



Relationship Analysis of HNKPC and Monetary Policy on a NCM Framework in ASEAN-3

Shella Elly Sritrisniawati¹, ²Evi Gravitiani, ³Guntur Riyanto

^{1,2,3,4}Faculty of Economics and Business, Universitas Sebelas Maret, Surakarta

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Abstract

The Hybrid New Keynesian Philips Curve (HNKPC) is an update of the Philips Curve. HNKPC discusses the combination of forward looking and backward looking on the inflation rate. In this case, the shock of the inflation rate to the unemployment rate will be analyzed according to the HNKPC. The dynamics of inflation used from the monetary policy aspect is the inflation targeting framework (ITF). This research will also combine the inflation rate of various elements in the new consensus macroeconomic framework in ASEAN-3 as an up-to-date research idea. The object of analysis used is ASEAN-3 covering Indonesia, the Philippines and Thailand. The method used in this research is Structural Vector Autoregression (SVAR) in the first quarter of 2000 – 4th quarter of 2021. The results of the SVAR find that inflation fluctuations are backward looking and forward looking in accordance with the HNKPC concept of the full unemployment rate in Indonesia, according to some in Thailand and not in the Philippines. The ITF is a monetary policy whose annual inflation target is determined by the central bank in accordance with the new consensus macroeconomic perspective.

Key words: HNKPC, monetary policy, NCM, SVAR

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¹ Corresponding author :
Address: Jl. K. Solikhin, RT 01 / RW 01, KKelurahan Paju,
Ponorogo
E-mail: shellasritrisniawati@gmail.com

INTRODUCTION

Along with the times, the Phillips curve underwent changes and updates according to Gali & Gertler (1999), namely the New Keynesian Phillips Curve (NKPC) to Hybrid New Keynesian Phillips Curve (HNKPC). The difference between the two is that NKPC still includes price rigidity, while HNKPC has included price expectations where prices are more flexible. The HNKPC model has included a monetary policy regarding price stability. In this model, it discusses the expected inflation rate or forward looking and the previous inflation rate (backward looking). So, forward looking can be defined as the target and expectation of inflation in the future, then backward looking is defined as previous inflation which will affect current inflation (Chowdhury & Sarkar, 2014). In this case, inflation is forward looking and backward looking in another sense as the lag of the inflation rate.

Based on the New Keynesian Phillips Curve (NKPC) which is a Dynamic Stochastic General Equilibrium (DSGE) model or a dynamic stochastic general balance model for the study of monetary policy and business cycle fluctuations (Chauvet, Hur, & Kim, 2017). The Phillips curve model commonly used in modern macroeconomics is the Hybrid New Keynesian Phillips Curve (HNKPC) model linking the past inflation rate and inflation expectations which states a short-term trend-off between inflation and unemployment, while the long-run balance length of constant inflation at the Non-Accelerated Inflation Rate of Unemployment (NAIRU). Unemployment occurs because of an imbalance in the labor market. The number of labor force is not proportional to the number of jobs. Unemployment becomes a problem in the economy because of the low level of productivity and income of the community so that it can lead to poverty and

other social problems (Seruni, 2012). Unemployment can also cause a decrease in per capita income and a country's gross domestic product (GDP) and gross national product (GNP).

Results from Chauvet, Hur, & Kim (2017), show that this is not in accordance with the prediction of HNKPC with a lag of inflation. Research find that the expected value of future output plays an important role in determining the dynamics of inflation. The overall results find that the HNKPC model with inflation lag is supported by the data and consistent with the predictions. The results of the study explain that the confusing negative dependence on inflation lies in the lag it self so that it is formed by a hybrid model with inflation lag.

