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In Search of Effective Monetary Policy in Indonesia: Inflation Targeting or Multiple Objectives?

SALSA DILLA*, NOER AZAM ACHSANI AND LUKYTAWATI ANGGRAENI

Department of Economics, Faculty of Economics and Management, Bogor Agricultural University, Indonesia

ABSTRACT

In the last 10 years, many countries that previously adopted multiple targets started to change their monetary policy to a single target—that is, an inflation targeting framework (ITF), due to the urgency of controlling price level. Indonesia formally adopted ITF as its new monetary framework in 2005. So far, there is no clear conclusion as to whether or not the ITF framework is functioning well. This paper compares the effectiveness of the two policies—the inflation targeting framework (ITF) and multiple objectives using two different monetary policy instruments; that is, money market rate (MMR) and base money (M0). We employ a Structural Vector Autoregressive (SVAR) model for Indonesian data from 2005-2012. The results show that the ITF is better than multiple objectives. Thus, the Bank Indonesia policy to implement ITF should be the right choice. However, our further analysis showed that the ITF using monetary aggregates (M0) as a policy instrument is the most suitable monetary policy framework. Therefore, we suggest that the Indonesian Central Bank should re-evaluate its current policy, which is ITF using money market rate (MMR) as a policy instrument.

JEL Code: E31, E42, E52, E58.

Keywords: inflation targeting, multiple objectives, monetary policy instrument, SVAR.

*Corresponding Author: E-mail: salsa.dilla@yahoo.com
Any remaining errors or omissions rest solely with the author(s) of this paper.

INTRODUCTION

Monetary policy is one of the most important aspects in macroeconomics. According to Fatas, Minhov and Rose (2004), central banks have to use three types of quantitative monetary targets: exchange rates, money growth rates and inflation targets. Fry (2000) argued that a debate remains about the appropriate objectives of monetary policy. On the one hand, a few central banks advocate that monetary policy can and should be targeted at employment and economic growth in addition to price stability (multiple objectives). On the other hand, the more commonly held view is that monetary policy should be directed solely at price stability (inflation targeting).

Studies concerning the difference between multiple objectives and inflation targeting have been conducted for several years. Mishra and Mishra (2010) found that the implementation of multiple objectives in India created conflict between exchange rate stabilization and inflation stabilization. Hargreaves (2002) argued that is it not possible for monetary policy to successfully achieve multiple targets because none of the targets will be successfully achieved. According to Pohan (2008), it is difficult to focus monetary policy in Indonesia on reaching the final target in the multiple objectives approach because there will be a trade-off among the targets.

In order to maintain price stability, many countries currently apply the so-called Inflation Targeting Framework (ITF) for their monetary policy. Based on Vasilescu and Mungiu-Pupâzan (2010), inflation targeting represents a strategy of monetary policy that requires the central bank to establish a target for the inflation rate and to achieve it using monetary instruments, so that price stability is obtained. Batini and Laxton (2006) stated that ITF is founded on a clear commitment to a quantitative inflation target as the primary objective of monetary policy, with a high degree of transparency and accountability in the formulation and implementation of policy.

Studies concerning the implementation of ITF have been conducted both in developed countries and developing countries. Svensson (1998) argues that inflation targeting indicates a stronger commitment to a systematic and optimizing monetary policy than other monetary policy regimes. Creel (2008) empirically found that the implementation of ITF brings some positive effects in developed countries like Canada, UK and Sweden. On the other hand, Roger (2009) found that ITF is more effectively implemented in high-income groups than in low-income groups. According to Mishra and Mishra (2010), Francia and Garcia (2005), Torres and Saridakis (2007), Razmi, Mohamed, Chin and Habibullah (2015) and Yogi (2008), the implementation of ITF in emerging countries like India, Mexico, Thailand and Indonesia shows an identical monetary phenomenon where exchange rates still play an important role in determining inflation rate. Consequently, the central banks tend to control exchange rate (*exchange rate targeting*) rather than inflation rate (*inflation targeting*), which is commonly known as *fear of floating*.

This paper is devoted to studying this issue in Indonesia, one of the most dynamic emerging markets in the world. Indonesia has been growing steady in the last few years. It is now the fourth largest economy in East Asia after China, Japan and South Korea and the 15th largest economy in the world on a purchasing power parity (PPP) basis.[1] Joining G-20, Indonesia is

[1]Taken from the paper "The Growth and Development of the Indonesian Economy" by Stephen Elias and Clare Noone (2011).

considered one of the most promising countries in the world. For these reasons, Indonesia's economic issues, including the monetary policy condition, are interesting to discuss.

Indonesia started to adopt the Inflation Targeting Framework (ITF) in July 2005 as its new monetary policy. In the first 3 years of inflation targeting regimes, in which base money was used as the monetary policy instrument, the performance was not satisfying, and some aspects such as government policy and exchange rate volatility also affected the inflation rate. Based on some empirical evidence provided by Bank Indonesia, inflation targeting would be more effective if only interest rate is used as the monetary policy instrument (rather than base money). Interest rate is considered more effective in signaling monetary policy through the money market. In reality, however, the monetary policy instrument transformation into interest rate did not result in any changes affecting the performance of the inflation targeting framework in Indonesia.

Keeping this development in mind, it is interesting to assess which monetary policy is suitable for implementation in Indonesia. The main purpose of this paper is to determine which policy could make an efficient transmission in Indonesia's monetary policy. This paper will be devoted to comparing the two policies (multiple objectives and ITF) with two different monetary policy instruments (i.e., money market rate (MMR) and base money (M0)). The results of this paper will have implications for macro and monetary economists, specifically policy makers in Indonesia (Bank Indonesia).

The rest of the paper will be organized as follows. Section 2 will explain the data and research methodology, followed by estimation results in section 3. A summary of the results, policy implications and suggestions for future research will be provided in section 4.

