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THE IMPACT OF GLOBALIZATION ON INFLATION IN INDONESIA

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Abstract: *Many researchers argue that globalization has reduced the role of domestic factors and improved global economic role in determining inflation. To prove the truth of the premise, the research was conducted in Indonesia. The results show, there is a significant effect of the domestic output gap on inflation in the crisis of 1998 and prior to the crisisand the period after the crisis of 1998.However, the sensitivity of inflation to domestic output gap has decreased.While, the foreign output gap in the period of the 1998 crisis and prior to the crisis was not significant. In the period after the 1998 crisis and after the crisis of 2008, foreign output gap was significant. Thus, in the period after the 2008 crisis, only significant foreign output gap, while the domestic output gap was not significant. It means that the views of the researchers are provento occur in Indonesia.*

JEL Classification: *E310*

Keywords*: inflation, globalization, domestic output gap, foreign output gap, economic crisis*

1. INTRODUCTION

In economic field, globalization is a process of economic and trade activities in which the countries around the world are in increasingly integrated market. Economic globalization on the one hand will open up market opportunities for domestic products to the international market and at the same time open up the opportunities of imported global products into the domestic market.

Analysts agree that economic globalization is highly associated with increased integration of national economy with the international one; in the markets of goods, services, labour and capital (Frankel, 2006). Frankel and other scholars (Ihrig, 2007;

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Rogoff, 2003; Romer, 1993) have the similarity to the view that globalization leads to increased effect on the behaviour of domestic inflation.

Each government always expectsthe condition of stable inflation because the stability of inflation is the prerequisite for sustainable economic growth. The stability of inflation will ultimately benefit the improvement of people's welfare. Therefore, controlling inflation becomes very important. Meanwhile, high and unstable inflation will have negative effect on the socio-economic conditions of a society.

The characteristic of inflation is often attributed to domestic factors, such as aggregate demand, the behaviour of wages, productivity, inflation expectations, the effect of the entire real factor balance and national monetary policy. In addition, inflation is also associated with external factors such as world energy prices and food prices. In its recent development, many researchers argue that globalization has diminished the role of domestic factors and improving global economic role in the formation process of inflation. Thus, there has been a relatively significant shift in experts' ideaby minimizing the degree of domestic roles and put the role of the global economy as a more decisive factor in inflation.

However, the debate is still going on, both in theoretical and empirical. Borio and Filardo (Borio, 2007) argue about the relevance of the Globe-Centric perspective in explaining the increase in the role of economic integration on the formation of inflation. On the other hand, there is the perspective of Country-Centric that considers excess demand as the determinant of inflation rate in the scope of one state so that the inflation is exclusive. The international effect is solely in the exchange rate and import prices. Meanwhile, Federal Reserve Board Chairman (Bernanke, 2007) said that although globalization has not been conclusively able to change the process of determining inflation in the economy, the effectiveness of monetary policy now requires the input of global effect.

According to McCandless (1995), inflation is a monetary phenomenon, and in the long run inflation is ultimately determined by monetary policy (Ball, 2006). However, this view has been challenged by the fiscal theory of the price level that was developed by Leeper (1991) and Woodford (1995) which states that fiscal policy plays an important role in determining the price through budget constraint associated with the policies of debt, expense, and taxation.

Meanwhile, the classic is based on the assumption that economic actors are perfect foresight, and the changes in the expectations of economic agents are directly and perfectly realized in the price, so the price is flexible. However, Keynes assumes that economic actors are adaptive. The adaptive economic actors forecast based on past information so that the price level is fixed. Decision making which is only based on previous information has the potential to do a systematic error (the Lucas's critique).

Therefore, New Keynesian appears which always revisestheir mistakes so that they do not make mistakes continuously and the decision taken to be true.

Based on the empirical study results, Borio (2007) concludes that global factors have replaced the role of domestic factors in influencing inflation (globe-centric). It is supported by Pain (2006). But their opinion was opposed by Ball (2006) who tends to be country-centric,while the one stated that domestic output gap and foreign output gap has the effect on inflation is Pehnelt (2007).

In fact, the role of inflation in real sector development in the global era is very important, so it is no longer relevant to perform dichotomy between real sector and financial sector (Rogoff, 2003). Possible alternatives to perform the dichotomy of inflation are between the country-centric and the globe-centric (Borio-Filardo, 2007).

In the case of Indonesia, the openness of the economy is also a part of the life of Indonesian economy. The results of Pearson correlation indicate a strong correlation between GDP deflator and consumer price level with the openness based on current prices ie respectively by 0.8885700 and 0.832838. This means that the higher level of openness, the domestic price level will be higher. However, if the openness based on constant prices, there is no strong correlation (0.375250 and 0.239199). The presence of relevance between domestic prices and the level of economic openness indicates that globalization can not be ignored in the formation of domestic prices.

The aim of this study is to examine the model of presence of relevance between domestic prices and the level of economic openness and the tendency of the inflation targeting which is not achieved mean that inflation in Indonesia is also influenced by the factors that play the role in changing the structure of international trade; one of which is the price stability of the states as the trading partners and the stability of the economic fundamental factors of the states of the trading partners. In other hand, based on Law No. 23 of 2000 and its amendments, Law No. 03 of 2004, Bank of Indonesia has the obligation to stabilize prices.

