

An Analysis on the Existence of Phillips Curve Theory in the Economy of North Sumatera in the Period of 2004-2015

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ABSTRACT

The objective of the research was to analyze whether Phillips Curve Theory is valid or not concerning inflation and unemployment in North Sumatera. The research used panel regression analysis, using E-views 7 software program. The population was North Sumatera Province and four inflation towns - Medan, Pematangsiantar, Padangsidempuan, and Sibolga in the research period of 2004-2015. The result of the research showed that the variable of inflation had positive and significant influence on unemployment rate. It indicated that the increase in inflation would cause the increase in the employment rate in North Sumatera so that it could be assumed that Phillips Curve theory could not describe the correlation between inflation and unemployment in North Sumatera.

Keywords: *Inflation, Unemployment, Phillips Curve, North Sumatera*

INTRODUCTION

Economic growth is one of the most important indicators in assessing the performance of an economy, especially to carry out an analysis of the results of economic development that has been carried out by a country or a region. The economy is said to experience growth if the production of goods and services increases from the previous year. Economic growth shows the extent to which economic activity can generate additional income or welfare for a certain period of time. Economic growth of a country or a region that continues to show improvement illustrates that the economy of the country or region is developing well through a process of economic development (Amir, 2008).

Economic development is a multidimensional process that involves major changes in social structure, public

attitudes, and national institutions, as well as economic acceleration, reducing inequality and eradicating absolute poverty (Todaro, 2000). Therefore, economic development cannot be measured solely from the growth rate of income or income per capita, but must also look at how the income is distributed to the population and know who benefits from the development.

Development in the Province of North Sumatra that takes place in a comprehensive and sustainable manner has improved the economy. Achieving the results of development that is felt by the community is an aggregate of development from 33 regencies and cities in North Sumatra Province which cannot be separated from the joint efforts of the government and the community. The potential of the region and natural resources can be seen as a comparative advantage for

the region, but on the other hand various obstacles such as human resources and sources of capital to exploit this potential are still faced by policy makers at both the provincial and district and city levels. As a result, the economic conditions of the community in general have not reached the same level of income equity and deficiencies are still found.

In the economy of a region, inflation and unemployment is one of the macroeconomic indicators that continues to get the attention of local governments. This is because the two indicators influence each other. Inflation is one of the important indicators in the economy that cannot be ignored, because it can have a broad impact on both the economy and the welfare of the wider community. While unemployment is a problem that has not been resolved to date, due to the lack of jobs available and the low skills and abilities individuals have to get jobs.

According to A.W. Phillips (1958) in his book entitled "The Relationship between Unemployment and the Rate of Change of Money Wages in the United Kingdom, 1861-1957" shows a negative correlation between unemployment and inflation. Phillips shows that the low unemployment rate tends to have high inflation, while high unemployment tends to have a low inflation rate (Mankiw, 2012). To find out the conditions of inflation and unemployment in North Sumatera Province in 2010 to 2015 can be seen in the following figure 1.1:

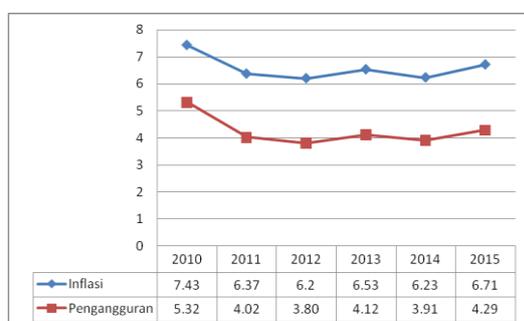


Figure 1.1 Inflation and Unemployment Rate in North Sumatera Province in 2010 - 2015 (%)

Figure 1.1 shows the movement of inflation and unemployment in 2010 to 2015 in North Sumatera Province. In general, based on Phillips's theory it is said that if the inflation rate rises, the unemployment rate is low. However, in figure 1.1, it can be seen that the movement of inflation appears to be increasing and decreasing along with the increase and decrease in the unemployment rate in North Sumatera Province.

