

Conference Paper

The Analysis of Monetary Transmission by Interest Rate Channel in Influencing the Inflation: VECM Approach

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Abstract

Bank Indonesia set Inflation Targeting Framework from July 2005 which is communicated the inflation target to the public. However, the phenomenon showed that the actual inflation from 2005 to 2016 has not been able to achieve compliance with inflation targeting that has been set by Bank Indonesia. The purpose of this research is to know and analyze about the effectiveness of monetary policy transmission of interest rate channel in influencing inflation in Indonesia. This purpose is reflected in the inflation fluctuation response due to the shock of other macroeconomic variables and the strongest variability of macroeconomic variable used as the operational target of monetary policy transmission. Data used in this research are quarterly time series data from year 2005Q3 until 2017Q1. The variables used in this research are SBI interest rate, the rate of interbank call money market, deposit interest rate, loan interest rate, investment and output gap. Data used in this research sourced by Bank Indonesia and Badan Pusat Statistik. The method used in this research is Vector Error Correction Model (VECM).

The results of impulse response function test showed that the transmission mechanism of monetary policy requires time lag to be able to influence inflation and indicate that the monetary policy transmission mechanism through the effective interest rate in influencing the ultimate goal of inflation. In addition, variance decomposition results concluded that the rate of interbank call money market variant is appropriately used as an operational target of monetary policy transmission for implementation in influencing inflation.

Keywords: Transmission, Monetary Policy, Interest Rate, Inflation, VECM.

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1. Introducing

In line with economic developments in the world, Bank Indonesia as the monetary authority to implement and establish an effective and efficient monetary policy in

order to maintain price stability as the sole target set forth in Act No. 6/2009 on Bank Indonesia. The main purpose of the implementation of monetary policy stipulated and implemented by Bank Indonesia is defined as a policy to achieve stability of rupiah value through the control of money supply and or interest rate. According to Kadir, Widodo and Suryani R (2008: 7-8) to achieve Bank Indonesia goals, there are several choices of monetary policy strategies that each have characteristics in accordance with nominal indicators used as the basis or intermediate goal to achieve the ultimate goal of monetary policy.

Setiawan and Karsinah (2016: 461-462) explained that Bank Indonesia officially announced the application of Inflation Targeting Framework (ITF) in July 2005. According to Yusuf (2014: 2), the implementation of ITF in Indonesia is forward looking which means monetary policy is currently an anticipatory step in achieving future inflation targets. Bank Indonesia (2018) stated that the inflation target is an inflation rate to be achieved by Bank Indonesia, in coordination with the Government regulated in the Minister of Finance Regulation based on the law concerning Bank Indonesia in the Memorandum of Understanding between the Government and Bank Indonesia.

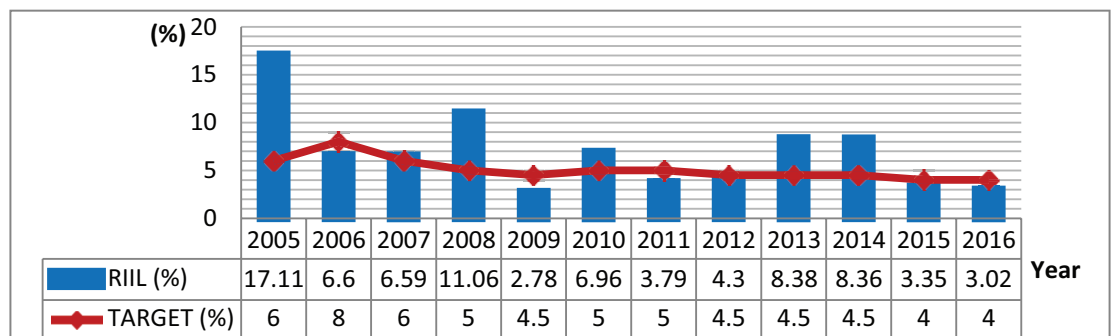


Figure 1: Target and Realization of Inflation in Indonesia Source: Bank Indonesia (2018).

