Determinant of World Oil Price and *Fed Funds Rate* on Indonesia Inflation

Masadi ✉

Economics Development Department, Economics Faculty, Universitas Negeri Semarang

Article Info

Abstract

The changing global economic cycle may affect the Indonesia inflation, such as world oil prices and Fed Funds Rate. This research aims at analyzing the direct or indirect effects that cause the changes in the world oil prices and the Fed Funds Rate to the volatility of inflation in Indonesia. The analytical tool used in this research is path analysis. The research results is a significant direct effect of the world oil price variable on the inflation, there is a significant direct effect of the Fed Funds Rate variable on the inflation, and there is a significant direct effect of the Bank Indonesia (BI) variable on the inflation. The variable of the amount of money in circulation has no significant direct effect on the Indonesia inflation, there is a significant direct effect of the variables of the world oil prices and the Fed Funds Rate on the money in circulation, and there is a significant direct effect of the Fed Funds Rate variable on the money in circulation. There is a significant direct effect of the world oil price variable on the BI rate, and there is significant direct effect of the Fed Funds Rate variable on the BI rate.

✉ Corresponding Author:
 Journal's Room, L Building, FE UNNES Sekaran Gunungpati
 Semarang 50229, Indonesia
 E-mail: masadijahadi@gmail.com

INTRODUCTION

The Indonesian economy is inseparable from the changing pattern of the global economic cycle. The changing pattern of the global economic cycle may affect the performance of the domestic economy through the trade path and through the financial market path, such as the world oil prices and the Fed Funds Rate.

The main objective of Bank Indonesia is to achieve and maintain the stability of Rupiah value, in accordance with the Acts no. 3 of 2004 Article 7 concerning Bank Indonesia.

To achieve this objective, Bank Indonesia in July 2005 has fully adopted the Inflation Targeting Framework (ITF) as a monetary policy framework with an inflation target as the main target. The monetary policy framework Bank Indonesia is operationally reflected by the determination of the BI rate because BI rate as a reference is expected to affect the inflation.

The monetary policy adopted by Bank Indonesia must be in accordance with the global and regional economic conditions. The time when the economy is in a booming state will be different from the depressed condition.

Bank Indonesia can implement expansionary and contractive monetary policy in order to face the situation. Expansive monetary policy is shown when there is a depressed economy. Monetary policy can affect economic activity and inflation by controlling interest rate and influencing financial (Thornton, 2014).

Bank Indonesia can establish a policy by increasing the money in circulation or decreasing the BI rate in order to encourage the economic activities.

Conversely, the contractive monetary policy is shown to slow down the economic activities by decreasing the money in circulation or by increasing the BI rate; in other words, this policy is conducted when the economy is experiencing the high inflation.

Bank Indonesia implemented a contractive monetary policy in 2006, 2008 and 2013, as reflected in the significant increase in the BI rate, and also the expansive monetary policy adopted by Bank Indonesia in 2007, 2009, and

2011 where the BI rate has decreased significantly.

This may be caused by the changes in the global economy such as changes in the world oil prices and the Fed Funds Rate.

The BI rate at the beginning of 2006 was at 12.75% and the inflation rate of 17.03% was as a consequence of the adjustment of fiscal and monetary policies adopted in overcoming the shocks of the macroeconomic instability during 2005 so that the optimism of the economic actors on the economy condition decreased as a result of anxiety of the increasing Fed Funds Rate.

Due to the need for a boost in domestic demand to support the economic growth in mid-2006, Bank Indonesia began to lower the BI rate to 9.75% by the end of 2006.

Besides the BI rate decrease, the government implemented the direct cash assistance (BLT) program for the poor households and the school operational assistance (BOS) program and the health insurance program for the poor (Askin)

In 2007 in line with the decline in the BI rate and the economic expansion, the domestic economic performance improved as reflected by the high economic growth and the stable inflation although the world oil price reached an average of 75 US dollars per barrel resulting in an increase in the subsidy costs in line with the government's commitment to maintain the domestic fuel price stability despite the rising world crude oil prices and the global financial market crisis.