In general, the Phillips curve states that if inflation increases then the unemployment rate will decrease. Conversely, if inflation decreases, the unemployment rate will decline. But from Figure 1.1 we can see that the alleged Phillips curve theory does not apply to describe the relationship of inflation and unemployment in North Sumatera Province. The phenomenon that occurs in North Sumatera Province actually shows a positive relationship between inflation and unemployment, where if there is an increase in inflation, the unemployment rate will also increase. And vice versa, if the inflation rate can be reduced down, this will also have an impact on the decline in unemployment in North Sumatera Province.

This can be seen from the data listed in figure 1.1. In 2011, the inflation rate in North Sumatera Province reached 6.37% with open unemployment at 4.02%. Then, in 2012, the Government of North Sumatera Province was able to reduce the inflation rate to reach 6.20%. The decline in inflation also affected the unemployment rate in North Sumatera Province that year and reached 3.80%. However, when there was an increase in inflation again in 2013, reaching 6.53%, the unemployment rate also experienced a significant increase to reach 4.12%. The same thing still happened in 2015, where when inflation rose to reach 6.71%, the unemployment rate also rose to around 4.29%.

The relationship between inflation and unemployment, known as the two macroeconomic indicators, has a negative relationship described by the Phillips Curve. Since then, the Phillips Curve has become

one of the cornerstones of the government in determining government policies and is used as an analytical tool in determining inflation targets so as not to sacrifice a greater level of unemployment in a country. Along with the Phillips Curve theory, the monetary authority can maintain a lower unemployment rate permanently by accepting some degree of inflation. Actively managed monetary and fiscal policies can be used to maintain the maximum level of labor at all times.

This is reinforced by the results of research conducted by Solikin (2004) which examined "Phillips Curves and Structural Change in Indonesia: Existence, Patterns of Expectation Formation, and Linearity". From the study, he concluded that the Phillips Curve phenomenon exists in the Indonesian economy, where the existence and behavior of the curve changes over time, in line with changes in the structure of economic fundamentals (regime dependent). In particular, the pattern of formation of expectations and linearity in the Phillips Curve experienced significant differences (changes) between the pre and post periods of the economic crisis.

Still in line with Solikin's statement, Maichal in 2012 analyzed the Phillips Curve in Indonesia using the Generalized Method of Moments (GMM). The estimation results using the GMM method on the hybrid model from the Keynesian Phillips Curve new shows that the Phillips Curve phenomenon exists in the Indonesian economy. The existence of the Phillips curve phenomenon in Indonesia tends to be caused by a mismatch between actual inflation and inflation expectations of shock variables such as changes in exchange rates or world crude oil prices.

However, many studies now show that the relationship between inflation and unemployment is no longer inversely proportional. As in the research conducted by Amri (2008) entitled "The Influence of Inflation and Economic Growth on Unemployment in Indonesia", found that the description of the Phillips Curve that links

inflation with the unemployment rate for the Indonesian case is not appropriate as a policy to reduce the unemployment rate. The results of statistical analysis testing the effect of inflation on unemployment during the period 1980 - 2005 as seen in the results of the statistical analysis below also prove conclusively that there is no real influence between inflation and the unemployment rate.

Still in line with previous research, Sopianti et al (2011) in her research on "The Effect of Economic Growth, Inflation Rate and Minimum Wage on Unemployment in Bali" also found a positive relationship between inflation and unemployment in Bali. The results of this study indicate that the variable economic growth, inflation rate, and minimum wage simultaneously have a significant effect on the number of unemployed people in Bali. Variable inflation rates have a positive and significant influence on the number of unemployed people in Bali, while economic growth and minimum wages partially do not affect the number of unemployed people in Bali.

Sukarsih et al (2011) in his research entitled "Empirical Study of Phillips New Keynesian Curves in Indonesia" also found that there was a positive relationship between inflation rates and unemployment rates thus indicating the validity of NKPC (New Keynesian Phillips Curve) in the case of inflation in Indonesia. So that in an effort to control the inflation rate, it is important to control the unemployment rate. Controlling the unemployment rate can be done by efforts to increase new employment opportunities. Increased new employment fields include encouraging increased foreign and domestic capital investment.