Figure 1 explains that the inflationary of Indonesia in 2005-2016 showed inflationary developments that tend to fluctuate from year to year. According to Suseno and Ayesha (2009: 41), fluctuations in the rate of inflation is due to the significant increase in demand for goods and services and caused by the supply side of changes in output prices and changes in government policy to price. It also shows that during 2005 to 2016 there was a condition of mismatch between the actual inflation rate and the inflation rate targeted by Bank Indonesia. Known throughout 2005 to 2016 the actual inflation rate in Indonesia in accordance with the inflation target set by Bank Indonesia only occurred in 2007, 2012, 2015 and 2016. This indicates that the control of inflation still has not reached conformity with the expected target so that testing to see the

relatively effective of monetary policy transmission in influencing Indonesia inflation is necessary for Bank Indonesia in maintaining the stability of the inflation rate.

According to Warjiyo (2004: 3), a process that illustrates how the monetary policy of the central bank in influencing various economic and financial activities so finally can achieve the final goal that called the transmission mechanism of monetary policy. The transmission mechanism of monetary policy occurs through interaction between the central bank, banking, financial sector and real sector where changes in monetary policy affect inflation through various channels such as interest rate channel, credit channel, exchange rate channel, asset price channel and expectations channel (Bank Indonesia, 2018).

Transmission channels that begin with the instrument to the achievement of the ultimate goal of monetary policy are very complex ([2]: 3). The complexity of the monetary policy transmission mechanism also relates to changes in the role and mode of operation of the monetary policy transmission channel in the economy. The selection of channel in this study is based on a change in quantity approach to price approach in controlling the stability of the economy as a monetary policy framework in which the price approach is the most influential variable ([2]: 26). Warjiyo (2004: 20) and Rahardjo (2009: 120-121) argue for the importance of monetary policy transmission mechanism through the interest rate channel by emphasizing the importance of financial market price aspect to various economic activities in the real sector where the monetary policy adopted by the central bank will affect on the development of various interest rates in the financial sector and will affect on the rate of inflation.

The result of research by Natsir (2011) stated that transmission mechanism of monetary policy through interest rate channel is effective to reach the final target of monetary policy in 1990:2 until 2007:1 with interbank call money market as the operational target. In addition, research by Wulandari (2012), Hasibuan and Pratomo (2013) and Panjaitan (2017) that studied demonstrate the effectiveness of interest rates channel stated that influence the aggregate demand as inflation through interest rate changes. According to Mankiw (2006: 89) one theory about the relationship between interest rates and inflation is Fisher Effect theory. The Fisher Effect theory explains that the interest rate may change for two reasons that are because the real interest rate changes or because the inflation rate changes so if there is a one percent increase in the rate of inflation, it will make a one percent increase in the nominal interest rate ([10]: 90).

Figure 2 explains that the interest rate of Bank Indonesia from 2005-2016 has fluctuated trend which proves that the data between the inflation rate and the SBI interest

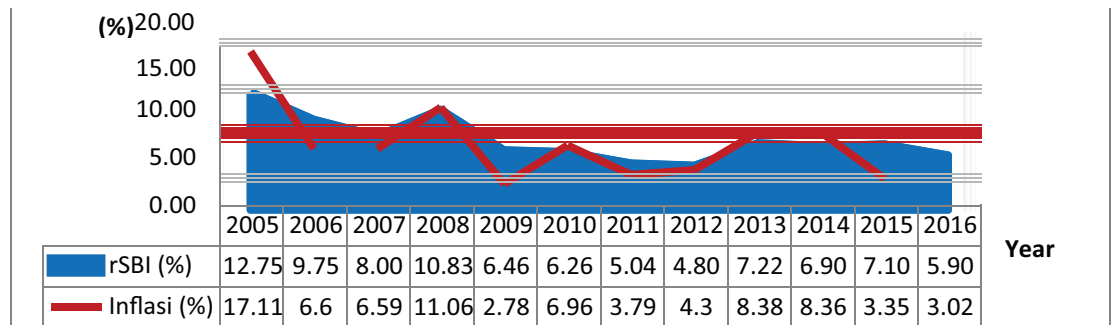


Figure 2: Inflation and Interest Rates Source: Bank Indonesia (2018).