RESEARCH METHODOLOGY

This research is carried out using secondary monthly data from Indonesia covering the period from 2005 January to 2012 December.[2] The data have been collected from the CEIC, International Financial Statistic (IFS), The Federal Reserve Bank of New York, Energy Information Administration and Bank Indonesia. The calculation process was done using the statistical package Eviews 6.

Eight variables are chosen to explain the model and to identify the monetary policy shocks; these consist of two foreign variables and six domestic variables. The foreign variables included in the model are oil price (West Texas Intermediate) and the federal funds rate (proxy for the international interest rate). The domestic variables included in the model are three non-policy variables and three policy variables. The non-policy variables are inflation (measured by a rate of change in the Consumer Price Index (CPI)), output (measured by industrial production index (IPI)) and exchange rate (as measured by real effective exchange rate (REER)). Policy variables are base money (M0) and money market rate (MMR), which are used as monetary policy instrument (MPI), gross bank credit (GBC) and broad money aggregate (M2).

[2]This period is chosen to see the progress of inflation targeting performance in Indonesia, since the inflation target was set in 2000 but ITF was formally legitimated from July 2005.

Based on the non stationarity test, the data are stationary in the first difference. Because the data in a VAR analysis must be stationer in the level this research uses VAR first difference, which will continue with Structural VAR analysis. The appropriate lag length for the estimated VAR has been decided on the basic of Akaike's Information Criterion (AIC). The number of lag included in the VAR model is one.

In this paper, we adopt the model of Mishra and Mishra (2010) to identify the impact of monetary policy instrument shocks in the multiple objectives scenario is presented in Equation (1):

$$\begin{vmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{21} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{31} & b_{32} & 1 & 0 & 0 & 0 & 0 & 0 \\ b_{41} & b_{42} & b_{43} & 1 & 0 & 0 & 0 & 0 \\ b_{51} & b_{52} & b_{53} & b_{54} & 1 & 0 & 0 & 0 \\ b_{61} & b_{62} & b_{63} & b_{64} & b_{65} & 1 & 0 & 0 \\ b_{71} & b_{72} & b_{73} & b_{74} & b_{75} & b_{76} & 1 & 0 \\ b_{81} & b_{82} & b_{83} & b_{84} & b_{85} & b_{86} & b_{86} & 1 \end{vmatrix} \begin{vmatrix} e^{oil} \\ e^{ffr} \\ e^{inf} \\ e^{y} \\ e^{reer} \\ e^{mpi} \\ e^{gbc} \\ e^{gbc} \end{vmatrix} = m_{ij} \begin{vmatrix} \varepsilon^{oil} \\ \varepsilon^{ffr} \\ \varepsilon^{inf} \\ \varepsilon^{y} \\ \varepsilon^{reer} \\ \varepsilon^{mpi} \\ \varepsilon^{gbc} \\ \varepsilon^{gbc} \end{vmatrix}$$

B e m ε

The restricted Structural Vector Autoregressive (SVAR) model used to identify the impact of monetary policy instrument shocks in the inflation targeting scenario is presented in Equation (2):

$$\begin{vmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{21} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{31} & b_{32} & 1 & 0 & 0 & 0 & 0 & 0 \\ b_{41} & b_{42} & b_{43} & 1 & 0 & 0 & 0 & 0 \\ b_{51} & b_{52} & b_{53} & b_{54} & 1 & 0 & 0 & 0 \\ b_{61} & b_{62} & b_{63} & 0 & 0 & 1 & 0 & 0 \\ b_{71} & b_{72} & b_{73} & b_{74} & b_{75} & b_{76} & 1 & 0 \\ b_{81} & b_{82} & b_{83} & b_{84} & b_{85} & b_{86} & b_{86} & 1 \end{vmatrix} \begin{vmatrix} e^{oil} \\ e^{ffr} \\ e^{inf} \\ e^{y} \\ e^{reer} \\ e^{mpi} \\ e^{gbc} \\ e^{gbc} \end{vmatrix} = m_{ij} \begin{vmatrix} \varepsilon^{oil} \\ \varepsilon^{ffr} \\ \varepsilon^{inf} \\ \varepsilon^{y} \\ \varepsilon^{reer} \\ \varepsilon^{mpi} \\ \varepsilon^{gbc} \\ \varepsilon^{gbc} \end{vmatrix}$$

B e m ε

where :

b_{ij} = element of B,

e^{j} = *error term* from the orthogonal shocks (j= oil price (OIL), fed funds rate (FFR), inflation (INF), output (Y), exchange rates (REER), *monetary policy instrument* (MPI): *base money* (M0) or money market rate (MMR), gross bank credit (GBC) and *broad money* (M2)),

m_{ij} = *cholesky restrictions*,

ε^{j} = orthogonal vector shocks.

The difference between the multiple indicator scenario and inflation targeting scenario is in the monetary policy instrument equation. In the multiple indicator scenario, the monetary policy instrument has been set after looking at the current value of inflation, output and exchange rates, while in the inflation targeting scenario only inflation is allowed to enter the monetary policy reaction function, as represented by the monetary policy instrument equation.

The SVAR model specification for the multiple objectives scenario with base money (M0) and money market rate (MMR) as monetary policy instrument is:

$$m_t = \sum_{i=1}^{1} \Gamma_i OIL_{t-1} + \sum_{i=1}^{1} \Gamma_i FFR_{t-1} + \sum_{i=1}^{1} \Gamma_i INF_{t-1} + \sum_{i=1}^{1} \Gamma_i Y_{t-1} + \sum_{i=1}^{1} \Gamma_i \mathrm{REER}_{t-1} + \sum_{i=1}^{1} \Gamma_i \mathrm{GM0}_{t-1}$$
$$+ \sum_{i=1}^{1} \Gamma_i GBC_{t-1} + \sum_{i=1}^{1} \Gamma_i GM2_{t-1} + \varepsilon_t$$

$$m_t = \sum_{i=1}^{l} \Gamma_i OIL_{t-1} + \sum_{i=1}^{l} \Gamma_i FFR_{t-1} + \sum_{i=1}^{l} \Gamma_i INF_{t-1} + \sum_{i=1}^{l} \Gamma_i Y_{t-1} + \sum_{i=1}^{l} \Gamma_i REER_{t-1} + \sum_{i=1}^{l} \Gamma_i MMR_{t-1}$$
$$+ \sum_{i=1}^{l} \Gamma_i GBC_{t-1} + \sum_{i=1}^{l} \Gamma_i GM2_{t-1} + \varepsilon_t$$

