indicates that the level of community monetization in Indonesia is still low. People tend to hold cash and demand deposits rather than savings and longer-term deposits. Based on this finding, it can be understood why interest rates do not influence the broad money supply. In this regard, the findings from the present study are not in line with the liquidity preference framework of Keynes (Mishkin, 2016). However, either a low or an excess liquidity can affect the development of the economy (Bathaluddin *et al.*, 2012; Bongini *et al.*, 2017; Duff, 2019; Ennis and Keister, 2003; Grob ty, 2017; Jelilov, 2016; Suyuan and Khurshid, 2015). An excess liquidity can reduce the effectiveness of the monetary policy transmission mechanism, while a low liquidity can induce firms to lay off employees and consumers to cut back their spendings (Blau, 2017).

Findings from this study imply that, if the government needs to control interest rates, it cannot use money supply as an instrument, and vice versa. In Indonesia, interest rates can be controlled by strengthening the role of the regional and national inflation monitoring teams. By doing so, managing the level of inflation enables the government to control interest rates.

Through a Memorandum of Understanding between the Government and the Bank of Indonesia, an inflation target is established for every three-year period in a Decree of the Minister of Finance (Central Bureau of Statistics, 2018). It is expected that the inflation target is used as a benchmark for businesses and the public in planning for their future economic activities. Suyuan and Khurshid (2015) noted that private investment is influenced by interest rates, which suggests that high interest rates increase interest expenses, whereas low interest rates encourage investment, which in turn increases the aggregate demand (Lash, 1975). Consequently, national incomes will increase as a result of lower interest rates. In Indonesia, the coordination between the Bank of Indonesia and the government may increase production, improve distribution, and minimize price distortion in the food market (Bank of Indonesia, 2015).

This study's analysis of liquidity is also related to national security issues such as money laundering, terrorism financing (Kord k and Kurilovsk , 2017), corruption, and tax evasion (Luzgina, 2017). First, Kord k and Kurilovsk  (2017) found that terrorist financing is an essential target of the national anti-money laundering efforts (e.g., laws, regulations, enforcement, etc.). In Indonesia, money launderers utilize various methods such as utilizing institutions outside the financial system and then penetrating into other sectors (Financial Transaction Reports and Analysis Center, 2016; Sasongko and Huruta, 2018). Second, Luzgina (2017) argued that corruption and tax evasion should be eliminated not only by punishment but also by creating an attractive environment for business development. In Indonesia, the five stages of anti-corruption efforts are as follows: probing, investigation, prosecution, Inkracht, and execution. In fact, corruption creates extra incomes and thus creates a positive impact on money supply. It is expected that money supply will increase if the extent of corruption is larger than usual, and vice versa (Financial Services Authority, 2017; Sasongko and Huruta, 2018).

In addition, liquidity is related to sustainability such as taxation. As Giri nien  and Giri nas (2016) and Bikas *et al.* (2017) noted, taxation plays a significant role in the fiscal system and impacts the state budget. In Indonesia, on the one hand, the increasing amount of non-taxable incomes negatively impacts tax revenues. On the other hand, an

increase in non-taxable incomes allows households to pay a smaller amount of taxes. As a result, households will end up with higher disposable incomes for consumption, investment, and savings (Hadijah, 2016; Sasongko and Huruta, 2018). To conclude, the Indonesian government needs to properly manage liquidity in relation to national security and sustainability issues in order to sustain the country's long-term economic development.

## 6. CONCLUSIONS

There are two major monetary policy instruments, namely, money supply and interest rate. Results from the Structural Vector Autoregression analysis conducted in this study indicate that the BI Rate shocks have a greater influence than the money supply shocks on the BI Rate. Moreover, the money supply shocks have a greater influence than the BI Rate shocks on the money supply. This implies that changes in the Bank of Indonesia interest rate do not cause money supply to change, and vice versa. Our findings are inconsistent with the liquidity preference framework formulated by Keynes. That is to say, the money supply in Indonesia does not have any impact on interest rates, and vice versa. Therefore, if the government needs to control interest rates, it cannot use money supply as an instrument, and vice versa. In Indonesia, interest rates can be controlled by strengthening the role of the regional and national inflation monitoring teams. By doing so, managing the level of inflation enables the government to control interest rates. In addition, the Indonesian government is suggested to properly manage liquidity that is related to national security and sustainability issues.