The crisis that occurred in the financial market where the money supply (monetary aggregate) became unstable, resulting in a new framework for monetary policy (Fontana, 2014; Lazaro & Perrotini, 2014). In this regard, this research refers to the monetary policy carried out by the central bank within the framework of the new macroeconomic consensus. The central bank makes efforts to control the inflation rate by using the inflation targeting framework (ITF) policy. After the monetary crisis, several central banks in Latin America, Asia, Europe, Brazil, Chile, and Mexico began to adopt inflation-targeting monetary policies supported by the New Consensus Macroeconomics (NCM) framework (Arestis, Chortareas, & Tsoukalas, 2010). In the new consensus macroeconomics, there are several models, the model related to unemployment and inflation, namely the inflation adjustment equation (IA). The model in equation IA has included the forward element. Policy makers, in this case the central bank, also pay attention to the rational expectations of the public. The central bank's policy of transmitting monetary policy uses the inflation targeting framework (ITF) in influencing the level of output and unemployment. When compared to the previous

monetary model, the new macroeconomic consensus model has made significant progress, namely changes that lead to a non-quantity framework in monetary policy. The non-quantity theoretical framework has demonstrated flexibility that is able to cover the novelty of the hypothesis, the expectation or expectation as well as the inertia of the Phillips curve.

In this regard, the rational expectation hypothesis is built based on people's behavior. Thus, this study analyzes the relationship and influence of inflation dynamics from various elements including

ITF monetary policy and backward and forward looking inflation on the unemployment rate in ASEAN-3. The research object of ASEAN-3 includes Thailand, the Philippines and Indonesia because three countries adopted the ITF policy first. The application of ITF in 3 ASEAN countries namely Thailand, the Philippines and Indonesia is supported by research (Pratama, 2018). The selection of the scope is expected to contribute to scientific thinking, especially to advance developing countries in the ASEAN region. The monetary policies adopted in ASEAN 3 countries are shown in Table 1 such as:

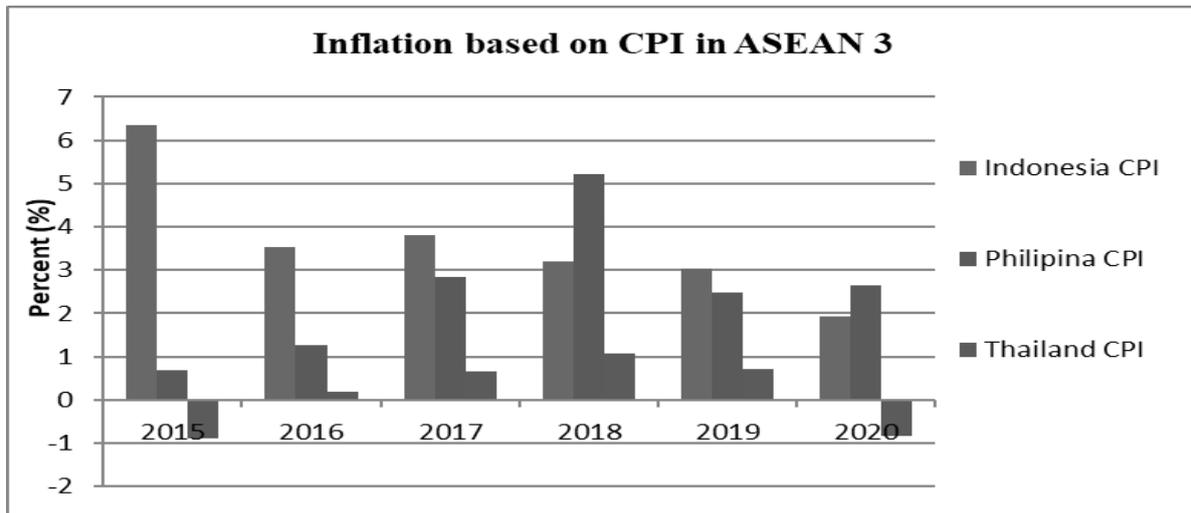
Table 1. Monetary Policy in ASEAN 3

Country	Monetary Policy	Indicator and Target
Indonesia	Inflation targeting since 2000 Inflation Targeting Lite (ITL)	Indicator : CPI/IHK Target on 2021 : 3,0 ± 1%
Filipina	Inflation targeting since 2002 Inflation Targeting Lite (ITL)	Indicator : CPI Target on 2021 : 3,0 ± 1%
Thailand	Inflation targeting since 2000 Full-Fledged Inflation Targeting (FFIT)	Indicator : Core CPI Target on 2021 : 3,0 ± 1%