The Indonesian economy was again affected by the negative impacts of the global economy in 2008 due to the subprime mortgage crisis in the end of 2007 in the United States, which started from an expansive government policy that triggered the rampant practice of high-risk credit distribution, in which the ease of applying for a long-term loan and an increase in the house prices has prompted the debtor to apply for a more risky mortgage loan in the hope of gaining the advantage of the lower interest rates.

However, the default and takeover action increased drastically in the middle of 2007, which

then triggered the bubble burst in the property sector.

Besides the subprime mortars, the tensions between the United States and Iran have sparked an increase in the global crude oil prices to $ 132 per barrel, which is the highest price during the period of research.

Besides the condition above, from the domestic side the government took steps to increase the price of the subsidized fuel to Rp 6000 per liter in May 2008, so it resulted in the increasing inflation rate to 95 percent. However, the inflation pressures gradually subsided by the end of the year along with the decrease in the fuel prices and in the global commodity prices.

The year of 2009 is a continuation of the policy of 2008 in which the policy was directed to maintain the macroeconomic stability and the financial system and the resilience of the domestic economy due to the instability in the global financial markets and the strong negative perception of prospects of the global economic recovery.

This condition made the investors reduce the placement of funds in the developed and developing countries. Thus, to overcome such conditions, the Federal Reserve lowered the Fed Funds Rate from 0.15% in early 2009 to 0.12% at the end of the year. It is similar to Bank Indonesia that implemented the monetary policy easing in the form of lowering the BI interest rate at the beginning of 2009 from 8.75% to 6.5% at the end of the year. Lower monetary policy rates always worsen risk-taking incentives and the effect is persistent (Valencia, 2014).

Besides, in the fiscal sector, in early 2008 the government lowered the price of the subsidized fuel for premium and diesel fuel in order to maintain the public purchasing power and the confidence of the economic actors in the real sector in order to encourage the increase in the economic activity while maintaining the inflation stability.

The year of 2013 was characterized by the uncertainty in the global financial markets over the issue of the reduction of monetary stimulus (tapering off) in the United States.

The financial market turbulence that occurred triggered the flow of foreign capital out of the emerging market countries including Indonesia to the developed countries, especially the United States.

Besides, the outflow of the foreign capital inflows from Indonesia was also triggered by the negative perceptions of the foreign investors against the inflation pressures that were high after the subsidized fuel price has increased in June 2013 of 44.45% for premium and 22.23% for diesel. So it triggered an increase in Indonesia's inflation rate in January of 4.57% to 8.38% by the end of the year

In 2014 Indonesia was affected again by the uncertainty of the direction of the Federal Reserve policy related to the reduction of monetary stimulus (tapering off) that gradually affected the vulnerability of the Indonesian financial market. Since

January the Fed Funds Rate has increased by 0.04% until the end of the year. This made Bank Indonesia increase the money in circulation and the BI rate in December to 7.75%.

All of the above explanation shows how much the influence of the monetary policy and the global economic conditions, both the world oil prices and the Fed Funds Rate, on the various economic activities and the Indonesian finance is.

The monetary policy taken aims at controlling the inflation rate to fit the goal and objectives of Bank Indonesia with the speed in the transmission process of the determined instrument. The monetary policy can peg the nominal rate and determine expected inflation (Cochrane, 2014).

RESEARCH METHOD

The type of research used is descriptive quantitative research and the data used in

this research is monthly time series data during 2006 - 2014 periods with secondary data type.

The selection of this period is based on the consideration that in that period the economy

was in stable condition and it was the start of the implementation of monetary policy with an inflation targeting framework (ITF) by Bank Indonesia.

The overall data used in this research can be seen in table 3.1

It uses the path analysis. Path analysis is a method for studying the direct effect and the indirect effect of the variables (Widarjono, 2015: 212).