## 7. LIMITATIONS AND FUTURE RESEARCH

Indonesia comprises thousands of islands. Such a special geographical condition influences the effectiveness of implementing monetary policies across the nation because there is a need for the government to adjust the policies for inter-regional differences and that will take a long time to do so. During the sample period of our study, there was a lack of effectiveness in the monetary policy instruments (i.e., interest rates and money supply) in Indonesia. Therefore, it is necessary to empirically examine the relationships between interest rates, money supply, money laundering, terrorism financing, corruption, and taxation in the country. Findings from this study indicate that there is actually a link between monetary policy on the one hand and money laundering, terrorism financing, corruption, and taxation on the other. To enhance our understand on this link, alternative statistical models such as Vector Error Correction Model, Panel Granger Causality, Autoregressive Distributed Lag Model, etc, can be applied in future research.

## REFERENCES

- [1] Abakpa, A., Purokayo, S. G., and Asaph, P. P. (2018). Analysis of the Determinants of Money Supply in Nigeria (1981-2015). *International Journal of Scientific Research*, III(2), 21–38. Retrieved from

- <http://journalijsr.com/content/2018/IJSR70.pdf>
- [2] Agliardi, E., Agliardi, R., and Spanjers, W. (2016). Corporate financing decisions under ambiguity: Pecking order and liquidity policy implications. *Journal of Business Research*, 69(12), 6012–6020.  
<https://doi.org/10.1016/j.jbusres.2016.05.016>
- [3] Ali, T. M., Mahmood, M. T., and Bashir, T. (2015). Impact of Interest Rate , Inflation and Money Supply on Exchange Rate Volatility in Pakistan Pakistan. *World Applied Sciences Journal*, 33(4), 620–630.  
<https://doi.org/10.5829/idosi.wasj.2015.33.04.82>
- [4] Amisano, G., and Giannini, C. (1997). *Topics in Structural VAR Econometrics* (2nd ed.). Retrieved from <https://www.springer.com/gp/book/9783642644818>
- [5] Bank of Indonesia. (2015). BI dan Pemerintah Sepakati Langkah Untuk Jaga Inflasi 2016. Retrieved from Bank of Indonesia website:  
[http://www.bi.go.id/id/ruang-media/siaran-pers/Pages/sp\\_179615.aspx](http://www.bi.go.id/id/ruang-media/siaran-pers/Pages/sp_179615.aspx)
- [6] Bank of Indonesia. (2016). Perkembangan Uang Beredar. Retrieved from Bank of IndonesiaIndonesia website:  
<https://www.bi.go.id/id/publikasi/perkembangan/Pages/M2-Agustus-2016.aspx>
- [7] Bank of Indonesia. (2017a). Statistik Ekonomi dan Keuangan Indonesia (SEKI). Retrieved from Bank of Indonesia website:  
<https://www.bi.go.id/id/statistik/seki/terkini/moneter/Contents/Default.aspx>
- [8] Bank of Indonesia. (2017b). Tujuan Kebijakan Moneter Bank Indonesia. Retrieved from Bank of Indonesia website:  
<http://www.bi.go.id/id/moneter/tujuan-kebijakan/Contents/Default.aspx>
- [9] Bank of Indonesia. (2018). BI 7-day (Reverse) Repo Rate. Retrieved from Bank Iof ndonesia website: <https://www.bi.go.id/id/moneter/bi-7day-RR/penjelasan/Contents/Default.aspx>
- [10] Bathaluddin, M. B., Nur, A. P. M., and Wibowo, W. A. (2012). The Impact of Excess Liquidity on Monetary Policy. *Bulletin of Monetary Economics and Banking*, 14(3), 245–267. <https://doi.org/10.21098/bemp.v14i3.404>
- [11] Bello, M. Z., and Abdullahi, M. (2013). Reationship between Inflation , Money Supply , Interest Rate and Income Growth (Rgdp) in Nigeria 1980-2010: an Empirical Investigation. *Journal of Economics and Sustainable Development*, 4(8), 7–13. Retrieved from  
<https://www.iiste.org/Journals/index.php/JEDS/article/view/5836>
- [12] Bikas, E., Bagotyrius, G., and Jakubauskaitė, A. (2017). The Impact Of Value-Added Tax On The Fiscal Sustainability. *Journal of Security and Sustainability Issues*, 7(2), 267–285. [https://doi.org/doi.org/10.9770/jssi.2017.7.2\(8\)](https://doi.org/doi.org/10.9770/jssi.2017.7.2(8))
- [13] Bilquees, F., Mukhtar, T., and Sohail, S. (2012). Dynamic Causal Interactions of Money, Prices, Interest Rate and Output in Pakistan. *Journal of Economic Cooperation and Development*, 3(3), 37–64. Retrieved from  
<http://www.sesric.org/pdf.php?file=ART11120501-2.pdf>
- [14] Blau, B. M. (2017). Social trust and the liquidity of cross-listed securities. *Journal of Business Research*, 78, 155–171.  
<https://doi.org/10.1016/j.jbusres.2017.05.009>
- [15] Bongini, P., Iwanicz-Drozowska, M., Smaga, P., and Witkowski, B. (2017).