Source: Central Bank of each country

The conception of NCM is obsessed with inflation targeting to achieve full employment. (Arestis & Sawyer, 2008) emphasize that macroeconomic policies cannot independently achieve full employment without other supporting policies. In targeting inflation, it is necessary to develop policies even to the regional level so that inflation is at its lowest point. The policy is a contribution to the development of alternative economic policies to achieve this goal. The inflation targeting framework (ITF)

explains that the ITF is a new approach in monetary policy that uses inflation as the main target that replaces the money supply. The ITF has been criticized for its policies that prioritize stabilization and can come at the expense of the unemployment rate. Annazah & Rahmatika (2019), explained that the ITF's monetary policy framework can address changing economic dynamics and challenges. The explanation gave rise to a research gap, so in this study, further analysis will be made of the relationship between the ITF and the unemployment rate.



Source: World Bank, processed

Figure 1. The Development OfThe ASEAN 3 Inflation Rate

Efforts to achieve stable inflation rate to achieve economic growth goals. The Covid-19 pandemic has affected consumer spending patterns in many countries around the world. The inflation rate in the Philippines in 2020 rose beyond the target of both the negative CPI inflation. Inflation in Q1 2021 was 4.5 percent, although on average per year it was still stable in the Philippines (Bangko Sentral Ng Philipinas, 2021). In Figure 1. The inflation rate in Thailand when measured from the CPI indicator is in the target range of negative 0.8 percent (Bank of Thailand, 2021). Meanwhile, the inflation rate in Indonesia is within the target range, both in terms of CPI. This is due to more effective financial stability and the transition to technological progress. This is because Bank Indonesia strengthened its exchange rate stabilization policy, although domestic demand was still weak so that inflation expectations were still within the target range (Bank of Indonesia, 2021).

METHOD

This study uses the method of Structural Vector Autoregression (SVAR). The time range used is 2000 - 2021 with quarterly data. The object of analysis is ASEAN 3 (Indonesia, the Philippines, and

Thailand). The data sources used are from the International Monetary Fund (IMF), World Bank, ASEAN Secretariat, Asian Development Bank (ADB), Climate watch data, Climate change indicator dashboard and the central banks of each ASEAN 3 country including Bank Indonesia (BI), Bangko Sentral ng Pilipinas (BSP) and Bank of Thailand (BOT).

In this study, adopting the model specifications from Abbas & Sgro (2011) and Teapon & Mustafa (2018), the equations in this study are as follows:

$$UNEMP_t = \beta_0 + \beta_1CPI_{t-1} + \beta_2CPI_{t+1} + \beta_3ITF_t + e_t \quad (1)$$

Noted :

UNEMP : Unemployment Rate

CPI_{t-1} : Inflation of Consumer Price Index (CPI) Backward Looking

CPI_{t+1} : Inflation of Consumer Price Index (CPI) Forward Looking

ITF : Inflation Targeting Central Bank

t : Year in t

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$: Constant/ Intercept

e : error term

This study was formed research hypotheses, namely that it is suspected that there are impacts, effects and shocks between the concept of HNKPC inflation, namely forward looking and backward looking inflation variables, monetary policy inflation targeting

framework (ITF) in accordance with research by (Fontana, 2014; Paula & Saraiva, 2016; Hervino, 2016). The relationship between the inflation rate variable and the unemployment rate in the short term is suspected to show a significant negative relationship according to the research of Medel (2018), Inflation targeting framework (ITF) which reflects the effectiveness of monetary policy is thought to have a significant relationship to unemployment (according to the research of (Dias, Teixeira, & Dias, 2013; Paula & Saraiva, 2016).