2. LITERATURE REVIEW

Prior to the 1990s, when globalization has not been much discussed, inflation was determined more by the domestic factors such as money supply, exchange rate, real output, taxes or government expenditures. In their current development, many researchers argue that globalization has reduced the role of domestic factors and improved global economic role in the formation process of inflation.

Literature Review

The Effect of Domestic Output Gap on Inflation

There is a consensus among researchers that, for the case of industrialized countries, the responsiveness of inflation to domestic resource use will decline. The conclusion

is expressed by several researchers, such as Borio (2007), IMF (2006), Pain (2006) for industrialized countries and Ihrig (2007).

Ihrig (2007) conducted the same research as conducted by Borio-Filardo (2007), but the operational definition of the inflation variables was changed. The initial operational definition of inflation variable is headline inflation turned into core inflation. The results indicate a significant decrease in the use of domestic resources in determining inflation. Ball (2006) used a simpler panel regression for 14 industrial countries with the annual data from the period of 1985 to 2005. The results show that the domestic output gap has positive significant effect on inflation.

The same thing is also shown by Pehnelt (2007) by analyzing the relationship between globalization and inflation in 22 states of the members of OECD (Organization for Economic Co-operation Development) in the period from 1980 to 2005 using the traditional Phillips curve approach and its extension. The panel data is broken down within five years. The results show that the term of autoregressive has a high significance in each period. The inflation rate in the year t depends on the inflation rate in the year t-1. Interestingly, the coefficient and the significance of autoregressive losttheir weight at the beginning of the 21stcentury in which it can be interpreted as a sign of the decline in further inflation persistence. Domestic output gap plays a significant role in determining inflation rate in the 1980s. The coefficient of domestic output gap shows the declining effect since the early 1980s and had lower coefficient than the first period (1981-1985), and then it became insignificant in the fourth period (1996-2000). This means that the effect of domestic output gap on inflation decreased during 25 years of observation.

The Effect of Foreign Output Gap on Inflation

Tootell (1998) estimates the model of Phillips curve as a standard for America in the period from 1973 to 1996 using the output gap for six US's trading partners. As a result, there is no evidence that these variables have the effect on inflation. Contrary to the results of Tootell (1998), Wynne (2007) supports the role of foreign resource utilization to inflation in the United States.

The most powerful and comprehensive results on the role of foreign resource utilization is Borio-Filardo (2007). They estimated the Phillips curve models for the 16 OECD countries (plus the European countries) in the period of 1985-2005. They found the effect of the weighted average of foreign output gap which is positive and significant on domestic inflation, and the general effect extended beyond domestic output gap and increased from time to time.

But Pain (2006) found no role of global output gap on inflation in the 21 OECD countries in 1980-2005. Likewise, Ball (2006) estimated a panel regression for 14 OECD countries in 1985-2005, and he found the effect of foreign domestic output gap on

inflation which was smaller than the domestic output gap with marginal significance. The foreign output gap was just a secondary effect on inflation.

Ihrig et al (2007) compared the estimation of Borio-Filardo (2007) with the same equation but by incorporating the measurement of foreign output gap and gave a different weighting. The results show that foreign output gap is positive and significant only in five out of 14 industrialized countries. This difference reflects the fact that the estimates of the foreign output gap for each country is different from the estimation of Borio (2006).

These results suggest the same studies and the same object, but the results can be different for different operational definitions between Ihrig et al (2007) and Borio-Filardo (2007). Ihrig et al (2007) produced the estimates showing that foreign output has no effect on domestic inflation in general. However, the estimation results of Borio-Filardo (2007) show the opposite result that foreign output gap has significant effecton domestic inflation. Thus, the different operational definitions can influence the estimation results.

Theoretical Framework

In a survey of inflation, this research used the theory of New Keynesian. New Keynesian theory used the approach of microfoundation of Macroeconomics (The New Keynesian Microfoundatioan of Macroeconomics). In economics, the term microfoundation refers to the analysis of microeconomics of individual behaviour such as household or firm that supports macroeconomic theory.

The one who is very influential on the use of microfoundation is Lucas with his criticism to the model of traditional forecasting Macroeconomics. Lucas states that the relationship between aggregate variables were observed in macroeconomic data will tend to change when macroeconomic policy changes. It is implied that the microfoundation model is more appropriate to predict the effect of policy changes on the assumption that the macroeconomic policy changes does not underlie the changing structure of microeconomics. Therefore, microfoundation likely brings better or more useful model for predicting.

New Keynesian Phillips Curve (NKPC)

Recent developments of the monetary theory of business cycle developed by the economists of New Keynesian results in the new version of Phillips curve analysis; the New Keynesian Phillips Curve (NKPC). Therefore, the basic theory used in this research is NKPC. New Keynesian shows an association between the real activity that is realized in the form of output gap with inflation. In this context, the New Keynesian develops and estimates a structural model of the Phillips Curve (Gali, and Gertler, 2000).