- Financial development and economic growth: The role of foreign-owned banks in CESEE countries. *Sustainability*, 9(3), 1–25. <https://doi.org/10.3390/su9030335>
- [16] Brooks, C. (2008). *Introductory Economics for Finance* (2nd ed.). Retrieved from [http://www.afriheritage.org/TTT/3 Brooks\\_Introductory Econometrics for Finance \(2nd edition\).pdf](http://www.afriheritage.org/TTT/3%20Brooks_Introductory%20Econometrics%20for%20Finance%20(2nd%20edition).pdf)
- [17] Caldara, D., and Herbst, E. (2016). *Monetary Policy, Real Activity, and Credit Spreads: Evidence from Bayesian Proxy SVARs*. Retrieved from <http://dx.doi.org/10.17016/FEDS.2016.049>
- [18] Central Bureau of Statistics. (2017). Dana Pihak Ketiga Perbankan Syariah Menurut Jenis Dana (miliar rupiah). Retrieved from Central Bureau of Statistics website: <https://www.bps.go.id/dynamictable/2015/12/22/1077/dana-pihak-ketiga-perbankan-syariah-menurut-jenis-dana-miliar-rupiah-2004-2017.html>
- [19] Central Bureau of Statistics. (2018). Inflasi. Retrieved from Central Bureau of Statistics website: <https://www.bi.go.id/id/moneter/inflasi/bi-dan-inflasi/Contents/Penetapan.aspx>
- [20] Cesa-Bianchi, A., Thwaites, G., and Viccondoa, A. (2016). Monetary Policy Transmission in an Open Economy: New Data and Evidence from the United Kingdom. In *Bank of England working papers* (No. 615). <https://doi.org/10.2139/ssrn.2835383>
- [21] Chen, H., Chow, K., and Tillmann, P. (2017). The effectiveness of monetary policy in China: Evidence from a Qual VAR. *China Economic Review*, 43, 216–231. <https://doi.org/10.1016/j.chieco.2017.02.006>
- [22] Dong, Y., Hauschild, M., Sørup, H., Rousselet, R., and Fantke, P. (2018). Evaluating the monetary values of greenhouse gases emissions in life cycle impact assessment. *Journal of Cleaner Production*, 209, 538–549. <https://doi.org/10.1016/j.jclepro.2018.10.205>
- [23] Duff, V. (2019). Liquidity Effect in Economics. Retrieved from <https://smallbusiness.chron.com/liquidity-effect-economics-5212.html>
- [24] Ennis, H. M., and Keister, T. (2003). *Economic Growth , Liquidity , and Bank Runs* (No. 03–01). Retrieved from [https://www.richmondfed.org/~media/richmondfedorg/publications/research/working\\_papers/2003/pdf/wp03-1.pdf](https://www.richmondfed.org/~media/richmondfedorg/publications/research/working_papers/2003/pdf/wp03-1.pdf)
- [25] Fan, L., Yu, Y., and Zhang, C. (2011). An empirical evaluation of China's monetary policies. *Journal of Macroeconomics*, 33(2), 358–371. <https://doi.org/10.1016/j.jmacro.2010.11.003>
- [26] Favara, G., and Giordani, P. (2009). Reconsidering the role of money for output, prices and interest rates. *Journal of Monetary Economics*, 56(3), 419–430. <https://doi.org/10.1016/j.jmoneco.2009.01.002>
- [27] Financial Services Authority. (2017). Laporan triwulanan III 2017. In *Otoritas Jasa Keuangan*. Retrieved from [https://www.ojk.go.id/id/data-dan-statistik/laporan-triwulanan/Documents/Laporan Triwulan OJK III-2017.pdf](https://www.ojk.go.id/id/data-dan-statistik/laporan-triwulanan/Documents/Laporan%20Triwulan%20OJK%20III-2017.pdf)
- [28] Financial Transaction Reports and Analysis Center. (2016). *Tipologi Pencucian Uang Berdasarkan Putusan Pengadilan Tahun 2015*. Retrieved from [http://www.ppatk.go.id/backend/assets/images/publikasi/1484876309\\_.pdf](http://www.ppatk.go.id/backend/assets/images/publikasi/1484876309_.pdf)
- [29] Gbenedio, P., Ayadi, O. F., and Okpala, A. (1999). Money Supply Variability and