The same opinion was also stated by the Bureau of Budget Analysis and APBN Implementation (2014) which analyzed "The Existence of the Inflation and Unemployment Tradeoff (Phillips Curve) in Indonesia". From the results of his analysis it was found that the Phillips Curve that illustrates the tradeoff between inflation and

unemployment does not apply in Indonesia because inflation in Indonesia is not caused by aggregate demand but rather an increase in prices, for example due to the increase in fuel prices. The trend in accordance with the Phillips curve is obtained from the relationship between unemployment and economic growth. Between unemployment and inflation can not be prioritized which will be handled first, everything depends on economic conditions. Unemployment prevention is a national commitment and macro and micro policies are needed in handling it.

Positive relationship was also found in describing the relationship between inflation and unemployment in Palopo City. Ilham (2015) in his research entitled "Analysis of the Relationship of Unemployment Causality, Inflation and Economic Growth of the City of Palopo" using the Spearman Correlation method, found a positive relationship between inflation and unemployment in Palopo City from 2007-2013. Maravian et al (2015) in their study stated that the inflation rate has no relationship to the number of unemployed. Adapting from the Phillips Curve, shows that the Phillips Curve analysis that illustrates the relationship between the inflation rate and unemployment is not suitable to be applied in Indonesia. This is due to inflation in Indonesia caused by increases in the price of goods, not an increase in demand due to high wage increases.

Different opinions expressed by Astuti (2016) in a study that examined "Analysis of Phillips Curves and Okun Law in Indonesia in 1986-2016". By using the Correlation Analysis method, he found that there was a negative but not significant relationship between inflation and unemployment in Indonesia in 1986 - 2016. This happened because inflation that occurred in Indonesia was not caused by an increase in the number of aggregate demand (demand-pull inflation) which will ultimately reduce the unemployment rate, but the increase in inflation in Indonesia is

generally caused by rising production costs such as fuel prices, electricity tariffs or other production costs (cost-push inflation).

The opinion on the existence of a long-term trade-off between inflation and unemployment is a misunderstanding of monetary policy. In fact, the issue of unemployment and inflation in various countries or regions of the world is responded to differently according to the conditions and priorities of the country or region. Of course, there are various differences in the characteristics of the country or region in accordance with the level of income of the country or region that influences decision making behavior. Developed countries and regions that have stable regional income tend to have a strong monetary policy system, so the unemployment rate also tends to be consistent.

North Sumatra Province which consists of 33 regencies and cities is one of the largest provinces in Indonesia. Unfortunately, the regional income of this region has not been strong enough to support stable economic growth so that the problem of inflation and unemployment is one of the biggest problems that are still being addressed. Because inflation and unemployment have a close relationship as explained in the Phillips Curve, it is necessary to have appropriate policies in overcoming the inflation problem in North Sumatra so that in suppressing the inflation rate does not affect the soaring unemployment rate in North Sumatra.

Therefore, based on the background described above, it is very interesting to carry out research with the title "An Analysis on The Existence of Phillips Curve Theory in The Economy of North Sumatera in The Period of 2004-2015".

Hypothesis

Based on the research background and the identification of the relationships between variables, the inflation research hypothesis has a negative effect on unemployment in North Sumatra.

MATERIAL AND METHODS

This study is to analyze the validity of the Phillips curve in influencing the relationship between inflation and unemployment in North Sumatra Province and in the 4 cities of inflation in North Sumatra. This research was conducted in North Sumatra Province, Sibolga City, Pematangsiantar City, Medan City and Padangsidempuan City. The reason for choosing the four cities is because the 4 (four) cities are cities included in the calculation of the Consumer Price Index (CPI) in North Sumatra. CPI is one of the important economic indicators that can provide information about the price development of goods and services paid by consumers. Changes in CPI over time illustrate the rate of increase (inflation) and the decline (deflation) of goods and services.

This research was conducted by focusing on the discussion of whether or not the Phillips curve theory applies in the relationship between inflation and unemployment in North Sumatra in the 2004 to 2015 research period.

This study uses secondary data. Secondary data is in the form of documentation with the collection of materials and data relating to the subject matter that the researcher quotes from books and journals or historical reports that have been compiled in archives originating from the Central Sumatra Provincial Statistics Agency (BPS) of North Sumatra Province. The types of data used in this study are annual secondary data, which are time series data and a combination of time series data and cross section (panel data) and processed using Eviews 7 software.