Theoretical Model

Deriving equations of NKPC, it is assumed that the market faced is monopolistic competition market. The firms in the market of monopolistic competition have monopoly power over their competitors based on the uniqueness of their product, better location, better service, more varied products, and cheaper prices; but their market power is severely limited by the availability of close substitute products.

The firms in the market of monopolistic competition have the market power although it is small. Because it has market power, the companies are able to change the pricesas shown by the following equation:

$$p_t = \theta p_{t-1} + (1 - \theta)\, p_t^{or} \tag{1}$$

where each of the variables are expressed as a percentage of deviation from a zero inflation steady state. P_t is the common price today. P_{t-1} is the previous price. qis the probability of no change and 1 - q is the probability to change. p^{or} (optimal reset price) is the price out of the balance of probabilities that it is likely to change. p^{or} value is determined by the discount factor (b) from a series of nominal mc (marginal cost). Based on the formulation of Calvo (1983), the formulation of optimal reset price is:

$$p_t^{or} = (1 - \beta\theta)\, \Sigma_{k=0}^{\infty} (\beta\theta)^k\, E_t(mc_{t+k}^n) \tag{2}$$

If the price is flexible (q = 0), p will move proportionally to mc_t. The research will be relevant if the price is not easily changed (0 <q<1) and it is known that $p_t \circ p_t - p_{t-1}$, where p is the inflation rate in the periods of t and on the other hand p is associated with $mc_t$is the percentage of the firm's real marginal cost deviations from the steady state value. Then, $p_t$and mc_t can be associated as follows:

$$\pi_t = \lambda\, mc_t + \beta\, E_t\{\pi_{t+1}\} \tag{3}$$

Where the coefficient $\lambda \equiv [(1-\theta)(1-\beta\theta)]/\theta$ depends on the frequency of price adjustments θ and discount factor β.

Because the company performed mark-up and considered forward looking and multiple period of the price, the firmrelies the pricing decisions on expected mc behaviour in the future so we get the equation:

$$\pi = \lambda \sum_{k=0}^{\infty} \beta^k\, E_t\{mc_{t+k}\} \tag{4}$$

Based on the equation (4), then π_t must be equal to the expectation of discounted mc. The output gap (Y_{gap}) is the difference between the current output (y_t) and potential output (y *) where potential output is an output at full employment and $xt \equiv yt - y$. The greater the difference between the two, the higher the inflation. Therefore, it is assumed that:

$$mc_t = \kappa\, x_t \tag{5}$$

where κ is the elasticity of output to the marginal cost.

The combination of the relation between marginal cost and output gap with the equation (3) results in anrelation such as the Phillips curve:

$$\pi_t = \lambda\kappa\, x_t + \beta\, E_t\{\pi_{t+1}\} \quad (6)$$

As the traditional Phillips curve, inflation depends on the output gap and a terminology of "cost push" that reflects the effect of expected inflation. Thus, the current inflation is influenced by the output gap and the cost push. Thus, the theoretical model used in this research wasthe model of NKPC that describes the relation between inflation and real sector. Real sector is demonstrated from the domestic output gap as the difference between actual output and potential output plus expected inflation.

Empirical Model

The empirical model used in this study was based on the premise that globalization will have an effect on inflation dynamics of a country if the country is opening up to international economy. The model used in the research was the Conventional Phillips-Curve with the model of NKPC (Gali, and Gertler, 2000) as the popular model to describe the relation between inflation and real sector:

$$\pi_t = \beta\pi^e_{t+1} + \alpha YGAP \quad (7)$$

Where:

π = CPI Inflation

π^e = Inflation Expectation

YGAP= domestic output gap

First, when an economy is more open and increasingly integrated with other countries, the sensitivity of domestic economy increaseto changes in international economy. Thus the sensitivity of inflation to domestic output gap decreases.

Second, if the argument that globalization really has the effect on the hypothesis of domestic inflation,the equation (7) needs to get a correction to includethe foreign output gap variable (YGAPf).The equation is:

$$\pi_t = \beta\pi^e_{t+1} + \alpha_d\, YGAP^d_t + \alpha_f\, YGAP^f_t \quad (8)$$

As described in the above theory,output influences inflation as output influences the marginal cost of a company. When firm's marginal cost increases, the price of goods is higher. Foreign output gap influences domestic inflation because foreign output gap influences domestic marginal cost. Increased foreign output gap in general will increase domestic inflation by the increasing demand for domestic goods. The

increased demand for domestic goods would pushdomestic real wages causing an increase in domestic inflation (Engel, 2012).

3. METHOD

This research used a series of econometric procedures to estimate the independent variable to the dependent variable of inflation. *The first* step was by performing a stationary testing to the time series data. *Secondly*, cointegration test was conducted to avoid spurious regression and finally estimated the model of Error Correction Model (ECM).

Test of Unit Roots

Unit root test is important since data stationary is required for more dynamic analysis. The data is said to be stationary whenthe means, variance and covariance are constant without depending on the size of the data. Stationary data will be able to result in the estimates that have stable means with minimum random error to avoid spurious regression. To testof unit roots used Augmented Dickey-Fuller (ADF).