The SVAR model specification for the inflation targeting scenario with base money (M0) and money market rate (MMR) as monetary policy instrument is:

$$m_t = \sum_{i=1}^{l} \Gamma_i OIL_{t-1} + \sum_{i=1}^{l} \Gamma_i FFR_{t-1} + \sum_{i=1}^{l} \Gamma_i INF_{t-1} + \sum_{i=1}^{l} \Gamma_i GM0_{t-1} + \sum_{i=1}^{l} \Gamma_i GBC_{t-1} + \sum_{i=1}^{l} \Gamma_i GM2_{t-1} + \varepsilon_t$$

$$m_t = \sum_{i=1}^{l} \Gamma_i OIL_{t-1} + \sum_{i=1}^{l} \Gamma_i FFR_{t-1} + \sum_{i=1}^{l} \Gamma_i INF_{t-1} + \sum_{i=1}^{l} \Gamma_i MMR_{t-1} + \sum_{i=1}^{l} \Gamma_i GBC_{t-1} + \sum_{i=1}^{l} \Gamma_i GM2_{t-1} + \varepsilon_t$$

where:

Γ = parameter in matriks polinomial (*finite order matrix*) with *lag*-i

m_t = variable analysis, including: oil price (OIL), federal funds rate (FFR), inflation (INF), output (Y), exchange rates (REER), base money (GM0) or money market rate (MMR), gross bank credit (GBC) dan broad money (GM2).

COMPARISON BETWEEN THE PERFORMANCE OF MULTIPLE OBJECTIVES AND INFLATION TARGETING IN INDONESIA

Comparison between the performance of multiple objectives and inflation targeting in Indonesia can be seen from the SVAR estimation [3] which presented in Table 1.

Table1 SVAR Estimation: Monetary Policy Instrument's Shock

	(1)	(2)	(3)	(4)
OIL	-0.018581	-0.008941	1.408452	1.438907
FFR	0.124556***	0.129385***	-0.651131	-0.595803
INF	1.520972**	2.054486***	16.40385	13.87553
Y	-0.169709	0	2.848590	0
REER	0.410001	0	-0.548978	0
M0	0.044929***	0.046076***	-	-
MMR	-	-	0.772703***	0.782226***
GBC	0	0	0	0
M2	0	0	0	0

Notes:

1. (1): Monetary Policy Instrument Equation for Multiple Objectives Scenario: M0 as MPI
   (2): Monetary Policy Instrument Equation for Inflation Targeting Scenario: M0 as MPI
   (3): Monetary Policy Instrument Equation for Multiple Objectives Scenario: MMR as MPI
   (4): Monetary Policy Instrument Equation for Inflation Targeting Scenario: MMR as MPI
2. *** = significant in 1%; ** = significant in 5%; * = significant in 10%

The estimation results show that the performance of inflation targeting, whether base money (M0) or money market rate (MMR) is used as the monetary policy instrument, is more responsive in terms of the changes of macroeconomic variables than in the case of multiple objectives. This fact is supported by the coefficient in the monetary policy instrument equation, which is higher on the inflation targeting compared to multiple objectives. The results indicate a higher or sharper monetary policy response in the inflation targeting scenario. Bank Indonesia has greater autonomy and freedom to respond to the shocks to reach the inflation target. One of the pre-conditions that must be met before implementing inflation targeting is the independence in deciding which monetary policy instrument will be used by Bank Indonesia. The transformation from multiple targets to a single target also became one of the reasons why Bank Indonesia is more focused on reaching the final target. In conclusion, it can be inferred that inflation targeting is a better choice for implementation in Indonesia rather than multiple objectives. This finding is in line with Mishra and Mishra (2010), Hargreaves (2002) and Pohan (2008), who all agreed that the implementation of multiple objectives will cause a trade-off among the targets.

[3]The SVAR estimation results for each model i.e. inflation targeting framework (ITF) and multiple objectives using two different monetary policy instruments, i.e. money market rate (MMR) and base money (M0) are presented in Appendix 1-4.

The next analysis would be simplified by comparing the performance of inflation targeting with base money (M0) as the monetary policy instrument and the performance of inflation targeting with money market rate (MMR) as the monetary policy instrument. From the estimation, we can infer that inflation is significantly influenced by base money (M0) but is not significantly influenced by money market rate (MMR). Surprisingly, inflation is not influenced by the money market rate variable, which represents the monetary policy instrument in Indonesia. If the money market rate (MMR) as the monetary policy instrument cannot affect the final target (inflation target), then this means that there was not yet an efficient monetary policy transmission in the ITF implementation in Indonesia. Moreover, we can conclude that the inflation targeting scenario with base money (M0) as the monetary policy instrument is the most relevant policy to be implemented in Indonesia.