RESULTS AND DISCUSSION

Model Conformity Test

Before conducting a panel regression test, the suitability test for the data analysis model is first carried out. This is done because the data used in this study is panel data, so the model suitability test is needed to determine whether the model used is the

Common Effect Model, Fixed Effect Model, or Random Effect Model. The first step is to find the estimation results of Pooled Least Square (PLS) or Common and Fixed Effect Model. From these results F and Chow Tests are carried out so that the best estimation results are obtained whether Common or Fixed Effect Model.

Chow Test Results

Chow test is done to choose whether the model used is Ordinary Least Square (OLS) or Fixed Effect Model (FEM). Testing with Chow Test is done with the following hypothesis:

Ho: $F_{stat} < F_{table}$, then a valid Ordinary Least Square (OLS) model is used.

Ha: $F_{stat} > F_{table}$, then a valid Fixed Effect Model (FEM) model is used.

The results of the Chow Test estimation can be seen in table 4.1. the following.

Table 4.1. Chow Test Results

Redundant Fixed Effects Tests			
Pool: FIXED			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	6.615665	(4,54)	0.0002
Cross-section Chi-square	23.928552	4	0.0001

The Chow test results show that the probability value (Prob.) For Cross-section F and Chi-square Cross-section is 0.0001. This means that the probability value (Prob.) For F-Cross-section and Chi-square Cross-section is smaller than the 5% significance level. Thus it can be concluded that the initial hypothesis is rejected and the chosen model is a fixed effect model or Fixed Effect Model (FEM).

Hausman Test Results

The Hausman test is used to select a random effect model with a fixed effect model. This test works by testing whether there is a relationship between errors in the model (composite error) with one or more explanatory variables (independent) in the model. The Hausman Test is carried out with the following hypothesis:

H0: Random Effect Model (REM)

H1: Fixed Effect Model (FEM)

The results of the Hausman Test estimation can be seen in table 4.2. the following.

Table 4.2. Hausman Test Results

Correlated Random Effects - Hausman Test			
Pool: RANDOM			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.736903	1	0.0307

From table 4.2 it is informed that the probability value (Prob.) Or -value for Random Cross-section is 0.0307. This means that the probability value (Prob) Cross-section random is smaller than the 5% significance level (0.0307 <0.05). Thus it can be concluded that the initial hypothesis is rejected and the chosen model is a fixed effect model or Fixed Effect Model (FEM). Because the results of the chow and hausman tests show that the best model used in this study is a fixed effect model (FEM),

then there is no need to do the LM test again.

Statistical Test Results

After the classical assumption test, a statistical test of the regression analysis model was conducted which aims to predict how much the influence of the independent variables on the dependent variable through the t test and F test with static models and dynamic models.

Results of Estimated Unemployment Rate in North Sumatra

From the results of the model suitability test, it is known that the model in accordance with the analysis of this study is a Fixed Effect Model (FEM). Then further testing of the unemployment rate in North Sumatra Province and 4 cities of inflation in North Sumatra. The results can be seen in table 4.3 below.

Table 4.3. Regression Results of Unemployment Rate in North Sumatra

Dependent Variable: UNP?				
Method: Pooled Least Squares				
Date: 06/20/17 Time: 09:14				
Sample: 2004 2015				
Included observations: 12				
Cross-sections included: 5				
Total pool (balanced) observations: 60				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.17769	0.772223	13.17973	0.0000
INF?	0.193165	0.083684	2.308274	0.0248
Fixed Effects (Cross)				
_SUMATERAUTARA--C	-3.051244			
_SIBOLGA--C	3.428354			
_PEMATANGSIANTAR--C	-0.472356			
_MEDAN--C	0.954816			
_PADANGSIDIMPUAN--C	-0.859571			
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.373756	Mean dependent var	11.67900	
Adjusted R-squared	0.315770	S.D. dependent var	3.898310	
S.E. of regression	3.224612	Akaike info criterion	5.274142	
Sum squared resid	561.4987	Schwarz criterion	5.483576	
Log likelihood	-152.2243	Hannan-Quinn criter.	5.356063	
F-statistic	6.445661	Durbin-Watson stat	1.218941	
Prob(F-statistic)	0.000092			