rate in 2005 to 2016 showed inflation which has not reached the low and stable price level besides that between the condition of Indonesia variable economy with similarities in Irving Fisher theory has not been matched.

Warjiyo (2004: 11) stated that the study of monetary transmission aims to examine two important aspects of knowing the dominant transmission channel in the economy as the basis for formulating a monetary policy strategy and to know how strong and the duration of deadlines each transmission channel works from since monetary action is carried out by the central bank from the transmission channel to the rate of inflation so that this analysis is important in determining which economic and financial variables will be the leading indicators of the inflation movement and future economic growth and which variables will be used as indicators to determine the main target of monetary policy ([16]: 11).

Natsir (2011: 11) stated that the effectiveness of the monetary policy transmission mechanism can be measured by two indicators, namely how much speed and time lag required by economic variables in a channel to respond to monetary policy instrument shocks to achieve the ultimate goal of inflation and how the power of the variables on monetary policy transmission channel in responding to the monetary policy shock to the realization of the ultimate goal of inflation. Both indicators are derived from Impulse Response Function (IRF) and Variance Decomposition (VD) tests in Vector Error Correction Model (VECM) analysis used to see the effectiveness of monetary policy transmission in achieving the ultimate goal of monetary policy based on existing phenomena (Sims in Gujarati, 2015: 485). Based on previously described background, this study will examine the effectiveness of the mechanism of monetary policy transmission of interest rate channel in Indonesia against the single targets of monetary policy in the form of inflation after Indonesia imposed the Inflation Targeting Framework.

2. Research Method

The data used in this study is secondary data obtained from Bank Indonesia, Badan Pusat Statistik (BPS) and International Financial Statistics (IFS) accessed through the International Monetary Fund (IMF) website. The type of data used in this study is the time series data from 2005: Q3 to 2017: Q1, among others inflation, SBI rates, interbank call money market rates, deposit rates, lending rates, investment and output gap.

The type of research used in this study is quantitative analysis approach In response to the problem formulation in this study using Vector Error Correction Model (VECM) analysis method to analyze the interest rate channel of transmission monetary policy in influencing inflation used as a tool of policy formulation. The formulation of the problem in this study will be answered using the estimation results of a VECM analysis, Impulse Response Function (IRF) and Variance Decomposition (VD) analysis through software in E-Views 9 software.

The Vector Error Correction Model (VECM) model is an restricted VAR used for cointegrated nonstationary nodes so that VECM has a long-term relationship built into the model specification and allows for short-term adjustment dynamics. Innovation accounting consists of Impulse Response Function (IRF) and Variance Decomposition (VD) is defined as the decomposition of shock (shock). Analysis of IRF and FEVD is used to obtain interaction information between variables.

The equations to be used in this research are:

$$\begin{aligned} INF_t &= \beta_0 + \beta_{10}INF_{t-i} + \beta_{11}rSBI_{t-i} + \beta_{12}rPUAB_{t-i} + \beta_{13}rDEP_{t-i} + \beta_{14}rKRDT_{t-i} \\ &\quad + \beta_{15}LnINV_{t-i} + \beta_{16}OG_{t-i} + e_{1t} \end{aligned}$$

$$\begin{aligned} rSBI_t &= \beta_0 + \beta_{17}INF_{t-i} + \beta_{18}rSBI_{t-i} + \beta_{19}rPUAB_{t-i} + \beta_{20}rDEP_{t-i} + \beta_{21}rKRDT_{t-i} \\ &\quad + \beta_{22}LnNV_{t-i} + \beta_{23}OG_{t-i} + e_{2t} \end{aligned}$$