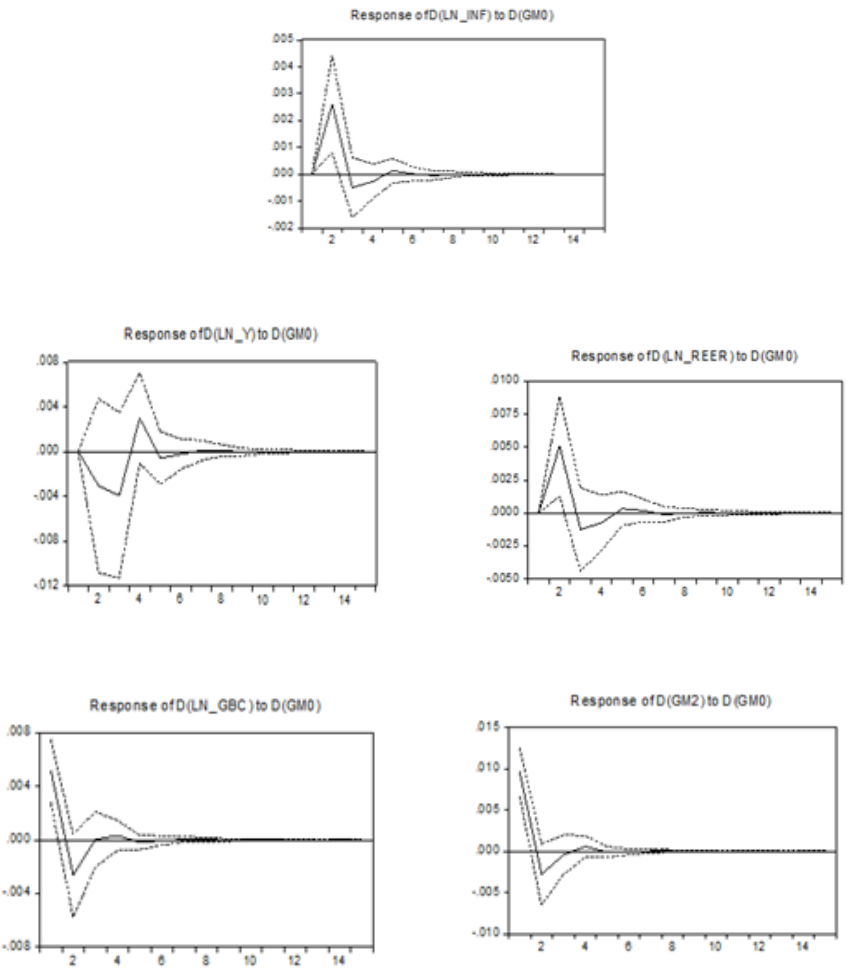
Based on Stone (2003), many emerging market countries are using an inflation target to define their monetary policy framework but are not able to maintain the inflation target as the main policy objective. Indonesia was categorized as "*inflation targeting lite*", where the Central Bank has relatively low credibility, a weak institutional framework and high vulnerability to economic shocks and financial instability. According to Achsani and Putri (2009), Indonesia experienced *incomplete pass-through* on the interest rate, as the money market rate was not transmitted completely to the real sector. Indonesia had the slowest speed of adjustment among the other ASEAN+3 countries in term of the official interest rate towards deposit rates and lending rates. Gigineishvili (2011) argued that developed countries have a stronger *pass-through* in term of the more stable financial structure, where interest rate is considered as a better signal for monetary transmission. On the other hand, for developing countries like Indonesia, the *pass-through* coefficients are mostly weak. Thus, monetary policy that depends on the *interest rate pass-through*, like the inflation targeting framework, cannot be optimal for implementation in a country that has a weak pass-through.

Impulse Responses Function (IRF) and Forecast Error Variance Decomposition (FEVD) are used for the next analysis. IRF is used to explain the response of base money (M0) shocks and money market rate (MMR) shocks towards the macroeconomic variables in the inflation targeting scenario, while FEVD is used to see the determinants of macroeconomic variables towards inflation, output and exchange rate variability in the inflation targeting scenario with both monetary policy instruments.

In general, IRF estimation results show that the inflation variable gives the highest response to the base money (M0) shocks compared to money market (MMR) shocks. Similarly, the output and exchange rates variables respond to base money (M0) shocks over a longer period than money market shocks (MMR). On the other hand, the exchange rate variable gives the highest response to money market (MMR) shocks. The importance of exchange rates indicates that Bank Indonesia still has to be focused on controlling exchange rates to reach price stability.

According to Roger and Stone (2005) inflation targeting is founded on a clear commitment to a quantitative inflation target as the primary objectives of monetary policy. Moreover, Bernanke and Mishkin (1997) argued the inflation targeting strategy in most cases significantly reduces the role of formal intermediate targets, such as exchange rate. By adopting ITF,

exchange rate should not be made the main objective to focus on rather than the inflation rate itself. Mishra and Mishra (2010), Francia and Garcia (2005) and Torres and Saridakis (2007) all agree that the implementation of ITF in developing countries, including Indonesia, shows an identical monetary phenomenon —the so-called *fear of floating* — where the Central Banks tend to control the exchange rate rather than the inflation rate.