Cointegration test

Linear combination between the variable of time series which is stationary at the same degree will be co-integrative. In the standpoint of economics, the concept of cointegration is widely used as a tool to analyze the long-term relationship. This research used Johansen's co- integration method. Johansen test refers to the model of Maximum Likelihood (Rumler, 2007) and worked to test the cointegration properties in the equation system (Mukherji and Naka, 1995).

Error Correction Model (ECM)

The application of ECM in this research used single quadratic cost function introduced by Domowitz and Elbadawi (1987). Based on single quadratic cost function, the model of Conventional models Phillips-Curve, the inflation (P) affected by price expectations (PE) and Indonesian output gap (GI), can be derived as follows:

Single quadratic cost function of the model:

$$P_t = f(PE_t, GI_t)$$

$$P_t^* = \alpha_0 + \alpha_1 PE_t + \alpha_2 GI_t + \varepsilon_t \quad (9)$$

$$C_t = b_1(P_t - P_t^*)^2 + b_2[(1 - B)P_t - f(1 - B)Zt]^2 \quad (10)$$

Where:

$b_1(P_t - P_t^*)^2$: cost of disequilibriun

$b_2[(1 - B)P_t - f(1 - B)Zt]^2$: cost of adjusment

$Z_t = f(Pe_t, GI_t)$

Minimizing the equation (10) to Pt and substituting Zt as the function of Pe_t and GI_t, it is obtained:

$$P_t = \beta_0 + \beta_1 PE_t + \beta_2 GI_t + \beta_3 B\, PE_t + \beta_4 B\, GI_t + \beta_5 B\, P_t \quad (11)$$

Where:

$\beta_0 = \alpha_0 b$; $\beta_1 = \alpha_1 b + (1 - b) f_1$; $\beta_2 = \alpha_2 b + (1 - b) f_2$; $\beta_3 = -(1 - b) f_1$

$\beta_4 = -(1 - b) f_2$; $\beta_5 = (1 - b)$

f1 is therow vector that shows the effect of Pe_ton Zt and f_2 is the row vector that indicates the effect of GI_tonZ_t. The equation (11) reflects the short-term relationship or imbalances that include the level of value and lag of P, Pe and GI variables.

The main problem in estimating the equation (11) relates to the level of the variables that may not be stationary. When it is not stationary, the use of OLS method can cause spurious regression (Thomas, 1997; and Insukindro, 1998). To overcome it, reparameterization was conducted:

$$P_t = \beta_0 + \beta_1 (PE_t - PE_{t-1} + PE_{t-1}) + \beta_2 (GI_t - GI_{t-1} + GI_{t-1}) + \beta_3 B\, PE_t + \beta_4 B\, GI_t + \beta_5 B\, P_t \quad (12)$$

Where:

$\beta_5 = (1 - b)$; $D\, P_t = P_t - P_{t-1}$

Equation (12) can be rewritten into:

$$DP_t = \beta_0 + \beta_1 DPE_t + \beta_2 DGI_t + (\beta_1 + \beta_3 + \beta_5 - 1) BPE_t + (\beta_2 + \beta_4 + \beta_5 - 1) BGI_t + (\beta_5 - 1)(BPE_t + BGI_t - BP_t) \quad (13)$$

If:

$\gamma_0 = \beta_0$ $\quad \gamma_3 = \beta_1 + \beta_3 + \beta_5 - 1$

$\gamma_1 = \beta_1$ $\quad \gamma_4 = \beta_2 + \beta_4 + \beta_5 - 1$

$\gamma_2 = \beta_2$ $\quad \gamma_5 = \beta_5 - 1$

$ECT = BPE_t + BGI_t - BP_t$

So, Error Correction Model:

$$DP_t = \gamma_0 + \gamma_1 DPE_t + \gamma_2 DGI_t + \gamma_3 BPE_t + \gamma_4 B\, GI_t + \gamma_5 ECT + \varepsilon_t \quad (14)$$

In order that the regression analysis achieved optimum results, the estimation results should not deviate from the classical assumptions.

4. RESULTS

This research used the data of the period of 1990q1-2014q4. The data were taken from the International Financial Statistic published by the IMF (International Monetary Fund)

and the World Bank Data by the World Bank. The variables used in this analysis were inflation (P), expected inflation (PE), the output gap of Indonesia (GI), and the output gap of the world (GW).

Unit Root Test

Unit root test was made to all the variables to be analyzed. This test used Augmented Dickey-Fuller (ADF), which is developed from the approach of Dickey-Fuller (Woodford). When the time series data is not stationary at zero degrees of I (0), the data stationary can be obtained through subsequent degrees in order to obtain the level of stationary at the n-th degree (first difference I (1) or second difference I (2)).