Source: Processed Results with Eviews 7

The equation of the function of the unemployment rate in North Sumatra is as follows:

1. The equation of the function of the unemployment rate in North Sumatra Province

$$UNP_SUMUT = 7.126446 + 0.193165 * INF_SUMUT$$

2. The equation of the function of the unemployment rate in the City of Sibolga

$$UNP_Sibolga = 13.606044 + 0.193165 * INF_Sibolga$$
3. The equation of the function of the unemployment rate in Pematangsiantar City

$$\text{UNP_Pematangsiantar} = 9.705334 + 0.193165 * \text{INF_Pematangsiantar}$$

4. The equation of the function of the unemployment rate in the city of Medan
 $\text{UNP_Medan} = 11.132506 + 0.193165 * \text{INF_Medan}$

5. The equation of the function of the unemployment rate in the City of Padangsidempuan

$$\text{UNP_Padangsidempuan} = 9.318119 + 0.193165 * \text{INF_Padangsidempuan}$$

From the function of the equation can be seen the constants or intercepts of each city and province vary. Sibolga City has the largest constant value compared to other regions, which is 13.606044. This means that, if it is assumed that the inflation rate in Sibolga City is zero, the open unemployment rate in Sibolga City is 13.61%. In other words, Sibolga City accounts for the highest unemployment rate compared to other regions in North Sumatra. This situation was caused by a lack of job creation in Sibolga City.

The regions that have the smallest constant value compared to other regions are North Sumatra Province which is equal to 7.126446. This means that, if it is assumed that the inflation rate in North Sumatra Province is zero, the open unemployment rate in North Sumatra Province is 7.13%.

Partial Significant Test Results (t-Test)

Partial test (t-test) was conducted to see the effect of each independent variable on the dependent variable. The test criteria used are if p value < 0.05, then Ha is accepted and if p value > 0.05, then Ha is rejected. The t test can also be done by comparing t count with t table with the degree of freedom the number of observations (n) minus the number of parameters in the model (k) including intercept, provided that if t count > t table (α 0.05) then Ha is accepted and Ho is rejected, if t count < t table (α 0.05) then Ho is accepted and Ha is rejected. From the regression results in table 4.3, equations for economic growth can be formed as follows:

$$\text{UN} = \beta_0 + \beta_1 \text{INF} + \varepsilon$$

$$\text{UN} = 10.17769 + 0.193165 * \text{INF}$$

$$t\text{-sig} = (0.000) (0.0248)$$

$$F\text{-sig} = 0.000092$$

$$R^2 = 0.373756$$

The interpretation of the results is:

The inflation coefficient = 0.193165 and t-sig = 0.0248

Based on the results of the structural equation it is known that the inflation variable has a positive effect on the level of open unemployment in North Sumatra. The meaning of the coefficient of 0.193165 is that if there is an increase in the inflation rate of 1%, it will potentially increase the open unemployment rate in North Sumatra by 0.19%. Then from the results of the estimation model above it can be determined that the inflation variable has a significant positive effect on the unemployment rate in North Sumatra at the 95% confidence level indicated by the probability of t-statistics smaller than $\alpha = 0.05$ ($0.0248 < 0.05$) so Ho is rejected and Ha be accepted.

Simultaneous Significant Test Results (F-Test)

The F test is used to determine whether there are simultaneous effects of independent variables on the dependent variable. The testing criteria used are if the probability value (p-value) is < 0.05, then Ha is accepted and if p-value > 0.05, then Ha is rejected.

Based on the regression results of the unemployment rate in North Sumatra in table 4.3, it can be informed together that inflation in North Sumatra Province, Sibolga City, Pematangsiantar City, Medan City and Padangsidempuan City has a positive and significant effect on the level of open unemployment in North Sumatra at the level of trust 95%, indicated by the F-sig value smaller than $\alpha = 0.05$ ($0.000092 < 0.05$).