- Interest Rate Spread in Developing Economies: The Case of Nigeria. *International Journal of Commerce and Management*, 9(1/2), 35–44. Retrieved from <https://doi.org/10.1108/eb047381>
- [30] Giriūnienė, G., and Giriūnas, L. (2016). Identification Of The Complex Tax System Evaluation Criteria: Theoretical Aspect. *Journal of Security and Sustainability Issues*, 7(2), 77–85. [https://doi.org/10.9770/jssi.2016.5.3\(4\)](https://doi.org/10.9770/jssi.2016.5.3(4))
- [31] Gong, P., and Dai, J. (2017). Monetary policy, exchange rate fluctuation, and herding behavior in the stock market. *Journal of Business Research*, 76, 34–43. <https://doi.org/10.1016/j.jbusres.2017.02.018>
- [32] Grobéty, M. (2017). *Government Debt and Growth : The Role of Liquidity* (No. 13). <https://doi.org/10.1016/j.jimonfin.2018.01.004>
- [33] Gupta, J., Chevalier, A., and Sayekti, F. (2000). The Causality Between Interest Rate, Exchange Rate and Stock Price in Emerging Markets: The Case of the Jakarta Stock Exchange. *SSRN Electronic Journal*, 1–22. Retrieved from <http://dx.doi.org/10.2139/ssrn.251253>
- [34] Hadijah, S. (2016). Penghasilan Tidak Kena Pajak (PTKP), Apa Itu? Retrieved from <https://www.cermati.com/artikel/penghasilan-tidak-kena-pajak-ptkp-apa-itu>
- [35] Huruta, A. D. (2018). The Causality of BI Rate and Federal Fund Rate. *Jurnal Keuangan Dan Perbankan*, 22(3), 532–541. <https://doi.org/10.26905/jkdp.v22i3.1972>
- [36] Ivanov, V., and Kilian, L. (2005). A practitioner's guide to lag order selection for VAR impulse response analysis. *Studies in Nonlinear Dynamics and Econometrics*, 9(1), 1–36. Retrieved from <http://drphilipshaw.com/Protected/A Practitioners Guide to Lag Order Selection for VAR Impulse Response Analysis.pdf>
- [37] Jelilov, G. (2016). The Impact of Interest Rate on Economic Growth Example of Nigeria. *African Journal of Social Sciences*, 6(2), 51–64. Retrieved from [https://www.researchgate.net/publication/307571239\\_THE\\_IMPACT\\_OF\\_INTEREST\\_RATE\\_ON\\_ECONOMIC\\_GROWTH\\_EXAMPLE\\_OF\\_NIGERIA](https://www.researchgate.net/publication/307571239_THE_IMPACT_OF_INTEREST_RATE_ON_ECONOMIC_GROWTH_EXAMPLE_OF_NIGERIA)
- [38] Johnson, L. J., Brick, J. R., and Price, K. (1987). The interest rate sensitivity of equity prices with respect to systematic risk and leverage. *Journal of Business Research*, 15(1), 85–92. [https://doi.org/10.1016/0148-2963\(87\)90020-8](https://doi.org/10.1016/0148-2963(87)90020-8)
- [39] Kamber, G., and Mohanty, M. S. (2018). *Do interest rates play a major role in monetary policy transmission in China?* (No. 714). Retrieved from <https://www.bis.org/publ/work714.pdf>
- [40] Kordík, M., and Kurilovská, L. (2017). Protection of the National Financial System From the Money Laundering and Terrorism Financing. *Entrepreneurship And Sustainability Issues*, 5(2), 243–262. [https://doi.org/10.9770/jesi.2017.5.2\(7\)](https://doi.org/10.9770/jesi.2017.5.2(7))
- [41] Langan, R., and Kumar, A. (2019). Time versus money: The role of perceived effort in consumers' evaluation of corporate giving. *Journal of Business Research*, 99, 295–305. <https://doi.org/10.1016/j.jbusres.2019.02.016>
- [42] Lash, N. A. (1975). The relative impact of monetary actions in selected advanced countries. *Journal of Business Research*, 3(2), 157–164. Retrieved from [https://doi.org/10.1016/0148-2963\(75\)90007-7](https://doi.org/10.1016/0148-2963(75)90007-7)
- [43] Lütkepohl, H. (2005). *New Introduction to Multiple Time Series Analysis*.