The SVAR model has advantages over traditional large-scale macro-econometric models because the results are represented by an easy-to-interpret structure. SVAR estimation is also used to obtain non-recursive error terms in the impulse response function (IRF) analysis framework. The SVAR model can be used to investigate the impact of individual shocks. The IRF test in the SVAR model can display the effects of shocks that affect variables over time. The SVAR approach in dealing with the degree of freedom problem can include several variables with a lot of lag. The determination of lag is carried out by using the optimum lag test to obtain the most suitable SVAR model. In this test, there are several criteria used, including the Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and Hannan Quinn Information Criterion (HQ). In this study, the three criteria will be compared to get the most suitable lag. The

next test is the stability test of the SVAR model. The results of the model stability test are also useful for Impulse Response Function (IRF) analysis. The condition for the stability test of the SVAR model is that the value of the roots of the model is less than 1, meaning that it is still in the unit circle and is stable. Stability test will show the ability of a model in research in doing forecasting (forecasting) in determining a policy. The next step is the Impulse Response Function (IRF). Impulse Response Function (IRF) is used to show the impact of shocks between variables (Damayanti, 2014; Khaliq, 2017). IRF shows a shock between variables. (Teapon & Mustafa, 2018) explain that IRF analysis is to determine the response of an endogenous variable to shocks of certain variables.

RESULTS AND DISCUSSION

In this analysis, before using the Structured Vector Autoregressive (SVAR) method, several tests will be carried out including the optimum lag test, model stability test and impulse response function (IRF). The test steps are as follows.

Optimum lag test aims to find the best lag length for estimation. The length of the lag can have an influence on the estimation and avoid the occurrence of autocorrelation and heteroscedasticity problems. The use of lag serves to determine the length of influence between variables. In this study, the optimum lag test used Akaike Information Criterion (AIC), Schwarz Criterion (SC), Hannan Quinn (HQ) and Final Prediction Error (FPE).

Table 2. Optimum Lag Test Results in ASEAN-3

Country	Lag	AIC	SC	HQ	FPE
Indonesia	2	2	2	2	2
Filipina	2	6	2	2	2
Thailand	2	2	2	2	2

Source: Estimated Results, processed

Based on Table 2. the results of the optimum lag test in Indonesia by determining the AIC, SC, HQ and FPE approaches all show lag 2. These results indicate the overall optimal lag that can be used in estimation. In the estimation of the State of Indonesia, the fast grace period in responding to the influence between variables optimally is 2. The Philippines lag test shows lag 2 by determining the SC, HQ and FPE approaches, while AIC shows lag 6. Overall, the optimal lag that can be used is 2 although does not rule out the possibility of up to lag 6. The fast grace period in responding to the influence between variables in the Philippines is 2 and the most optimal is 6. The optimal lag test value in

Thailand shows the same value as in Indonesia. With the determination of the AIC, SC, HQ and FPE approaches, all of them show lag 2. The estimation in Thailand is lag 2 as a fast grace period in responding to the influence between variables optimally.

Model stability testing is one of the most important tests in research, due to obtain a stable SVAR model. The results from the model stability test are also useful for Impulse Response Function (IRF) analysis. The condition for the stability test of the SVAR model is that the value of the roots of the model is less than 1, meaning that it is still in the unit circle and is stable. The results of the model stability test in ASEAN 3 are as follows.