$$\begin{aligned} rPUAB_t &= \beta_0 + \beta_{24}INF_{t-i} + \beta_{25}rSBI_{t-i} + \beta_{26}rPUAB_{t-i} + \beta_{27}rDEP_{t-i} + \beta_{28}rKRDT_{t-i} \\ &\quad + \beta_{30}LnINV_{t-i} + \beta_{31}OG_{t-i} + e_{3t} \end{aligned}$$

$$\begin{aligned} rDEP_t &= \beta_0 + \beta_{69}INF_{t-i} + \beta_{70}rSBI_{t-i} + \beta_{71}rPUAB_{t-i} + \beta_{72}rDEP_{t-i} + \beta_{73}rKRDT_{t-i} \\ &\quad + \beta_5LnINV_{t-i} + \beta_6OG_{t-i} + e_{4t} \end{aligned}$$

$$\begin{aligned} rKRDT_t &= \beta_0 + \beta_{74}INF_{t-i} + \beta_{75}rSBI_{t-i} + \beta_{76}rPUAB_{t-i} + \beta_{77}rDEP_{t-i} + \beta_{78}rKRDT_{t-i} \\ &\quad + \beta_{79}LnINV_{t-i} + \beta_{80}OG_{t-i} + e_{5t} \end{aligned}$$

$$\begin{aligned} LnINV_t &= \beta_0 + \beta_{81}INF_{t-i} + \beta_{82}rSBI_{t-i} + \beta_{83}rPUAB_{t-i} + \beta_{84}rDEP_{t-i} + \beta_{85}rKRDT_{t-i} \\ &\quad + \beta_{86}LnINV_{t-i} + \beta_{87}OG_{t-i} + e_{6t} \end{aligned}$$

$$\begin{aligned} OG_t &= \beta_0 + \beta_{88}INF_{t-i} + \beta_{89}rSBI_{t-i} + \beta_{90}rPUAB_{t-i} + \beta_{91}rDEP_{t-i} + \beta_{92}rKRDT_{t-i} \\ &\quad + \beta_{93}LnINV_{t-i} + \beta_{94}OG_{t-i} + e_{7t} \end{aligned}$$

Where INF is inflation, rSBI is SBI interest rate, rPUAB is the interbank call money market rate, rDEP is the deposit interest rate, rKRDT is the lending rate, LnINV is the natural logarithm of investment, OG is the output gap, β_0 is intercept factor, t-i is lag optimal, β_{10} until β_{94} is regression coefficient and e_{1t} until e_{7t} is error term.

3. Results and Discussion

Based on the result of stasioneries test and cointegration test which has been done, it is concluded that this research model is appropriately analyzed by using Vector Error Correction Model (VECM) method to analyze short and long-term influence. It is given that based on the Phillips Perron stationary test it is proved that all the data used has been stationary at the first difference level and based on the Johansen cointegration test that the estimated model has cointegration or long-term relationships. The time series model may not be equilibrium, so adjusting to short- term equilibrium deviation

should include error correction term originating from long-term residual equation. The result of VECM estimation on the monetary policy transmission mode model of interest rate channel will be said significant if t-statistic value shows bigger value than a t-table value equal to 1.67793.

TABLE 1: VECM Estimation.