The model used in this research is path analysis method with path model analysis specification as follows:

Table 1. Variables Used in Research

| No	Variables	Codes of data	Units	Sources
1	World oil price	WTI	Dollar per barrel	*U.S Energy Information Administration* http://www.eia.gov
2	*Fed Funds Rate*	FFR	Persen	*Federal Reserve* *http://www.federalreserve.gov*
3	Amount of money in circulation	JUB	Billions of Rupiah	Bank Indonesia *http://www.bi.go.id*
4	BI rate	SBI	Percent	Bank Indonesia *http://www.bi.go.id*
5	Inflation	INF	Percent	Bank Indonesia *http://www.bi.go.id*
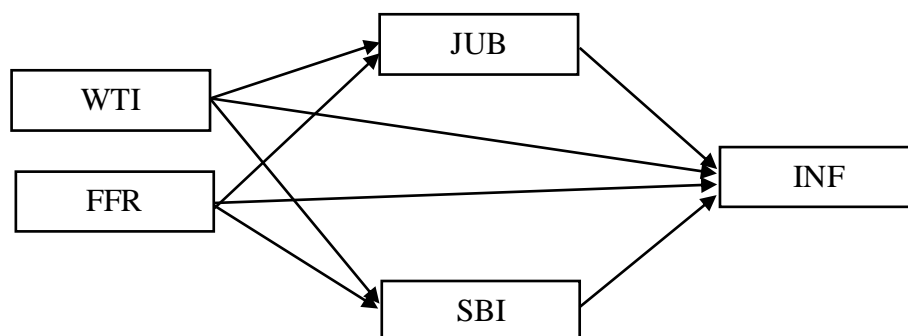
Figure 1. Specification of Path Analysis Model
Source: Previous Research

Based on the specification of the model, the equation is found as follows:

$$JUB = \beta 1 WTI + \beta 2 FFR + e1 \dots\dots\dots\dots\dots(1)$$

$$SBI = \beta 1 WTI + \beta 2 FFR + e2 \dots\dots\dots\dots\dots(2)$$

$$INF = \beta 1 WTI + \beta 2 FFR + \beta 3 JUB + \beta 4 SBI + e3 \dots\dots\dots\dots\dots\dots\dots(3)$$

Information:

WTI is world oil prices, FFR isFed Funds Rate, SBI is BI rate, JUB is the money in circulation, INF is inflation, B is coefficient that measures the relationship among the variables and e   is unexplained variants by the model

RESULTS AND DISCUSSION

The Result of hypotesis test of the effect of the world oil price fluctuation and the Fed Funds Rate on the volatility of the Indonesian inflation is as follows:

Table 2. Summary of Direct and Indirect Effects and Total Effect

Variables	p	Effects Estimate (Direct)	Indirect through		Total
			JUB	SBI	
WTI → JUB	***	0.359	-	-	0.359
FFR → JUB	***	-0.570	-	-	-0.570
WTI → SBI	.001	-0.208	-	-	-0.208
FFR → SBI	***	0.684	-	-	0.684
JUB → INF	.380	-	-	-	-
FFR → INF	***	-0.380	-	0.847	0.467
SBI → INF	***	1.239	-	-	1.239
WTI → INF	***	0.280	-	-	0.280

Source: AMOS 21 (data processed)

The direct effect of the world oil prices on the amount of money in circulation, this research shows that the variables of the world oil price variable to the amount of money in circulation are positive and significant with an estimate value of 0.359 and the probability <0.005 (p <0.05). This is in line with the research of Maulana and Tohari (2006) and Afdi (2012) that the changes in the world oil prices have contributed to the amount of money in circulation in which the increase in the world oil prices will raise the demand for money due to the effects of price increases of products used by the public so this will be responded by Bank Indonesia by increasing the amount of money in circulation.

The direct effect of the Fed Funds Rate on the amount of money in circulation

The testing result of the Fed Funds Rate variable to the variable of the amount of money in circulation is negative and significant with an estimate value of -0.570 and the probability <0.005 (p <0.05). This is in line with Maulana and Tohari (2006) research in which the Fed Funds Rate has contributed to the amount of money in circulation. When the Fed Funds Rate increases, Bank Indonesia tends to raise the BI rate that makes people tend to save money if compared to distributing to the productive sectors

The direct effect of the world oil prices on the BI rate, the testing result of the world oil price variable to the BI rate variable is negative and significant with an estimate value of -0.208 and the probability <0.005 (p <0.05).