Table 3. Stability Test Results of SVAR Model in ASEAN 3

Indonesia		Filipina		Thailand	
Value of Roots Model	Note	Value of Roots Model	Note	Value of Roots Model	Note
0.9933032		1.0061838	Unstable	0.9961361	
0.9641753		0.9295932		0.9340946	
0.9457923	Stable	0.9295932		0.8900248	Stable
0.6856437		0.6949187	Stable	0.6918801	
0.5679705		0.6949187		0.6862561	
0.5679705		0.5132456		0.3192943	

Source: Estimated Results, processed

The results of testing the stability of the SVAR model in Indonesia show that the value of the roots model is less than 1, meaning that the Indonesian SVAR model is stable. Likewise, in Thailand the results of the roots model value of less than 1 have stability in the same model as in Indonesia. Meanwhile, in the SVAR model in the Philippines, there is one result of a root value of more than 1, but when viewed from the other roots values, which have many values less than 1, it can be concluded that the Philippines SVAR model is quite stable. Thus, it can be concluded that the SVAR model in Indonesia, the Philippines and Thailand has been stable. These results

can be used for further analysis on the Impulse Response Function (IRF).

Impulse Response Function (IRF) analysis describes information about one of the endogenous variables' responses to the change in one standard deviation of all endogenous variables. This change is to see the impact or shock of one of the endogenous variables caused by all the encoding variables. An analysis used to determine the response to a shock, shock or change in error on endogenous variables in the VAR or SVAR system. The IRF test in this study used 10 periods based on the maximum lag magnitude to determine the response between variables.

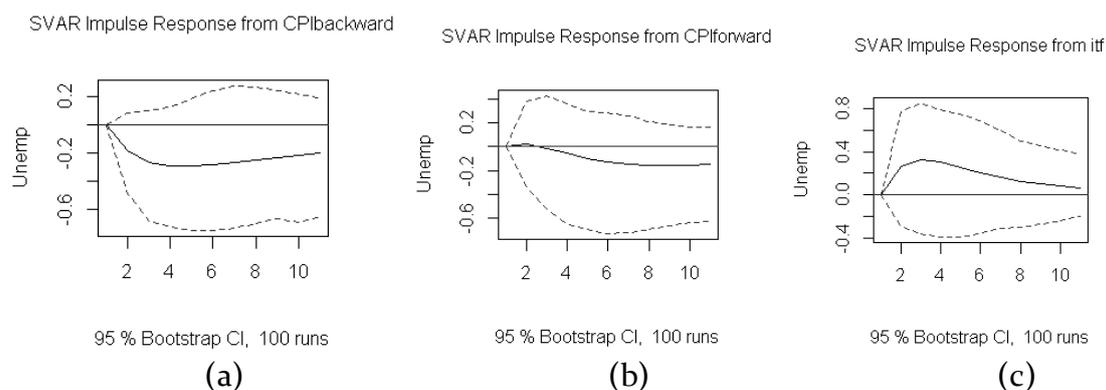


Figure 4. IRF Results in Indonesia

For the impulse CPI backward response unemp, results of the IRF test in Indonesia are shown in Figure 4a. illustrates that there is a negative influence between the variable CPI backward (backward looking inflation) on Unemp (unemployment rate). The unemployment rate variable responds if there is a shock to the backward CPI (past inflation). The negative response starts from the beginning of the period to the 10th period, then it will return to the balance point. Based on the results of the IRF between the variable unemployment rate and past/ previous inflation which has a negative effect in accordance with the theory of the hybrid new keynesian Phillips curve (HNKPC). The inflation rate in the previous period can also have a negative effect on the current unemployment rate. In line with research conducted by Seruni (2012), explained that there is a negative relationship between inflation and unemployment in ASEAN countries with the Phillips curve framework.

For impulse CPI forward response unemp, the Unemp variable (unemployment rate) responds to the fluctuating shocks from CPI forward (expectations of inflation/ Inflation to come). The shock from the expectation of future inflation has not yet been responded to, but after the second period, the unemployment rate has responded negatively. In the next period the

fluctuations are getting smaller, which means the unemployment rate will return to balance. CPI forward results are the same as CPI backward although the effect is not as large as CPI backward. Based on the results of the IRF in Figure 4b. It is shown that the expectation of future inflation on the unemployment rate has a negative effect like the effect of previous inflation. However, the magnitude of the response received by the unemployment rate was not as large as the shock caused by previous inflation. This can be interpreted that previous inflation is more influential than expectations of future inflation due to the behavior of the public who will be more vigilant and anticipate economic conditions that occurred previously.