Determination Coefficient Test (R^2 Test)

The testing of the coefficient of determination (R^2) is used to measure the proportion or percentage of contributions of the independent variables studied against the variation in the ups and downs of the dependent variable or in other words to test the goodness-fit of the regression model. The value of R^2 is said to be good if it is above 0.5 because the value of R^2 ranges from 0 to 1. The value of R^2 is equal to zero ($R^2 = 0$) indicating no influence between the independent variables on the dependent variable. If R^2 is getting closer to 1, the stronger the influence of the independent variable on the dependent variable and if R^2 is getting closer to zero, the smaller the influence of the independent variable on the dependent variable.

From the regression results of the unemployment rate in North Sumatra in table 4.3, it can be seen that the coefficient of determination or R-square (R^2) is 0.373756. This means that together the inflation variables in North Sumatra Province, Sibolga City, Pematangsiantar City, Medan City and Padangsidempuan City were able to provide an explanation of the variation in open unemployment rates in North Sumatra by 37.38% and the remaining 62.62% explained by other variables that were not included in the estimation model.

Phenomenon in Medan City

From the regression results in the equation shows that the inflation rate will have a positive effect on the number of open unemployment in the city of Medan. In other words, a high inflation rate will have an effect on the increase in the number of open unemployment in Medan City, so it can be said that the Phillips Curve Theory does not apply in describing the relationship between inflation and unemployment in Medan City.

This is because inflation that occurs in the city of Medan is classified as the Cost Push Inflation group because the volatility in inflation increases tends to be due to an increase in production costs such as an

increase in basic electricity tariffs and fuel prices. The Phillips Curve theory will apply to economic conditions where inflation arises due to the fluctuations in the demand for goods and services or known as Demand Pull Inflation.

In addition, the positive relationship between inflation and the open unemployment rate in Medan City is also caused by employment patterns. The pattern of employment in the city of Medan is likely to be labor intensive, meaning that companies use more human power than mechanical power. This can be seen from BPS data which shows that in 2010 out of 133 companies registered in Medan City there were 33,497 workers with details of 6,935 workers in the Food, Beverage and Tobacco sector; 2,842 workers in the textile, apparel and leather sectors; 2,657 workers in the Timber and Wood Material sector; 2,002 workers in the Paper, Paper Products, Printing and Publishing sectors; 7,504 workers in the Chemical sector, Chemicals, Rubber and Plastics; 290 workforce in the nonmetallic material sector; 2,804 workers in the Basic Metals sector; 828 workers in the sector of Metal, Machinery and Equipment; 2,688 workers in other sectors.

The large number of workers in one business sector shows the large number of workers absorbed in the business sector. So that the company will spend more to hire employees who are employed. This condition will result in the business sector being vulnerable to the impact of rising prices of goods and services due to high inflation volatility, especially if the economic conditions of the business sector are unstable when inflation fluctuates. Termination of employment (layoffs) is one alternative that must be taken by the company when they want to reduce expenses to finance employee salaries and maintain production at a certain level in order to continue to run business operations.

Therefore, the positive impact of inflation fluctuations on the increase in unemployment in the City will be felt because the business sector in Medan tends

to be labor intensive, so that inflation fluctuations will be able to destabilize the business sector and have an impact on increasing unemployment due to high layoffs. This is in line with the results of research conducted by Chaido and Melina (2013).

Chaido and Melina (2013) in their research entitled "Phillips Curve Inflation and Unemployment: An Empirical Research for Greece", they stated that there was a relationship between inflation and unemployment in Greece using cointegration and causality methods. Furthermore, they said that for a short period of time the Phillips Curve theory was unable to explain the negative relationship between inflation and unemployment. However, for the long term, the inflationary turmoil that will occur will have an impact on increasing employment opportunities in Greece which will eventually drive Greek economic growth.

The long-term positive relationship between inflation and unemployment in Greece is due to the existence of high taxation policies, instability of monetary policy, low level of investment, and prolonged increase in corruption rates. In contrast to the results of research by Chaido and Melina, Ivan and Oleg (2012) state that the Phillips Curve Theory exists in explaining the relationship between inflation and unemployment in Japan.