Table 2
The Result of Unit Roots Test In The Period of 1998 Crisis and Prior to The Crisis; After The 1998 Crisis; and After The 2008 Crisis

The Period of 1998 Crisis and Prior to The Crisis

VAR	*I(0)*			*I(1)*			*I(2)*		
	Con-stant	*Constant and trend linier*	*None*	*Con-stant*	*Con-stant and trend linier*	*None*	*Con-stant*	*Con-stant and trend linier*	*None*
P	0,82	-4,46*	3,96	-3,70*	-4,28*	-1,93*	-	-	-
PE	1,19	-70,60*	0,15	-28,04*	-15,16*	-3,76*	-		-
GI	-3,88*	-3,43**	-4,85*	-	-	-	-	-	-
GW	-1,83	-1,66	-1,84	-4,83*	-4,78*	-4,90*	-	-	-
				After The 1998 Crisis					
P	0,44	-4,08*	6,81	-5,14*	-5,12*	-3,07*	-	-	-
PE	0,665	-3,56**	6,423	-8,05*	-18,26*	-1,93**	-		-
GI	-6,33*	-4,54*	-7,42*	-	-	-	-	-	-
GW	-0,34	-0,70	-0,51	-6,04*	-6,41*	-6,09*	-	-	-
				After The 2008 Crisis					
P	0,14	-3,64**	6,46	-4,13*	-3,89**	-1,42	-4,82*	-4,81*	-4,93*
PE	6,89	-13,30*	12,67	-13,04*	-14,88*	-1,78	-5,22*	-3,4***	-5,27*
GI	-3,55*	-4,04**	-3,48*	-	-	-	-	-	-
GW	-1,95	-1,90	-1,95	-4,10*	-4,03**	-4,13*	-	-	-

Note: Critical valuesof MacKinnon: α = 1% (*); α = 5% (**); α = 10% (***)

By the theorem of Engle and Granger (1987), a pair of variables is said to be cointegrated when there are somelinear combinations that produce stationary trend I (0). Meanwhile, a series of cointegrated non-stationary variables have deviating possibility in the short term but they should still lead to long-term equilibrium position through error correction mechanisms.

Table 2 show that there is a variable that requires differentiation more than once to reach the stationary nature. However, in general, it can be said that all the variables

have stationary properties and qualified to be used in dynamic analysis (Wickens and Brusch, 1998).

Cointegration Test

Granger Representation Theorem (1987) states that when two or more variables are stationary,there is possibly a stationary linear combination. Stationary linear combination is called the cointegration equation that leads to the implications of long-term equilibrium. Long-term equilibrium is achieved through cointegrationby estimating long-term relationships using the variables which are not stationary at zero degree.

Table 3
The Result of Johansen Cointegration Test of Phillips-Curve Conventional Model In The Period of 1998 Crisis and Prior to The Crisis; After The 1998 Crisis; and After The 2008 Crisis (Signifikansi 5% Terhadap*Trace Statistic*)

The Period of 1998 Crisis and Prior to The Crisis

Data Trend Test Type	*None No Intercept No Trend*	*None Intercept No trend*	*Linier Intercept No trend*	*Linier Intercept Trend*	*Quadratic Intercept trend*
Trace	1	2	2	2	2
		After The 1998 Crisis			
Trace	3	2	1	1	3
		After The 2008 Crisis			
Trace	3	3	3	2	3

*Critical values based on MacKinnon-Haug-Michelis (1999)

Johansen's cointegration test results using five assumptions on the Phillips-Curve Conventional model (Table 3) show that, in the period of crisis in 1998 and prior to the crisis, the period after the crisis of 1998 and the period after the crisis of 2008,it demonstrated the existence of a linear combination of a set of variables that establish the Phillips-Curve conventional model. Thus, the cointegration test results show that the time series variable is cointegrated. It means that there is a stable relation in the long term.

Table 4 shows that the five assumptions made in Johansen's cointegration method in all periods demonstrate the existence of a linear combination of a set of variables that establish the model of Augmented Phillips Curve. Thus, it can be concluded that the model built can form a long-term model that leads to equilibrium.

The Calculation Results of Error Correction Model (ECM)

In the real world, economic actors do not act spontaneously in response to the actions. Therefore, it requires a dynamic model, especially the error correction model. The existence of the error correction results in theerror correction coefficient that indicates

Table 4
The Result of Johansen Cointegration Test of Augmented Phillips-Curve Model In The Period of 1998 Crisis and Prior to The Crisis; After The 1998 Crisis; and After The 2008 Crisis (Signifikansi 5% Terhadap*Trace Statistic*)

The Period of 1998 Crisis and Prior to The Crisis

Data Trend *Test Type*	*None* *No Intercept* *No Trend*	*None* *Intercept* *No trend*	*Linier* *Intercept* *No trend*	*Linier* *Intercept* *Trend*	*Quadratic* *Intercept* *trend*
Trace	2	2	2	2	2
		After The 1998 Crisis			
Trace	2	3	1	2	4
		After The 2008 Crisis			
Trace	**4**	**4**	**2**	**3**	**4**

*Critical values based on MacKinnon-Haug-Michelis (1999)

the phenomenon of corrected deviation toward equilibrium. With the ECM, it can be identified whether the observed variables are co integrated or not. It is indicated by a significant error correction term.