In ITF and IRF response unemp, the IRF test on the ITF variable against Unemp in Indonesia is shown in Figure 4c. Shocks to the ITF responded positively to the unemployment rate. At the beginning of the period the fluctuations are at the highest level between periods 2 and 4, then in the next period the fluctuations tend to decrease at the end of the period. After the 10th period it will stabilize and go to equilibrium. The ITF policy in Indonesia was responded positively by the unemployment rate. This condition is in line with the expectations of the central bank which is trying and trying to stabilize the inflation rate. ITF policies that are useful for keeping the inflation target in line with the target can control the unemployment rate.

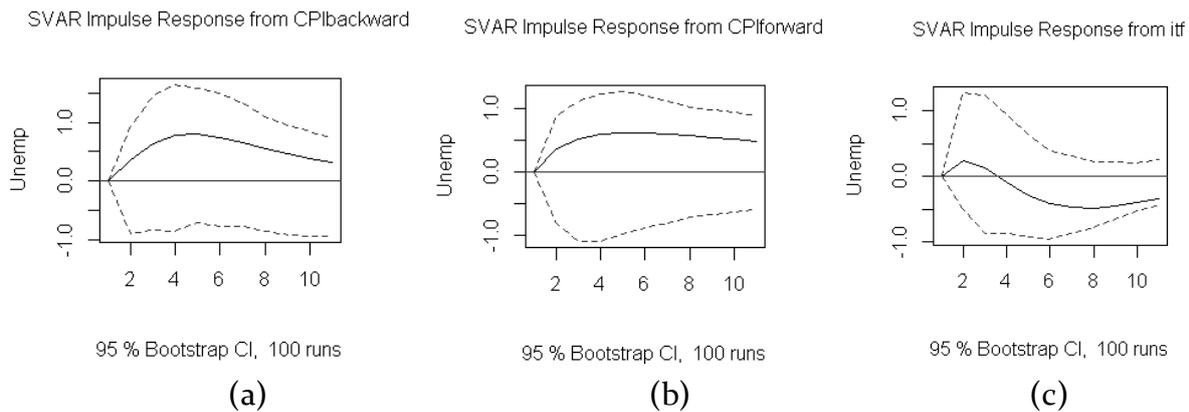


Figure 5. IRF Results in Filipina

In impulse CPI backward response unemp, IRF testing on the CPIbackward variable on the Unemp variable response is depicted in Figure 5a. The previous inflation response to the unemployment rate in the Philippines was different from the results in Indonesia. The previous positive response to inflationary volatility was the unemployment rate in the fourth period, then it would decline again in the next period. In the 10th period will begin to return to the equilibrium point. The results of the IRF between the previous inflation variable, namely year $t-1$ on the unemployment rate in the Philippines which has a positive effect, are not in accordance with the theory of the hybrid new keynesian Phillips curve (HNKPC). The unemployment rate in the Philippines can be caused by the current inflation rate or it can also be influenced by other factors that are not included in the research model.

In impulse CPI forward Response Unemp, figure 5b shows the IRF results from the CPI forward variable (inflation expectations) to Unemp (unemployment rate). The shock of the inflation expectation variable was responded positively by the unemployment rate. Fluctuations due to shocks occurred at the beginning of the period until the end of the period with a stable level, even at the end of the period only experienced a slight decline and had not yet reached the equilibrium level. The results of

the IRF between the inflation expectations variable, namely year $t+1$ on the unemployment rate in the Philippines, are the same as inflation in the previous period which has a positive effect, so it is not in accordance with the hybrid new keynesian Phillips curve (HNKPC) theory. The unemployment rate in the Philippines can be caused by the current inflation rate or it can also be influenced by other factors that are not included in the research model.