Variable	Coefficient	T-Statistic	Information
Long-Term			
INF(-1)	1.000000		
RSBI(-1)	-1.249160	[-6.02983]	Significant
RPUAB(-1)	1.960971	[14.1464]	Significant
RDEP(-1)	1.024743	[5.92368]	Significant
RKRDT(-1)	-3.956081	[-24.1125]	Significant
LN_INV(-1)	-2.138532	[-8.03989]	Significant
OG(-1)	-0.228570	[-0.80235]	Not Significant
Short-Term			
D(INF(-1))	-0.017872	[-0.06679]	Not Significant
D(INF(-2))	-0.031747	[-0.09519]	Not Significant
D(INF(-3))	-0.059089	[-0.24781]	Not Significant
D(RSBI(-1))	-2.444310	[-1.24882]	Not Significant
D(RSBI(-2))	0.134462	[0.08756]	Not Significant
D(RSBI(-3))	-0.556320	[-0.50508]	Not Significant
D(RPUAB(-1))	0.105304	[0.11306]	Not Significant
D(RPUAB(-2))	-0.377266	[-0.43451]	Not Significant
tD(RPUAB(-3))	-1.045170	[-1.96728]	Significant
D(RDEP(-1))	1.966639	[0.72511]	Not Significant
D(RDEP(-2))	1.524179	[0.68538]	Not Significant
D(RDEP(-3))	-2.097763	[-0.92083]	Not Significant
D(RKRDT(-1))	-0.783862	[-0.28100]	Not Significant
D(RKRDT(-2))	3.223200	[-1.01605]	Not Significant
D(RKRDT(3))	2.009880	[0.62348]	Not Significant
D(LN_INV(-1))	2.048296	[0.85251]	Not Significant
D(LN_INV(-2))	0.737358	[0.44204]	Not Significant
D(LN_INV(-3))	0.470698	[0.31273]	Not Significant
D(OG(-1))	-0.109112	[-0.33617]	Not Significant
D(OG(-2))	0.094701	[0.51784]	Not Significant
D(OG(-3))	0.246612	[-0.62583]	Not Significant
R-squared	0.678262		
Adj. R-squared	0.285026		
F-statistic	1.724821		

Source: results of the researcher's data (2018)

The result of VECM estimation based on Table 1 showed that all variables in monetary policy transmission mechanism in the long term have a significant influence on inflation except for output gap variable while in the short term all the variables have no significant effect to inflation except variable of PUAB interest rate. The value of determination coefficient known R-square of 0.678262 with adjustment correction value of Adjustment R-square of 0.285026 indicates that the selected model is good enough because all variables are able to explain the inflation variable in the mechanism of the monetary policy transmission rate of the interest rate of 67.82%.

3.1. Impulse responses function (IRF) test

The Impulse Response Function (IRF) analysis of the Vector Error Correction Model (VECM) illustrates the response or impact of the endogenous variables to the shock of change by a standard deviation on all endogenous variables in the VECM system. According to Batubara and Saskara (2015: 51-52) IRF analysis is needed to find out how the effect of shock a variable on the variable itself and other variables within the IRF system so it can be known how long the influence shock of a variable against other variables and which variable will provide the greatest response to the shock on the interest rate channel in response to the inflation variable as the ultimate goal of monetary policy in Indonesia within the next 40 quarters.