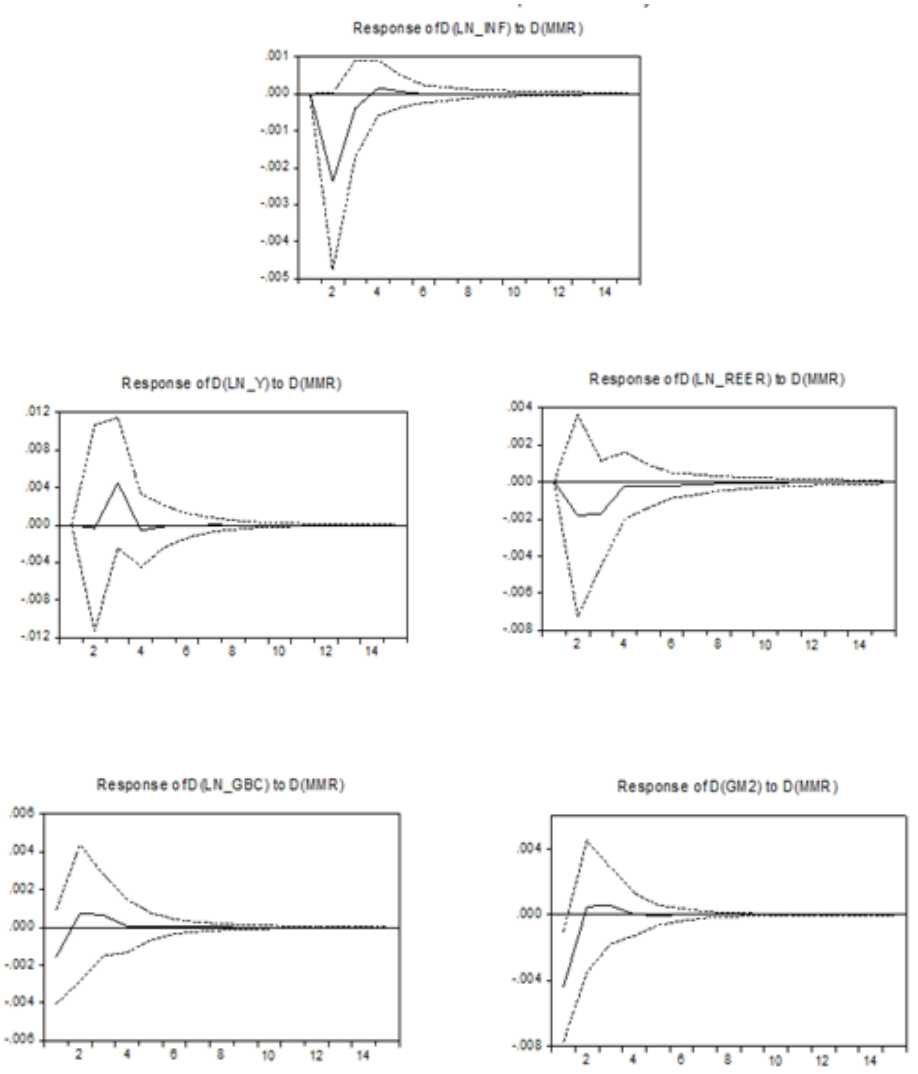


Source: data processed with Eviews 6

Figure 1 The Dynamic Response of Macroeconomic Variables Towards Base Money Shocks in the Inflation Targeting Scenario

The IRF result for both scenarios shows that one-standard-deviation shocks in the monetary policy instrument will be responded to by gross bank credit and broad money variables in the first month and by the other variables in the second month. After that, a shock in base money will be responded to by the inflation variable until the 24th month and will start to converge at the 25th month, while a shock in money market rate will be respond to by the inflation variable

until the 7th month and start to converge at the 8th month. The IRF result for the inflation targeting scenarios with base money (M0) and money market rate (MMR) as monetary policy instrument are presented in Figure 1 and Figure 2, respectively.



Source: data processed with Eviews 6

Figure 2. The Dynamic Response of Macroeconomic Variables Towards Money Market Rate Shocks in the Inflation Targeting Scenario

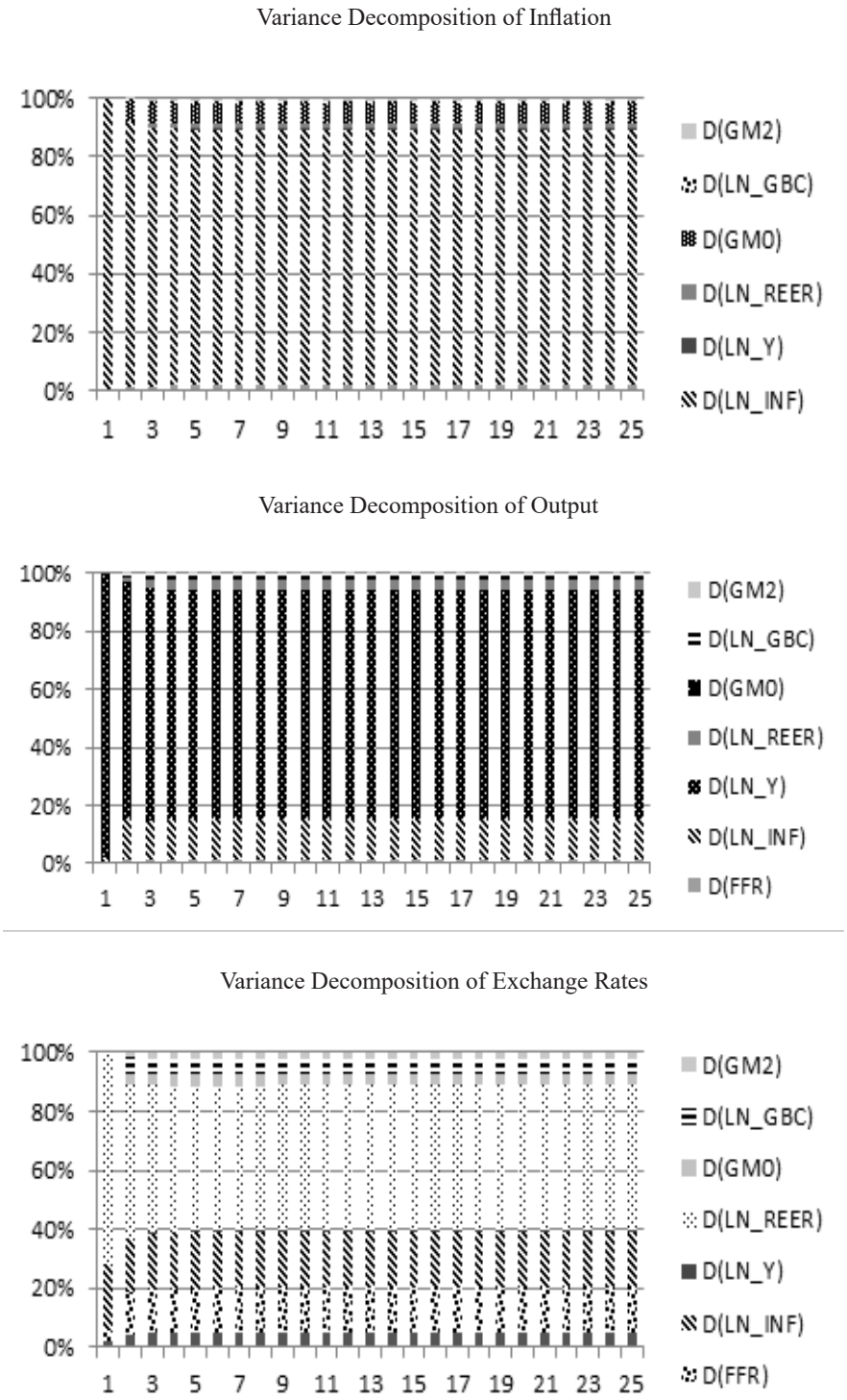


Figure 3 Forecast Error Variance Decomposition for Inflation Targeting with Base Money as Monetary Policy Instrument