In impulse ITF response unemp, figure 5c shows the results of the IRF variable ITF against Unemp in the Philippines. The relationship between the ITF and Unemp variables illustrates that if there is an ITF shock, the unemployment rate will be responded positively by the unemployment rate at the beginning of the period until the 3rd period. The next period the unemployment rate response will be negative until the end of the period. The lowest peak in the 8th period will then go to point 0 or the equilibrium point. Based on the IRF analysis of the ITF monetary policy on the unemployment rate, which initially had a positive effect, then it became negative. In this case, it can be interpreted that the monetary policy of the ITF was initially determined to be less than optimal due to the shift from the money supply policy to the ITF. After the optimal ITF policy can reduce the unemployment rate.

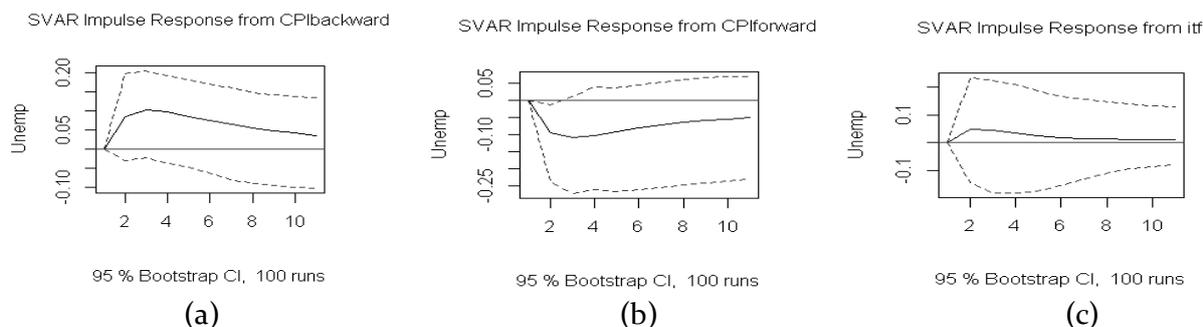


Figure 6. IRF Results in Thailand

The impulse CPI backward response unemp, the IRF test in Figure 6a in Thailand illustrates that if there is a shock to the CPI backward variable, the Unemp variable responds positively. The highest point in the 3rd period then in the next period will decrease towards the equilibrium point until the end of the period. The results of the IRF variable CPI backward to the Unemp response are the same as in the Philippines. The results of the IRF between the previous inflation variable, namely year $t-1$ on the unemployment rate in the Philippines which has a positive effect, are not in accordance with the theory of the hybrid new keynesian Phillips curve (HNKPC). The unemployment rate in the Philippines can be caused by the current inflation rate or it can also be influenced by other factors that are not included in the research model.

The impulse CPI forward response unemp, the results of the IRF test between the shocks of the CPI forward variable responded negatively by the Unemp variable as shown in Figure 6b. At the beginning of the period there was a shock with the highest point in the 3rd period, then the 4th period started to rise and approached the equilibrium point in the 10th period. The results of the IRF for the CPI forward variable had the opposite result with the IRF for the CPI backward variable in Thailand. Based on the results of the IRF, the expectation of future inflation on the unemployment rate has a negative effect. This can be interpreted

that inflation expectations that will come if the value is high will be able to reduce the unemployment rate, and vice versa. This condition is in accordance with the HNKPC where there is a trade off between inflation and unemployment.

The ITF response unemp, figure 6c shows the IRF results between the ITF variable and the Unemp variable response. In Thailand, the results of the IRF variable ITF are the same as the IRF variable GrGDP. The shocks from the ITF variable fluctuated slightly but only at the beginning until the fourth period. The next period until the 10th period, Unemp did not respond to ITF fluctuations, as evidenced by the line that coincided with the balance line. The relationship between the ITF variable and the Unemp variable has a positive direction. Based on the results of the IRF, the relationship between shocks from the ITF policy variables on the unemployment rate in Thailand only fluctuated at the beginning of the period, then had no impact on the unemployment rate. Although it has no impact, the positive direction of the relationship can be interpreted that the implementation of the ITF policy can increase the unemployment rate at first not optimally. The ITF policy is also set by the Central Bank which aims to maintain the inflation target, so that it is only an intermediate target so it is not fully aimed at achieving the unemployment rate.