This is in line with Afdi (2012), Zhou (2012) and Maulana and Tohari (2006) research, in which the world oil prices contribute to the Indonesian macroeconomic variables including the BI rate.

The increase in the world oil prices will lead to the increase in production and consumption costs that will also increase the price of goods in general. If it continues, it will reduce the demand for goods and will make the layoffs and make the economy depressed.

To cope with it, Bank Indonesia will reduce the BI rate so that the producers tend to borrow funds from the banks.

The direct effect of the Fed Funds Rate on the BI rate variable

The testing result of Fed Funds Rate variable to BI rate variable is positive and significant with an estimate value of 0.684 with the probability <0.005 (p <0.05). This is in line with Prastowo's 2008 research in Andrian and Puji (2013) and Juoro (2013) in which the increase in the Fed Funds Rate will lead to an increase in the BI rate because it is very influential for the foreign investors. If the BI rate does not respond, it will cause the outflow of foreign capital that will cause the balance of payments deficit, so that Bank Indonesia will raise the BI rate in order to reduce the possible effect.

The direct effect of the amount of money in circulation on the inflation variable

The testing result of the variable of the amount of money in circulation to the inflation variable is negative and not significant with an estimate value of -0.059 with the probability> 0.005 (p> 0.05). This is in line with the theory of Mankiw (2007: 155) that the changes in the amount of money in circulation in the short term do not have a significant effect, while the changes in the amount of money in circulation in the long term are significant to the inflation and in line with Keynes's theory of quantity of money that has no effect on the total demand, because an economy may experience the inflation as well as the rate of money quantity remains constant. If the money in circulation increases, the price will also increase. The increase in price will lead to an increase in the demand for money for transactions; therefore, to prevent from the inflation, the Central Bank will raise the interest rates. This result is also in line with a research conducted by Maggi (2013) in which in the short term the additional amount of money in circulation has no effect
to the inflation but will affect the inflation in the long term.

The direct effect of the Fed Funds Rate on the inflation

The testing result of Fed Funds Rate variable to the inflation variable is negative and significant with an estimate value of -0.380 with the probability <0.005 (p <0.05). This is in line with the research of Maula and Tohari (2006) and Juoro (2013) in which the Fed Funds Rate has contributed to the Indonesian macroeconomic variables including the Indonesian inflation because it is very influential for the foreign investors. If the Fed Funds Rate increases, the BI rate will increase too.

If the BI rate does not respond, the foreign capital will outflow that will cause the balance of payments deficit, so that to reduce it, Bank Indonesia will lower the BI rate.

The direct effect of the BI rate on the inflation

The testing result of the BI rate variable to the inflation variable is positive and significant with an estimate value of 1.239 with the probability <0.005 (p <0.05). This is in line with the Fisher effect, in which there is a one-way relationship between the inflation and the interest rates.

And this is in line with the research of Maggi and Dian (2013), Putra (2015), Endir (2008) and Juoro (2013) in which the interest rate has a contribution to the inflation variable.

The lowering of the interest rates will also lower the inflation because it will reduce the enthusiasm of the investors to develop the productive sectors.

The direct effect of the world oil prices on the inflation

The testing result of the world oil price variable to the inflation variable is positive and significant with an estimate value of 0.280 with the probability <0.005 (p <0.05). This is in line with a research conducted by Cologni and Manera in 2008 in Afdi (2012), Maulana and Tohari (2006), Zhou and Wang (2012), Ali et al (2014), and Nazarian and Amiri (2014) that the increasing world oil prices will lead to the rising inflation. The higher world oil prices will soon be followed by the rising prices of petroleum products, such as gasoline and fuel used by both

the producers and consumers. Furthermore, because there is an effort to substitute the oil with other forms, the price of other alternative energy sources also increases. So the company diverts the increase in production costs in the form of higher consumer prices for non-energy goods or services, while the workers will respond to the increase in the living costs by demanding higher wages.