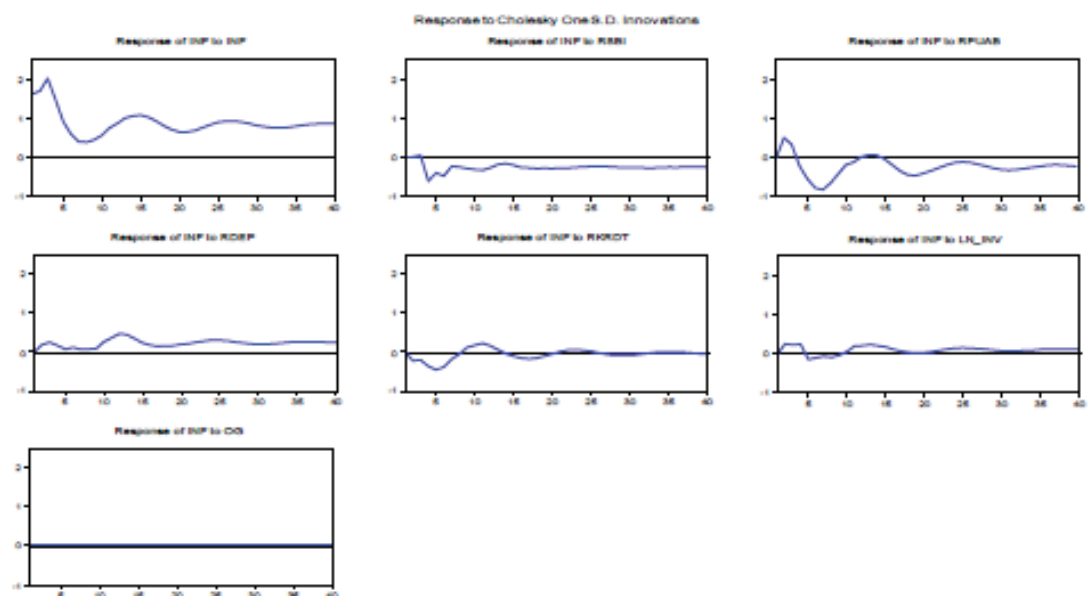


Figure 3: The Result of IRF Analysis of Interest Rate Channel Source: results of the researcher’s data (2018).

The Impulse Responses Function (IRF) Test Result in Figure 3 showed the impact of the inflation variable shock SBI rate, PUAB interest rate, deposit interest rate, loan

interest rate, investment, output gap on the inflation response. At the beginning of the quarter it was found that only shocks caused by inflation itself were able to respond by inflation of 1.6%, while shocks caused by other variables in the model began to respond by inflation in the second quarter as basically the monetary policy transmission mechanism required time lag to be able to influence the ultimate goal of monetary policy in the form of inflation.

On the interest rate, it is seen that the overnight interbank call money rate shocks responded strongly by 0.5% by inflation in the second quarter, whereas other variable shocks such as deposit rates responded by inflation in the second quarter of 0.2% and investment was also strongly responded by inflation in the second quarter by 0.3%. This suggests that the interbank call money market interest rate shocks can be responded by inflation shocks with the strongest and fastest response from other variables in the interest rate channel model.

3.2. Variance decomposition (VD) test

The variance decomposition test describes the relative importance of each variable in the VECM system because of the shock in which the variance decomposition of this device in the VECM model separates the variation of the number of variables estimated to be shocked components or to innovation variables with the assumption that innovation variables are not correlated (Widarjono, 2016: 342). According to Batubara and Saskara (2015: 53), the variance of decomposition provides an estimate of how much a variable contributes to the change of the variable itself and other variables in some future periods. Then which variables are expected to have the largest contribution of a particular variable in this study will be known through analysis of variance decomposition in the period of 40 quarters.

Based on Figure 4, the analysis of the variance decomposition of the interest rate indicates that the fluctuation of the inflation variable in the first quarter is influenced by the internal shock of 100%. In the first quarter, there was no effect of other economic variables other than the inflation variable itself. In the forecasting of the next quarter, the shock value of the inflation variable itself is further decreased and other variables such as SBI rates, interbank call money interest rates, deposit rates, lending rates, investment and output gap start entering and affecting inflation rate.

The analysis of variance decomposition on the interest rate indicates that the variant of interbank call money market interest rates as instrument variable in the interest rate channel responds strongly and gives a relative average of contribution which tend