- Retrieved from [http://www.afriheritage.org/TTT/2 New Introduction to Multiple Time Series Analysis.pdf](http://www.afriheritage.org/TTT/2%20New%20Introduction%20to%20Multiple%20Time%20Series%20Analysis.pdf)
- [44] Luzgina, A. (2017). Problems of Corruption and Tax Evasion in Construction Sector in Belarus. *Entrepreneurship And Sustainability Issues*, 5(2), 263–282. [https://doi.org/10.9770/jesi.2017.5.2\(8\)](https://doi.org/10.9770/jesi.2017.5.2(8))
- [45] Malliaris, A. G., and Stefani, S. (1991). Money, inflation and interest rates: Illustrations from twelve European economies. *European Journal of Political Economy*, 7(3), 275–298. [https://doi.org/10.1016/0176-2680\(91\)90014-T](https://doi.org/10.1016/0176-2680(91)90014-T)
- [46] Mansour, M., Sghaier, A., Banour, B., and Jabeur, S. B. (2019). The Interactions between the Lending Rates, Deposit Rates and Money Market Rates. *Iranian Economic Review*, 23(1), 163–189. Retrieved from [https://ier.ut.ac.ir/article\\_69104\\_32a210b67228f0419f1ee35e176cb83f.pdf](https://ier.ut.ac.ir/article_69104_32a210b67228f0419f1ee35e176cb83f.pdf)
- [47] Martin, V., Hurn, A. S., and Harris, D. (2013). Econometric Modelling with Time Series. In *Cambridge University Press*. Retrieved from <https://eprints.qut.edu.au/62806/>
- [48] Mild, A., Waitz, M., and Wöckl, J. (2015). How low can you go? - Overcoming the inability of lenders to set proper interest rates on unsecured peer-to-peer lending markets. *Journal of Business Research*, 68(6), 1291–1305. <https://doi.org/10.1016/j.jbusres.2014.11.021>
- [49] Mishkin, F. S. (2016). *The Economics of Money, Banking, and Financial Markets* (11th ed.). England: Pearson Education.
- [50] Monnet, C., and Weber, W. E. (2001). Money and interest rates. *Federal Reserve Bank of Minneapolis Quarterly Review*, 25(4), 2–13. Retrieved from <https://ideas.repec.org/a/fip/fedmqry/2001ifallp2-13nv.25no.4.htm>
- [51] Osisanwo, B. G., Tella, S. A., and Adesoye, B. A. (2019). The Empirical Analysis of Monetary Policy on Balance of Payments Adjustments in Nigeria: A Bound Testing Approach. *Iranian Economic Review*, 23(1), 129–147. Retrieved from [https://ier.ut.ac.ir/article\\_69102\\_d480ea96c1e0ea74a967590ba33c495a.pdf](https://ier.ut.ac.ir/article_69102_d480ea96c1e0ea74a967590ba33c495a.pdf)