To analyze the data,the three periods were examined, i.e. the crisis period of 1998 and before the crisis (1990q1-1998q4); the period after the crisis of 1998 (1999q1-2008q2) and the period after the crisis of 2008 (2008q3-2014q4) .There are two models used to explain the existing problems, i.e. the model of Conventional Phillips Curve to see the sensitivity of inflation to the output gap of Indonesia, and the second model is Augmented Phillips Curve to see the effect of globalization on inflation by including the variables of the world output gap into the model of Conventional Phillips Curve.

Analysis to the Model of Conventional Phillips Curve

The model of Conventional Phillips-Curve shows the relation between domestic inflation and the output gap Indonesia by adding the price expectations. The estimation results that have been freed from the deviation of classic assumption is shown in Table 5.

Table 5 shows that the error correction term (ect) in the model of Conventional Phillips-Curve in the crisis period of 1998 and prior to the crisis isnegative significant; likewise, with ectin the period after the 1998 crisis and after the crisis of 2008. The significant ect indicates the validity of the model specification and shows the cointegration between the variables. The negative sign indicates the error term which is getting smaller until it reaches the equilibrium and not explosive. How quickly the process toward the equilibrium is dependent on the value of the coefficient of error term that indicates the speed of adjustment towards the equilibrium.

The estimation results of the 1998 crisis and prior to the crisis show the sensitivity the domestic inflation to the variable of the domestic output gap in the short term at

Table 5
Estimation Result of Conventional Phillips-Curve Model

	Periode		
	The Period of 1998 Crisis and Prior to The Crisis	*After The 1998 Crisis*	*After The 2008 Crisis*
C	0.099165	-0.138045	-0.237886
PE(-1)	0.090838	-0.085054	-0.051002
GI(-1)	2.538026*	1.796993***	0.375487
D(PE)	1.812668	1.665070	8.427626**
D(GI)	-1.095519*	- 0.260730	0.187732
Ect0(-1)	-0.486967*	- 0.342948*	- 0.568430**
R^2	0.830555	0.398557	0.525954
R^2 Adjusted	0.799176	0.301550	0.407443
F-statistik	26.46878*	4.108538*	4.438006*

Note: (*)Significantat 1%; (**) Significantat 5%; (***)Significantat 10%

1.095519. But in the period after the 1998 crisis and after the crisis of 2008, the domestic output gap variable becomes insignificant. In the long term, the variable of the domestic output gap was significant in the crisis period of 1998 and prior to the crisis, and in the period after the crisis 1998. The coefficients in the crisis period of 1998 and before the crisis were 2.538026, and then changed to 1.796993 in the period after the crisis of 1998. It means that the variable of the output gap of Indonesia is sensitive for the period. But the sensitivity of inflation to output gap of Indonesia shows a decline. These findings indicate the recognition of the potential of global factors in influencing inflation in Indonesia along with the weakening of domestic factors. This is in line with the findings of Borio-Filardo (2007).

The variable of inflation expectation is significant in the short term only to the period after the 2008 crisis with the significance level of five per cent and with the coefficient of 8.427626. In the long term, inflation expectation variable is not significant at all periods. This could happen because the inflation in Indonesia is possibly a backward-looking phenomenon and not the forward-looking one as indicated by the model of traditional Phillips-Curve.

Thus, domestic factor (domestic output gap) influence the inflation in Indonesia, both in the short term and long term, only in the crisis period of 1998 and before the crisis. In the period after the crisis of 1998, these effects occurred only in the long term and they were not significant in the short term. It shows that inthe long-term, there was a decline in the sensitivity of inflation to domestic factor. Even, in the period after the 2008 crisis, domestic factor was insignificant either in a long-term and short-term. Thiscould happen because Indonesia's dependence on foreign was getting greater. The dependence can be seen in the export and import condition in Indonesia. The increase in imports was in line with increased exports. When the exports increased,

the import automatically increased. In other words, Indonesia's dependence on imports was very large because many of Indonesia's imports were in the form of the imports of capital goods and raw materials. These findings indicate the recognition of the potential of global factors in influencing the inflation in Indonesia with the weakening of domestic factors. This is in line with the findings of Borio-Filardo.

Analysis to the Model of Augmented Phillips Curve

The model of Augmented Phillips Curve in this research was the model of New Keynesian Phillips Curve by including a variable of the output gap of the world. The model demonstrates the existence of global effects in the determination of inflation in Indonesia. Thus, based on the estimation result, it can be identified whether the hypothesis of Borio-Filardo (2007) was also proven to be experienced by Indonesian, or otherwise, as the research of Ball (2006) or Ihrig et al (2007).

Based on Table 6, in the short term, the output gap of Indonesia was significant in the period of the crisis in 1998 and prior to the crisis, as well as in the period after the crisis of 1998. However, in the period after the 2008 crisis, the variable was not significant. The elasticity of the output gap of Indonesia also shows a decrease from 0.351865 to 1.76352. The decline in the elasticity shows a decrease in the sensitivity of inflation to the output gap of Indonesia.