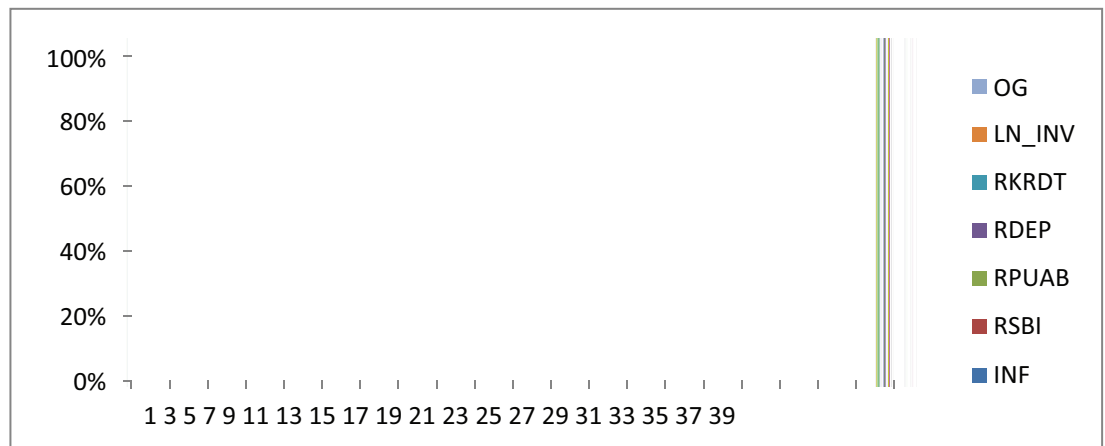


Figure 4: Results of VD Analysis of Interest Rate Channel Source: results of the researcher’s data (2018).

to increase over time. This is shown in the variable of interbank call money market interest rates from second quarter until the 40th quarter tends to increase from 3.47% to 9,81% where the value of variable of interbank call money market interest rates as instrument variable has the highest contribution value from other variant variables in the model so that it can be concluded that the transmission mechanism of monetary policy through the effective interest rate in influencing the final target of monetary policy in the form of inflation.

Based on the results of this analysis, it can be concluded that the transmission mechanism of monetary policy through the interest rate channel after the application of Inflation Targeting Framework (ITF) effective in influencing the final target of monetary policy in the form of inflation and from the test results conducted it can be stated that interest rates of interbank call money market is the right variable used as operational target on interest rate channel in monetary policy with single target of inflation in Indonesia compared to exchange rate variance in exchange rate.

The results of this study are in line with the results of previous studies, including research conducted by Natsir (2011) which states that monetary policy through the effective interest rate influences the ultimate goal of monetary policy in the form of inflation in Indonesia with interbank call money market interest rate effectively as an operational target. In addition, the results of this study are also in line with the results of research by Wulandari (2012), Hasibuan and Pratomo (2013) and Panjaitan (2017) stated that the effective interest rate channel in influencing aggregate demand through changes in variable rate shocks on interest rates of interbank call money market.

4. Conclusion

Based on the result of research that has been done by the writer about monetary policy transmission mechanism of interest rate channel in influencing inflation in Indonesia period 2005: Q3-2017: Q1 it can be concluded that VECM estimation result in interest rate channel through Impulse Responses Function test effectively realize the final target of monetary policy in Indonesia. The next analysis of Variance Decomposition (VD) showed that the variant of PUAB interest rate used as instrument variables in the interest rate channel responds strongly to inflation shocks and gives relatively average contribution which tend to increase over time. This indicates that the variant of interbank call money market interest rates is appropriately used as the operational target for the implementation of monetary policy transmission in influencing inflation in Indonesia.