- [52] Rubio-Ramírez, J. F., Waggoner, D. F., and Zha, T. (2010). Structural vector autoregressions: Theory of identification and algorithms for inference. *Review of Economic Studies*, 77(2), 665–696. <https://doi.org/10.1111/j.1467-937X.2009.00578.x>
- [53] Samimi, A. J., Rasekhi, S., and Asadi, S. P. (2019). The Monetary Policy, Credit Constraint and Spatial Distribution of Economic Activity: A Contribution of New Economic Geography. *Iranian Economic Review*, 23(1), 1–27. Retrieved from [https://ier.ut.ac.ir/article\\_69096\\_63213af5d09fbc021cd5407697717e30.pdf](https://ier.ut.ac.ir/article_69096_63213af5d09fbc021cd5407697717e30.pdf)
- [54] Sasongko, G., and Huruta, A. D. (2018). Monetary policy and the causality between inflation and money supply in Indonesia. *Business: Theory and Practice*, 19, 80–87. <https://doi.org/10.3846/btp.2018.09>
- [55] Suyuan, L., and Khurshid, A. (2015). The effect of interest rate on investment; Empirical evidence of Jiangsu Province, China. *Journal of International Studies*, 8(1), 81–90. <https://doi.org/10.14254/2071-8330.2015/8-1/7>
- [56] Urbanovský, T. (2017). Granger Causalities Between Interest Rate, Price Level, Money Supply and Real Gdp in the Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 65(2), 745–757.

<https://doi.org/10.11118/actaun201765020745>

- [57] Vizmanos-Batac, C., and Tatlonghari, V. M. (2017). Differential Output Growth , Money Supply , and Interest Rate between the Philippines and its Major Trading Partners : Analyzing the Impact on the Spot Peso Exchange Rates. *Review of Integrative Business and Economics Research*, 6(2), 115–141. Retrieved from [http://buscompress.com/uploads/3/4/9/8/34980536/riber6-2\\_08k17-099\\_115-141.pdf](http://buscompress.com/uploads/3/4/9/8/34980536/riber6-2_08k17-099_115-141.pdf)
- [58] Wuyah, Y. T., and Amwe, A. D. (2016). The Implications of Money Supply on Interest Rate in Nigeria. *American Journal of Business and Society*, 1(4), 189–194. Retrieved from <http://www.aiscience.org/journal/ajbs>
- [59] Yoo, S. H., and Kwak, S. J. (2004). Information technology and economic development in Korea: a causality study. *International Journal of Technology Management*, 27(1), 57–67. <https://doi.org/10.1504/ijtm.2004.003881>