In the long term, the level of significance of the output gap of Indonesia in the period of the 1998 crisis and prior to the crisis and the period after the crisis of 1998 is one percent. However, in the period after the crisis of 2008, the output gap of Indonesia was not significant. The elasticity of the variable declined from 2.438147 to 2.236776. It shows a decrease in the sensitivity of inflation to output gap of Indonesia, both in the short-term and long-term. Thus, the estimation results of the model of Augmented Phillips Curve support the estimation results of the model of conventional Phillips-Curve.

The variable of the world output gap in the short term was not significant at all periods. However, in the long term, the variable indicates that global effects can not be ignored. This happened because in the crisis period of 1998 and before the crisis, the output gap of the world did not have the effect on inflation, but in the period after the crisis of 1998 the output gap of the world had the effect on the inflation in Indonesia with the significance level of one per cent. Then, in the period after the 2008 crisis, the output gap of the world also showed its significance. But the sensitivity of inflation to the output gap of the world shows a decrease from 2.135464 to 0.905943.

The variable of price expectation was only significant in the period after the 1998 crisis and after the crisis of 2008 in the short-term. In the long-term, price expectation variable was only significant in the period after the crisis of 1998. It means that phenomenon of inflation in Indonesia tend backward looking.

Table 6
Estimation Result of Augmented Phillips-Curve Model

	Periode		
	The Period of 1998 Crisis and Prior to The Crisis	*After The 1998 Crisis*	*After The 2008 Crisis*
C	0.090030	- 0.889852*	- 0.309982***
PE(-1)	0.048683	- 0.351436*	- 0.064111
GI(-1)	2.438147*	2.236776*	0.596716
GW(-1)	0.485814	2.135464*	0.905943**
D(PE)	0.830509	7.556739*	10.06382**
D(GI)	-1.176352*	- 0.351865***	0.132256
D(GW)	0.224432	- 0.126882	0.116228
ECT11(-1)	-0.673108*	- 0.505942*	- 0.618473**
R^2	0.845113	0.454521	0.562738
R^2Adjusted	0.801744	0.327243	0.392692
F-Statistik	**19.48680***	**3.571080***	**3.309323****

Note: (*)Significantat 1%; (**) Significantat 5%; (***)Significant at 10%

Therefore, the estimation results show that the sensitivity of inflation to output gap of Indonesia decreased from a period of crisis in 1998 and before the crisis to the period after the 1998 crisis both in the short-term and long-term. In other hand, output gap of the world was only significant in the long term; in the period after the crisis of 1998 and the period after the crisis of 2008. It means that inthe period of 1998 crisis and before the crisis, in the long term, domestic inflation wasonly influenced by the domestic output gap. Whereas in the period after the crisis of 1998, domestic inflation not only influenced by the domestic output gap but also the world output gap. But, in the period after the crisis of 2008, only the output gap of the world influenced the inflation in Indonesia.

The estimation results of the model of Augmented Phillips Curve are not much different from the conventional Phillips-Curve. Based on the estimation of the model of Augmented Phillips-Curve, it shows that what is assumed from the estimation of the conventional Phillips-Curve it is proven to occur. When domestic factor (output gap of Indonesia) had no effect (in the period after the 2008 crisis), domestic inflation was influenced by foreign factors (output gap of the world).

Surprisingly, these results indicate that the increasing openness of the economy of Indonesia led to the declining role of domestic factors and the increasing role of foreign factors in influencing inflation in Indonesia.

The implication is, as significant global effect on inflation in Indonesia, the ability of Bank of Indonesia in controlling inflation will be more difficult because the foreign factor has greater effect on inflation in Indonesia. Meanwhile, the foreign factors are external factors, beyond the power of Bank of Indonesia to control. On the other hand,

the ability of domestic factors in determining inflation begins to decline. Even in the period after the crisis of 2008, only foreign factors (output gap of the world) that influenced domestic inflation, while domestic factors (output gap of Indonesia) had no effect on domestic inflation. However, Bank of Indonesia (BI) can still hope from inflation expectation in determining inflation in Indonesia. Therefore, Bank of Indonesia should be able to maintain the credibility of its inflation target so that economic actors are easier to make economic decisions.

5. CONCLUSION AND POLICY IMPLICATION

The analysis results show the declining role of domestic factors (output gap of Indonesia) in determining inflation in Indonesia. Even in the period after the 2008 crisis, domestic factors did not influence inflation in Indonesia. Meanwhile, foreign factors (output gap of the world) had just influenced inflation in Indonesia in the period after the crisis of 1998 and the period after the crisis of 2008. The declining role of domestic factors and the prominence of foreign factors in influencing inflation in Indonesia in the long term show that global factors can not be ignored in determining inflation in Indonesia. Thus, after the crisis, both the crisis of 1998 and 2008, it shows the foreign effects in the determination of inflation in Indonesia. Particularly, after the crisis of 2008, inflation in Indonesia was no longer influenced by domestic factors, but only influenced by foreign factors.

These research have three ways: *the first* that the Bank of Indonesia (BI) should take into account global factors in determining the inflation target in Indonesia. In fact, global factors are external factors, and they are beyond the power of BI to control. *The second* that the duties of BI will become increasingly difficult with more involvement of global factors in determining inflation in Indonesia. Therefore, it is important for the Bank to cooperate with both central and local government in controlling inflation. And *the third*, the central bank must cooperate with other countries in order to control the world's inflation so that the central bank still has the ability to control domestic inflation.