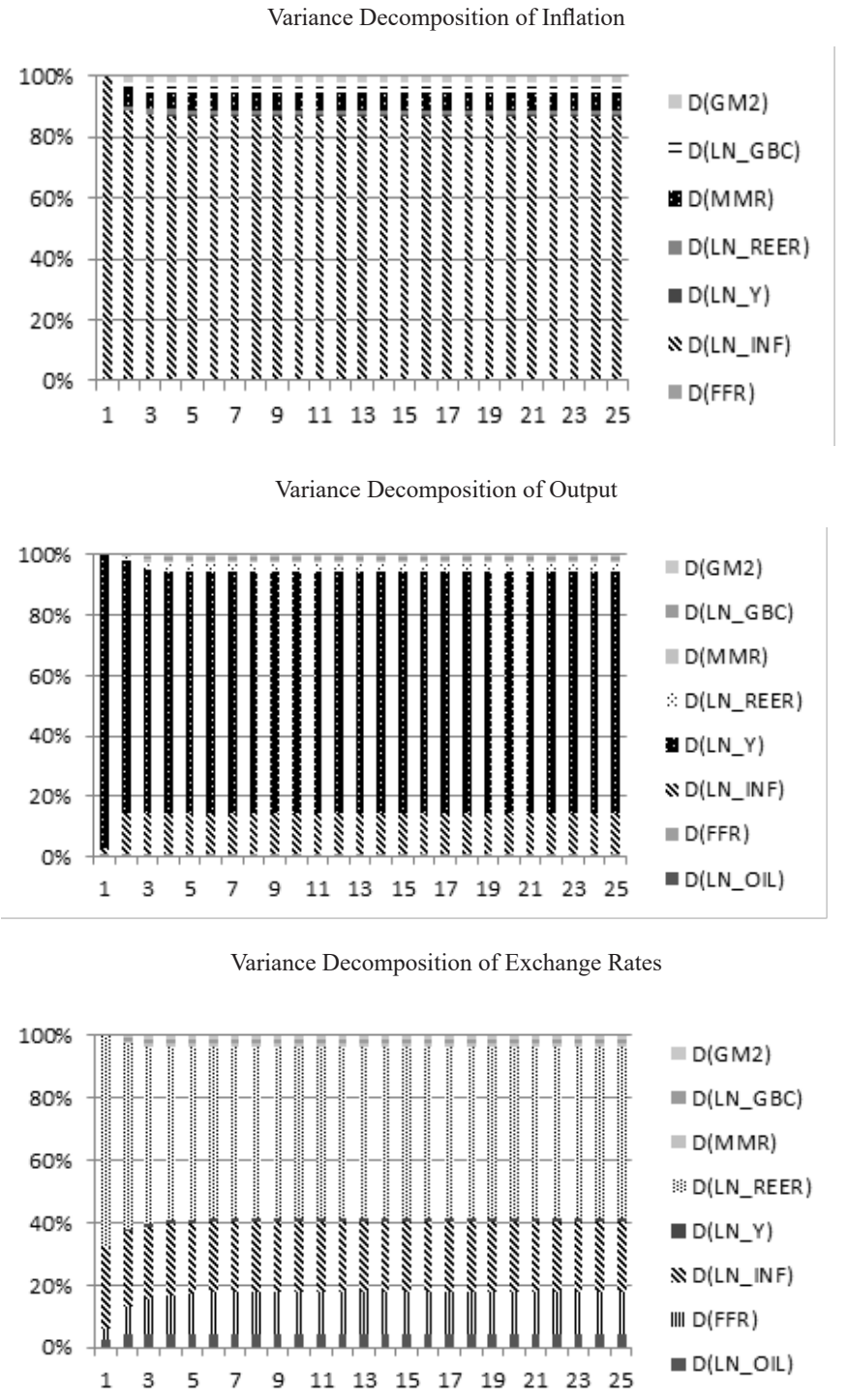


Figure 4 Forecast Error Variance Decomposition for Inflation Targeting with Money Market Rate as Monetary Policy Instrument

The FEVD estimation results in general show that, in the inflation targeting scenario, base money (M0) plays an important role in explaining the movements of inflation, after the inflation variable itself, where it gives a greater portion on explaining the inflation variability rather than money market rate (MMR). In spite of that, money market rate (MMR) made an important contribution to explaining the variability of output. On the other hand, inflation also plays an important role in explaining the movements of exchange rates for ITF with both base money and money market rate as the monetary policy instrument. These findings strengthen the fact that base money (M0) is a better monetary policy instrument in controlling the inflation rate. For further information, the FEVD estimation result is presented in Figure 3 and 4.

CONCLUSION

The inflation targeting scenario has proven to be well implemented in Indonesia in comparison to the multiple objectives scenario. Inflation is significantly influenced by base money (M0) but is not significantly influenced by money market rate (MMR). These findings show that the inflation targeting framework with money market rate (MMR) as monetary policy instrument, which is still implemented today, has not been successful enough to create an efficient monetary policy transmission in reaching the final target.

Based on the SVAR estimation results, the inflation targeting scenario using base money (M0) as the monetary policy instrument is preferable to be implemented than the current inflation targeting framework. This means that Bank Indonesia has to be more concerned with controlling the quantity of base money rather than controlling the money market rate to improve the effectiveness of monetary policy transmission.