Using data from 1980 to 2012, they found that the existence of the Phillips Curve was proven by the existence of a negative slope or slope in a linear relationship between inflation and unemployment in Japan. This is because the projection of the labor force can provide accurate predictions of inflation rates and unemployment in Japan. This projection of changes in the workforce will later also affects economic growth in Japan.

If you look at the conditions in Medan at this time, the variable that greatly influences the change in unemployment is the inflation rate, where if the inflation occurs is very high, this will encourage the

emergence of unemployment in the city of Medan and fewer job opportunities. This is due to labor patterns that tend to be labor intensive and the minimum level of investment, especially in the real sector in the city of Medan, so that price turbulence will greatly affect the economy of Medan City through the turbulent unemployment rate.

When the inflation rate is high, the economic growth rate indicated by the City of Medan GRDP will decline. Likewise the opposite. When the inflation rate is low, the GDP growth rate will increase. The GRDP growth rate of Medan City at constant 2000 prices according to the business field (BPS, 2015) shows that there was a fluctuation in the growth rate of the GRDP of Medan City from 2011 to 2014. In 2011, the growth rate of Medan's GRDP was 7.79% while in 2012 it was 7.66% and 5.36% in 2013.

The decrease in the growth rate of the GRDP of Medan City was due to an increase in the inflation rate during 2011 to 2013. In 2011, the inflation rate in Medan City was 3.54%; in 2012 amounted to 3.79% and 10.09% in 2013. It was only then for 2014, the growth rate of Medan City's GRDP increased to 6.05% after the inflation rate was able to be reduced in the range of 8.24%.

The decrease in the growth rate of the GRDP of Medan will certainly have an impact on the increase in unemployment in the city of Medan, it can be seen that when the GRDP growth rate decreased in 2013, the open unemployment rate in Medan increased to 10.01%.

Wage rigidity also contributes to the increase in unemployment in the city of Medan, where rising wage rates make labor supply increase so that labor demand decreases resulting in surplus or surplus labor. This is supported by the research of Panjawa and Soebagyo (2014) in the Journal of "The Effect of Minimum Wage Increases on Unemployment Rate" which states that minimum wages have an influence on the unemployment rate in the Surakarta Residency where increases in minimum

wages will cause an increase in unemployment caused by wage rigidity (wage rigidity) namely the inability of wages to make adjustments to the equilibrium point where labor supply is equal to labor demand.

Phenomenon in the City of Padangsidimpuan

From the results of the regression equation shows that the inflation rate will have a positive effect on the number of open unemployment in the City of Padangsidimpuan. In other words, a high inflation rate will have an influence on the increase in the number of open unemployment in Padangsidimpuan City. So it can be said that the Phillips Curve Theory does not apply in describing the relationship between inflation and unemployment in the City of Padangsidimpuan.

The regression results indicate that the inflation rate will have a positive effect on open unemployment in Padangsidimpuan City, in other words high inflation will have an effect on the increase in open unemployment in Padangsidimpuan City, so it can be said that the Phillips Curve Theory does not apply to describing the relationship between inflation and unemployment in the City of Padangsidimpuan.

Similar to the city of Medan, inflation in the City of Padangsidimpuan is classified as the Cost Push Inflation group because of the volatility in the inflation that occurs tends to be due to an increase in production costs such as rising fuel prices resulting in a decrease in total supply. This causes scarcity and rising prices of goods and services. The high price of goods and services will result in a decline in public interest in consuming these goods and services.

Shocks caused by an increase in oil prices can result in a trade-off from the existence of the Phillips Curve in describing the relationship between inflation and unemployment. This was also stated by Ball and Mankiw (2002) in his journal entitled

"The NAIRU in Theory and Practice". Shock variables are important in assessing the Phillips Curve model because of the stagflation that occurred in the 1970s in the United States and other industrialized countries which ultimately led to the collapse of the Phillips Curve phenomenon, generally due to the increase in world oil prices by OPEC.

Therefore, the shock variable needs to be included in the Phillips Curve in order to illustrate the possibility of a shift in the trade-off phenomenon shown by the Phillips Curve (Ball and Mankiw, 2002).