References

Ball, L. M. . (2006). Has Globalization Changed Inflation? *National Bureau of Economic Research, No. 12687*.

Bernanke, B. S. (2007). Globalization and Monetary Policy. (Remark by the Chairman of The Board of Governors of The US Federal Reserve System, at The Economic Summit).

Borio, C.; and A. Filardo. (2007). Globalization and Inflation: New Cross-Country Evidence on The Global Determinants of Domestic Inflation. *Bank For International Settelements BIS Working Papers, No. 227*.

Calvo, Guilermo A. (1983). Stagerred Prices in a Utility Maximizing Framework. *Journal of Monetery Economics, 12*, 383-398.

Carlstrom, C. T. dan T. S. Fuerst. (2006). Central Bank Independence and Inflation: A Note. *Federal Reserve Bank of Claveland Working Paper No. 06/21*, 1-11.

Cheung, Yin-wong dan Kon S. Lai. (1995). Lag Order and Critical Values of The Augmented Dickey-Fuller Test. *Journal of Business and Economic Statistics, 13 No. 3*.

Cote, Denise dan Carlos De Resende. (2008). Globalization and Infalation: The Role of China. *Bank of Canada Working Paper 2008-35*.

Domowitz, I. dan L. Elbadawi, 1987, An Error-Correction Approach To Money Demand: The Case of The Sudan, J*ournal of Development Economics*, 26: 257-275.

Engel, Charles. (2012). Inflation and Globalisation: A Modelling Perspective. *BIS Working Papers, No. 70*.

Engle, R. F. dan C. W. J. Granger. (1987). Cointegration and Error Correction: Representative, Estimation and Testing. *Econometrica, 55 No.2*.

Frankel, J. dan L. Willard. (2006). What Do Economist Mean by Globalization? Implications for Inflation and Monetary Policy. *www.ksghome.harvard.edu.*

Gali, J. dan Gertler, M. (2000). Inflation Dynamic: Structural Econometric Analysis. *NBER Working Paper Series*.

Gujarati, D., & Porter, dan Dawn C. (2009). *Basic Econometrics*. Singapore: McGraw-Hill Companies.

Ihrig, Kamin, Lindner dan Marquez. (2007). Some Simple Test of The Globalization and Inflation Hypothesis. *International Financial Discussion Papers-Board of Governors of The Federal Reserve System, No. 891*.

IMF. (2006). How Has Globalization Affected Inflation? *World Economic Outlook, Chapter III*.

Insukindro (1999), Pemilihan Model Ekonomi Empirik Dengan Pendekatan Koreksi Kesalahan, *Jurnal Ekonomi Dan Bisnis Indonesia*, Vil. 14, no. 1, 1-8.

Leeper, E. M. (1991). Equilibria Under Active and Passive Monetary and Fiscal Policies. *Journal of Monetary Economics, 27*(1), 129-147.

McCandless, G.T. Jr and Weber W. E. (1995) Some Monetary Fact, *Quarterly Review Vol. 19 No. 3* Federal Reserve Bank of Mineapolis

Mukherjee, T. K. and Naka, A (1995), Dynamic Relations Between Macroeconomic Variables and The Japanese Stock Market: An Aplication of a Vector Error Correction Model, *Journal of Financial Research*

Pain, N., I. Koske dan M. Sollie. (2006). Globalization and Inflation in The OECD Economies. *OECD Economics Department Working Paper, No. 524*.

Parkin, Michael. (2008). *Macroeconomics*: Pearson Addison Wesley.

Pehnelt, Gernot. (2007). Globalisation and Inflation in OECD Countries. *ECIPE Working Paper, No.4/2007*.

Rogoff, K. (2003). Globalization and Global Disinflation. *Federal Reserve Bank of Kansas City*.

Romer, D. (1993). Openness and Inflation: Theory and Evidence. *Quarterly Journal of Economics, 108 (4)*, 865-903.

Rumler, F. (2007). Estimate of The Economy New Keynesian Phillips Curve for Euro Area Countries. *Open Economy Review, 18*, 427-451.

Thomas, R. L. (1997). *Modern Econometrics: An Introduction*: Addition-Wesley.

Tootell, Geofrey M. B. . (1998). Globalization and U. S. Inflation. *New England Economic Review*.

Vega, M. dan D. Winkelried. (2005). Inflation Targeting and Inflation Behavior: A Successful Story? *International Journal of Central Banking, 1 (3)*, 253-175.

Wickens M. R. and Breusch, T.S. (1988), Dynamic Specification, The Long Run and The Estimation of Transformed Regression Models, *The Economic Journal, Vol. 98 No. 390, pp 189-205*.

Woodford, Michael. (1995). Price Level Determinacy Without Control of A Monetary Aggregate. *NBER Working Paper 5204*.

Wynne, M. A. dan E. K. Kersting. (2007). Opennesss and Inflation. *Federal Reserve Bank of Dallas, Staff Paper No. 2*.