Modifying Bank Indonesia's consistency in implementing the framework is also needed to improve the performance of inflation targeting. In line with the exchange rate policy in particular, emerging countries like Indonesia formally adopted a floating exchange rate, but in reality most of them will not allow the exchange rates to freely move; in other words, they implement an exchange rate targeting rather than an inflation targeting.

The next interesting area for future research would be to widen the scope of study by doing a comparison analysis in ASEAN+6 about the effectiveness of the inflation targeting performance in each country, as well as a comparison between the ITF countries and non-ITF countries.

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Appendix 1 Estimated Structural Contemporaneous Coefficients in Multiple Objectives with Base Money as MPI

	OIL	FFR	INF	Y	REER	M0	GBC	M2
OIL	0.086256***	0	0	0	0	0	0	0
	(0.006502)							
	[13.26650]							
	0.0000							
FFR	0.311855*	0.137728***	0	0	0	0	0	0
	(0.170212)	(0.010382)						
	[1.832154]	[13.26650]						
	0.0669	0.0000						
INF	-0.004148	0.005080	0.009175***	0	0	0	0	0
	(0.011553)	(0.007101)	(0.000692)					
	[-0.359043]	[0.715405]	[13.26650]					
	0.7196	0.4744	0.0000					
Y	0.022825	0.026571	-0.489118	0.042193***	0	0	0	0
	(0.053169)	(0.032752)	(0.490222)	(0.003180)				
	[0.429286]	[0.811291]	[-0.997749]	[13.26650]				
	0.6677	0.4172	0.3184	0.0000				
REER	0.032875	0.022675	1.100643***	0.003785	0.017940***	0	0	0
	(0.022631)	(0.013978)	(0.209616)	(0.045326)	(0.001352)			
	[1.452664]	[1.622198]	[5.250763]	[0.083507]	[13.26650]			
	0.1463	0.1048	0.0000	0.9334	0.0000			
M0	-0.018581	0.124556***	1.520972**	-0.169709	0.410001	0.044929***	0	0
	(0.057351)	(0.035525)	(0.601587)	(0.113516)	(0.266963)	(0.003387)		
	[-0.323993]	[3.506149]	[2.528268]	[-1.495026]	[1.535800]	[13.26650]		
	0.7459	0.0005	0.0115	0.1349	0.1246	0.0000		

Appendix 1 (Cont.)

GBC	-0.004098	-0.026754***	0.111495	0.046931*	-0.233928***	0.114169***	0.010787***	0
	(0.013777)	(0.009105)	(0.149588)	(0.027598)	(0.064948)	(0.025594)	(0.000813)	
	[-0.297477]	[-2.938226]	[0.745346]	[1.700548]	[-3.601781]	[4.460852]	[13.26650]	
	0.7661	0.0033	0.4561	0.0890	0.0003	0.0000	0.0000	
M2	-0.008168	-0.011624	-0.096378	-0.003464	-0.081987	0.146831***	0.584498***	0.010126***
	(0.012940)	(0.008957)	(0.140872)	(0.026330)	(0.065312)	(0.026605)	(0.100074)	(0.000763)
	[-0.631234]	[-1.297653]	[-0.684149]	[-0.131552]	[-1.255324]	[5.518940]	[5.840653]	[13.26650]
	0.5279	0.1944	0.4939	0.8953	0.2094	0.0000	0.0000	0.0000

Note: ( ) standard errors; [ ] z-statistics

*** = significant in 1%; ** = significant in 5%; * = significant in 10%

Appendix 2 Estimated Structural Contemporaneous Coefficients in Inflation Targeting with Base Money as MPI

	OIL	FFR	INF	Y	REER	M0	GBC	M2
OIL	0.086256***	0	0	0	0	0	0	0
	(0.006502)							
	[13.26650]							
	0.0000							
FFR	0.311855*	0.137728***	0	0	0	0	0	0
	(0.170212)	(0.010382)						
	[1.832154]	[13.26650]						
	0.0669	0.0000						
INF	-0.004148	0.005080	0.009175***	0	0	0	0	0
	(0.011553)	(0.007101)	(0.000692)					
	[-0.359043]	[0.715405]	[13.26650]					
	0.7196	0.4744	0.0000					
Y	0.022825	0.026571	-0.489118	0.042193***	0	0	0	0
	(0.053169)	(0.032752)	(0.490222)	(0.003180)				
	[0.429286]	[0.811291]	[-0.997749]	[13.26650]				
	0.6677	0.4172	0.3184	0.0000				
REER	0.032875	0.022675	1.100643***	0.003785	0.017940***	0	0	0
	(0.022631)	(0.013978)	(0.209616)	(0.045326)	(0.001352)			
	[1.452664]	[1.622198]	[5.250763]	[0.083507]	[13.26650]			
	0.1463	0.1048	0.0000	0.9334	0.0000			
M0	-0.008941	0.129385***	2.054486***	0	0	0.046076***	0	0
	(0.058062)	(0.035766)	(0.535338)			(0.003473)		
	[-0.153983]	[3.617515]	[3.837739]			[13.26650]		
	0.8776	0.0003	0.0001			0.0000		

Appendix 2 (Cont.)

GBC	-0.004098	-0.026754***	0.111494*	0.046931*	-0.233928***	0.114169***	0.010787***	0
	(0.013771)	(0.009120)	(0.153265)	(0.027254)	(0.064095)	(0.024956)	(0.000813)	
	[0.297616]	[-2.933567]	[0.727462]	[1.722005]	[-3.649728]	[4.574808]	[13.26650]	
	0.7660	0.0034	0.4669	0.0851	0.0003	0.0000	0.0000	
M2	-0.008168	-0.011624	-0.096378	-0.003464	-0.081987	0.146831***	0.584498***	0.010126***
	(0.012934)	(0.008970)	(0.144313)	(0.026013)	(0.064564)	(0.026066)	(0.100074)	(0.000763)
	[-0.631528]	[-1.295777]	[-0.667835]	[-0.133159]	[-1.269852]	[5.633103]	[5.840653]	[13.26650]
	0.5277	0.1951	0.5042	0.8941	0.2041	0.0000	0.0000	0.0000