The indirect effect of the world oil prices on the inflation through the intervening variable of the amount of money in circulation, the magnitude of the direct effect of world oil prices on the amount of money in circulation was 0.359. The direct effect of the amount of money in circulation on the inflation is -0.059. Therefore, the hypothesis stating that there is an indirect effect of the world oil price on the inflation through the mediation variable of money in circulation amounted 0,359 x -0,059 =   -0,021 is rejected, because the magnitude of the indirect effect (-0,021) is smaller than the direct effect of the world oil price on the inflation (0.280). So it can be said that the world oil price variable does not have an indirect effect on the inflation variable through the intervening variable of money in circulation.

The rising world oil prices will increase the demand for money due to the effect of rising prices of products used by the public, and the effect of money in circulation on the inflation is insignificant because Bank Indonesia will increase the interest rates in reducing the inflation.

The indirect effect of the world oil prices on the inflation through the intervening variable of the BI rate

The magnitude of the direct effect of world oil prices on the BI rate is -0.208. The direct effect of BI rate on the inflation is 1.239. Therefore, the hypothesis stating that there is an indirect effect of the world oil price on the inflation through the intervening variable of the BI rate that equals to -0.208 x 1.239 = -0.258 is rejected, because the magnitude of the indirect effect (-0.258) is smaller than the direct effect between the world oil price and the inflation (0.280).

So it can be said that the world oil price variable does not have an indirect effect on the inflation variable through the intervening variable of the BI rate.

The rising world oil prices will increase the demand for money because the effect of rising price of products used by the public (Maulana and Tohari (2006) and Afdi (2012)) and the effect of BI rate on the inflation is positive in which the increase in the BI rate will make an increase in the inflation (Maggi and Dian (2013), Endir (2008) and Juoro (2013)).

The indirect effect of the Fed Funds Rate on the inflation through the intervening variables of the amount of money in circulation,

the magnitude of the indirect effect of the Fed Funds Rate on the inflation with the intervening variable of the money in circulation is rejected.

It is because the direct effect of the money in circulation on the inflation is insignificant (Mankiw (2007: 155) and Maggi (2013)), in which in the short term the addition of money in circulation has no effect on the inflation but in the long term it will affect the inflation.

The indirect effect of the Fed Funds Rate on the inflation through the intervening variable of the BI rate

The magnitude of the direct effect of the Fed Funds Rate on the BI rate is 0.684. The direct effect of BI rate on the inflation is 1.239.

Therefore, the hypothesis stating that there is an indirect effect of the Fed Funds Rate on the inflation through the intervening variable of BI rate of 0.684 x 1.239 = 0.847 is received, because 0.847> -0.380.

The number is positive, so it can be said that the variable of Fed Funds Rate has an effect on the variable of inflation through the intervening variable of BI rate. So in this case the higher the Fed Funds Rate is, the higher the BI rate will be.

The rising BI rate will increase the inflation (Maulana and Tohari (2006), Maggi and Dian (2013), Endir (2008), Juoro (2013), and Aprianti (2011)).

Based on the direct and indirect effects, the total effect given by the Fed Funds Rate on the inflation is 0.467 (-0.38 + 1.239 = 0.467) 0.467 or equal to 46.7%.

CONCLUSION

Based on the results of research and discussion, it can be concluded that there is a direct positive and significant effect of the variable of the world oil price on the amount of money in circulation; there is a direct negative and significant effect of the Fed Funds Rate variable on the variable of money in circulation; there is a direct negative and significant effect of the world oil price variable on the BI rate variable; there is positive direct and significant effect of the Fed Funds Rate variable on the BI rate variable; there is no direct and insignificant effect of the variable of money in circulation on the inflation variable; there is direct negative and significant effect of the Fed Funds Rate variable on the inflation variable; there is a direct positive and significant effect of the BI rate variable on the inflation variable; there is a direct positive and significant effect of the world oil price variable on the inflation variable, there is no direct effect of the world oil price on the inflation through the intervening variable of money in circulation; there is no indirect effect of the world oil price on the inflation through the intervening variable of BI rate, there is no indirect effect of Fed Funds Rate on the inflation through the intervening variable of money in circulation; there is no direct effect of Fed Funds Rate on the inflation through the intervening variable of BI rate.

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