References

- [1] *Act of The Republic of Indonesia Number 6 of 2009 Concerning Bank Indonesia.*
- [2] Baisth, Ahmad. (2007). Analisis Mekanisme Transmisi Kebijakan Moneter Melalui Jalur Suku Bunga dan Nilai Tukar. *Tesis*. Bogor: Institut Pertanian Bogor.
- [3] Bank Indonesia. (2018a). Data Inflasi. Bank Indonesia: <https://www.bi.go.id/id/moneter/inflasi/bi-dan-inflasi/Contents/Penetapan.aspx>. (Accessed on February 20 2018).
- [4] _____. (2018b). Penetapan Target Inflasi. Bank Indonesia: <https://www.bi.go.id/id/moneter/inflasi/data/Default.aspx> (Accessed on January 10 2018).
- [5] _____. (2018c). Statistik Sistem Keuangan Indonesia. Bank Indonesia: <https://www.bi.go.id/id/statistik/sski/default.aspx>. (Accessed on February 25 2018).
- [6] _____. (2018d). Transmisi Kebijakan Moneter. Bank Indonesia: <https://www.bi.go.id/id/moneter/transmisi-kebijakan/Contents/Default.aspx>. <https://www.bi.go.id/id/moneter/inflasi/data/Default.aspx> (Accessed on January 10 2018).
- [7] Batubara, Dison M.H and I.A Nyoman Saskara. (2015). Analisis Hubungan Ekspor, Impor, PDB, dan Utang Luar Negeri Indonesia Periode 1970-2013. *Jurnal Ekonomi Kuantitatif Terapan*. Vol 8, No. 1, pp 46-55.
- [8] Hasibuan, Saida and Wahyu Ario Pratomo. 2013. Mekanisme Transmisi Kebijakan Moneter melalui suku bunga SBI sebagai Sasaran Operasional Kebijakan Moneter dan Variabel Makroekonomi. *Jurnal Ekonomi dan Keuangan*. Vol 1, No.12, pp 27-40. Medan:Universitas Sumatera Utara.

- [9] Kadir, Abdul M, Priyo R. Widodo and Guruh Suryani R. (2008). *Penerapan Kebijakan Moneter dalam Kerangka Inflation Targeting di Indonesia. Buku Seri Kebanksentralan No 21*. Jakarta: Pusat Pendidikan dan Studi Kebanksentralan (PPSK). Bank Indonesia.
- [10] Mankiw, N.Gregory (Ed). (2006). *Makroekonomi*. Jakarta: Erlangga.
- [11] Natsir, M. (2011). Analisis Empiris Efektivitas Mekanisme Transmisi Kebijakan Moneter di Indonesia melalui Jalur Suku Bunga (Interest Rate Channel Periode 1990:2-2007:1). *Majalah Ekonomi*. Kendari: Universitas Haluoleo.
- [12] Panjaitan, Mangsa. 2017. Studi Efektivitas Mekanisme Transmisi Kebijakan Moneter di Indonesia. *Jurnal Ilmiah Maksitek*. Vol. 2, No. 2, pp 187-202. Universitas Methodiest Indonesia.
- [13] Rahardjo, Mugi. (2009). *Ekonomi Moneter*. Surakarta: Lembaga Pengembangan Pendidikan (LPP) UNS dan UPT Penerbitan dan Pencetakan UNS (UNS Press).
- [14] Setiawan, Rifky Yudi dan Karsinah (2016). Mekanisme Transmisi Kebijakan Moneter dalam Mempengaruhi Inflasi dan Pertumbuhan Ekonomi di Indonesia. *Economics Development Analysis Journal*. Vol 5, No. 4, pp 460-474. Semarang: Universitas Negeri Semarang.
- [15] Suseno dan Siti Aisyah. (2009). *Inflasi. Buku Seri Kebanksentralan No.22*. Jakarta: Pusat Pendidikan dan Studi Kebanksentralan (PPSK) Bank Indonesia.
- [16] Warjiyo, Perry. (2004). *Mekanisme Transmisi Kebijakan Moneter Di Indonesia. Buku Seri Kebanksentralan No.11*. Jakarta: Pusat Pendidikan dan Studi Kebanksentralan (PPSK) Bank Indonesia.
- [17] Wulandari, Ries. (2012). Do Credit Channel and Interest Rate Channel Play Important Role in Monetary Transmission Mechanism in Indonesia?: A Structural Vector Autoregression Model. *Procedia-Social and Behavioral Sciences*. Vol 65, pp 557-563. Bogor: Universitas Juanda.
- [18] Yusuf, Mohamad. (2014). Analisis Efektivitas Jalur-Jalur Transmisi Kebijakan Moneter dengan Sasaran Tunggal Inflasi di Indonesia. *Thesis*. Surabaya: Universitas Brawijaya.