Based on the results of using the Structural Vector Autoregression (SVAR) method based on the IRF test, it can be concluded that backward looking and forward looking inflation which is

in accordance with the hybrid new keynesian Phillips curve (HNKPC) concept of the unemployment rate is fully compatible in Indonesia, partially in Thailand and not suitable in the Philippines. In line with research conducted by Annazah & Rahmatika (2019), that the relationship between the unemployment rate and inflation in ASEAN 7 countries is still valid. The results in the Philippines are in accordance with Singh (2018), research which found that inflation has no significant effect on unemployment, the Phillips curve phenomenon does not occur in a country because it has included the element of inflation expectations. In Seruni (2012), explaining inflation is always interesting to discuss, especially related to the impact of unemployment. Inflation is an economic phenomenon that tends to occur in developing countries such as most ASEAN countries. Domestic policy failures or global issues can cause inflationary shocks or price fluctuations. The negative impact of inflation will be a decrease in production, the use of production factors becomes inefficient and there is a change in people's purchasing power and will eventually have an impact on demand so that economic depreciation can be created and the increase in production prices is not proportional to the increase in production, the reduction in labor creates high unemployment. Annazah & Rahmatika (2019), provide reasons that underlie unemployment always exists in the economy because of the conditions of the job search process, the time needed to get a suitable job, and also the existence of rigid wages. Wage Rigidity is caused by setting minimum wages, bargaining power of trade unions and efficiency in getting wages.

With regard to inflation and unemployment, the central bank can use the unemployment rate as a material to assess the effectiveness of the implementation of the inflation targeting framework (ITF) monetary

policy in a country. The monetary policy of the ITF in each of the 3 ASEAN countries, namely Indonesia, the Philippines and Thailand, is the same, fully determined by the policies of the central banks of each country, so the direction of the relationship is not directly related to the unemployment rate. The results of this study related to the ITF are supported by research Dhewanto & Maulina (2008), that the implementation of the ITF has not made a significant contribution, because in controlling inflation there is always a large gap between the inflation target and the realization of inflation. The ITF framework is a monetary policy in which the amount of the inflation target is determined annually by the central bank in accordance with the New Consensus Macroeconomic (NCM) perspective. The ITF framework in determining inflation targets in the medium and long term can provide freedom to achieve price stability, achieve output and unemployment levels. Azwar & Saragih (2018), and Annazah & Rahmatika (2019), explained that the ITF can have an influence on unemployment conditions. The application of the ITF is useful for pushing inflation expectations at the desired level. Economists have agreed that targeting inflation as the main monetary policy can affect real output and unemployment in the short term.

CONCLUSION

Based on the results of the partial analysis of the SVAR method, it was found that in each of the 3 ASEAN countries, namely Indonesia, the Philippines and Thailand, the independent variables were CPI $t-1$ (backward looking inflation), CPI $t+1$ (forward looking inflation) and ITF (Inflation targeting framework) has a different direction of relationship in each country. In Indonesia, backward looking inflation leads to a negative relationship, while forward looking inflation initially produces a positive direction but over time it can turn into

a negative relationship. The Philippines produces a positive relationship direction for these two variables. Meanwhile, for Thailand, backward looking inflation leads to a positive relationship and forward looking inflation leads to a negative relationship. It was concluded that the results in SVAR in Indonesia and Thailand were in accordance with the Hybrid New Keynesian Phillips Curve concept, but not in the Philippines. The direction of the Inflation targeting framework (ITF) relationship in the three countries resulted in the same direction, namely positive. It can be concluded that the monetary policy of the ITF in the three countries in controlling the inflation rate must be more optimal. Full control of the ITF is controlled by the central bank, which cannot directly affect the unemployment rate in accordance with the inflation adjustment in the new consensus macroeconomic framework.

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