Note: ( ) standard errors; [ ] z-statistics

*** = significant in 1%; ** = significant in 5%; * = significant in 10%

Appendix 3 Estimated Structural Contemporaneous Coefficients in Multiple Objectives with Money Market Rate as MPI

	OIL	FFR	INF	Y	REER	MMR	GBC	M2
OIL	0.086432***	0	0	0	0	0	0	0
	(0.006515)							
	[13.26650]							
	0.0000							
FFR	0.307678*	0.136505***	0	0	0	0	0	0
	(0.168358)	(0.010289)						
	[0.0676]	[13.26650]						
	0.0669	0.0000						
INF	-0.002830	0.003824	0.009220***	0	0	0	0	0
	(0.011586)	(0.007200)	(0.000695)					
	[-0.244287]	[0.531019]	[13.26650]					
	0.8070	0.5954	0.0000					
Y	0.018391	0.024304	-0.634929	0.042426***	0	0	0	0
	(0.053328)	(0.033185)	(0.490509)	(0.003198)				
	[0.344865]	[0.732386]	[-1.294429]	[13.26650]				
	0.7302	0.4639	0.1955	0.0000				
REER	0.040235	0.025700*	1.301183***	-0.015355	0.019481***	0	0	0
	(0.024503)	(0.015284)	(0.227359)	(0.048947)	(0.001468)			
	[1.642053]	[1.681535]	[5.723024]	[-0.313698]	[13.26650]			
	0.1006	0.0927	0.0000	0.7538	0.0000			
MMR	1.408452	-0.651131	16.40385	2.848590	-0.548978	0.772703***	0	0
	(0.986690)	(0.615892)	(10.56396)	(1.942576)	4.228292	(0.058245)		
	[1.427452]	[-1.057218]	[1.552812]	[1.466399]	-0.129834	[13.26650]		
	0.1534	0.2904	0.1205	0.1425	0.8967	0.0000		

Appendix 3 (Cont.)

GBC	-0.003607	-0.015275	0.284556*	0.028826	-0.153641**	-0.001991	0.011879***	0
	(0.015344)	(0.009528)	(0.164617)	(0.030227)	(0.065011)	(0.001639)	(0.000895)	
	[-0.235058]	[-1.603075]	[1.728595]	[0.953640]	[-2.363319]	[-1.214981]	[13.26650]	
	0.8142	0.1089	0.0839	0.3403	0.0181	0.2244	0.0000	
M2	-0.004089	0.006714	0.145015	-0.018497	-0.018275	-0.004120***	0.773910***	0.011404***
	(0.014735)	(0.009280)	(0.160694)	(0.029168)	(0.064361)	(0.001586)	(0.102337)	(0.000860)
	[-0.277505]	[0.723467]	[0.902428]	[-0.634156]	[-0.283939]	[-2.596938]	[7.562367]	[13.26650]
	0.7814	0.4694	0.3668	0.5260	0.7765	0.0094	0.0000	0.0000

Note: ( ) standard errors; [ ] z-statistics

*** = significant in 1%; ** = significant in 5%; * = significant in 10%

Appendix 4 Estimated Structural Contemporaneous Coefficients in Inflation Targeting with Money Market Rate as MPI

	OIL	FFR	INF	Y	REER	MMR	GBC	M2
OIL	0.086432***	0	0	0	0	0	0	0
	(0.006515)							
	[13.26650]							
	0.0000							
FFR	0.307678*	0.136505***	0	0	0	0	0	0
	(0.168358)	(0.010289)						
	[0.0676]	[13.26650]						
	0.0669	0.0000						
INF	-0.002830	0.003824	0.009220***	0	0	0	0	0
	(0.011586)	(0.007200)	(0.000695)					
	[-0.244287]	[0.531019]	[13.26650]					
	0.8070	0.5954	0.0000					
Y	0.018391	0.024304	-0.634929	0.042426***	0	0	0	0
	(0.053328)	(0.033185)	(0.490509)	(0.003198)				
	[0.344865]	[0.732386]	[-1.294429]	[13.26650]				
	0.7302	0.4639	0.1955	0.0000				
REER	0.040235	0.025700*	1.301183***	-0.015355	0.019481***	0	0	0
	(0.024503)	(0.015284)	(0.227359)	(0.048947)	(0.001468)			
	[1.642053]	[1.681535]	[5.723024]	[-0.313698]	[13.26650]			
	0.1006	0.0927	0.0000	0.7538	0.0000			
MMR	1.438907	-0.595803	13.87553	0	0	0.782226***	0	0
	(0.983226)	(0.611838)	(9.043635)			(0.058962)		
	[1.463455]	[-0.973791]	[1.534286]			[13.26650]		
	0.1433	0.3302	0.1250			0.0000		

Appendix 4 (Cont.)

GBC	-0.003607	-0.015275	0.284556*	0.028826	-0.153641**	-0.001991	0.011879***	0
	(0.015347)	(0.009518)	(0.163953)	(0.029865)	(0.065004)	(0.001619)	(0.000895)	
	[-0.235009]	[-1.604918]	[1.735595]	[0.965224]	[-2.363545]	[-1.229952]	[13.26650]	
	0.8142	0.1085	0.0826	0.3344	0.0181	0.2187	0.0000	
M2	-0.004089	0.006714	0.145015	-0.018498	-0.018274	-0.004120***	0.773910***	0.011404***
	(0.014738)	(0.009270)	(0.160067)	(0.028822)	(0.064355)	(0.001567)	(0.102337)	(0.000860)
	[-0.277444]	[0.724274]	[0.905960]	[-0.641799]	[-0.283963]	[-2.628424]	[7.562367]	[13.26650]
	0.7814	0.4689	0.3650	0.5210	0.7764	0.0086	0.0000	0.0000

Note: ( ) standard errors; [ ] z-statistics

*** = significant in 1%; ** = significant in 5%; * = significant in 10%