Inflation will have a major effect on the open unemployment rate in Padangsidimpuan City. This is mainly due to the fact that most of the workforce in Padangsidimpuan City is absorbed in the service or service sector. According to the 2015 Sakernas results in the City of Padangsidimpuan, labor in the service sector is 66.50%; the agricultural sector is 20.62% and manufacturing is 12.87%, so that if there is an increase in high inflation it will result in an increase in unemployment.

In addition, the continued impact of inflation will affect the economic growth of the City of Padangsidimpuan because the economic structure of the City of Padangsidimpuan originates more from the trade, hotel and restaurant sector, which is 22.74% and followed by the services sector by 19.02%.

Wage rigidity also contributes to the increase in unemployment in the City of Padangsidimpuan, where rising wage rates make labor supply increase so that labor demand decreases resulting in surplus or surplus labor. This is supported by the research of Panjawa and Soebagyo (2014) in the Journal of "The Effect of Minimum Wage Increases on Unemployment Rate" which states that minimum wages have an influence on the unemployment rate in the Surakarta Residency where increases in minimum wages will cause an increase in unemployment caused by wage rigidity (wage rigidity) namely the inability of wages to make adjustments to the

equilibrium point where labor supply is equal to labor demand.

Phenomenon in Pematangsiantar City

From the regression equation results, it can be concluded that the inflation rate will have a positive effect on open unemployment in Pematangsiantar City, in other words high inflation will have an effect on the increase in open unemployment in Pematangsiantar City, so it can be said that the Phillips Curve Theory does not apply the relationship between inflation and unemployment in Pematangsiantar City.

This is because inflation that occurs in the City of Pematangsiantar is classified as the Cost Push Inflation group because the volatility of the inflation increase tends to be due to an increase in production costs such as an increase in the basic electricity tariff and fuel prices. The Phillips Curve theory will apply to economic conditions where inflation arises due to the fluctuations in the demand for goods and services or known as Demand Pull Inflation.

In addition, employment patterns in Pematangsiantar City are also labor intensive. This can be seen from the percentage of the population working according to their employment. In 2015, of the 90.53% of the population employed there were 77.98% of the population working in the trade sector and other services; 11.36% worked in the manufacturing sector and 10.66% worked in the agricultural sector. This labor intensive employment pattern will be easily affected by high inflation volatility, especially because the number of workers absorbed more in the trade and services sectors is indirectly related to fluctuations in inflation.

Labor-intensive employment patterns in Pematangsiantar City will depend on the movement of the wage curve. When the level of wages is high, the supply of labor is very high, and vice versa when the wage rate is low, the demand for labor is high so that the unemployment rate will decline. In relation to inflation, a high

inflation rate can reduce the ability of companies to pay employees alone which can affect the unemployment rate in Pematangsiantar City.

This is supported by the results of research by Omercevic and Nuroglu (2012). In their research entitled "Phillips and Wage Curves: Empirical Evidence from Bosnia and Herzegovina", they stated that the Phillips Curve theory does not exist in describing the relationship between inflation and unemployment in the economy of Bosnia and Herzegovina. Research that uses data from 2008 to 2012 found a positive relationship between inflation rates and unemployment in Bosnia and Herzegovina.

According to them, the absence of the Phillips Curve in Bosnia and Herzegovina is due to the inflation that encourages the increase in net payment will not stimulate an increase in employment rates. However, it is the analysis of the wage level curve that implies the fact that only inflation-adjusted wage increases will stimulate employment so that it can reduce unemployment. In other words, inflation that is able to influence the fluctuations in wage rates will have a major influence on the fluctuation of the unemployment rate in Pematangsiantar City.

Not only that, the impact of inflation will also influence the achievement of the economic growth targets of Pematangsiantar City. This is because the trade and services sector is a leading sector that contributes the most to the growth of the Pematangsiantar City GRDP from year to year, so that high inflation volatility will not only lead to high open unemployment but will also disturb the achievement of economic growth in Pematangsiantar.

Wage rigidity also contributes to the increase in the unemployment rate in Pematangsiantar City, where rising wage rates make labor supply increase so that labor demand decreases resulting in surplus or surplus labor. This is supported by the research of Panjawa and Soebagyo (2014) in the Journal of "The Effect of Minimum Wage Increases on Unemployment Rate"

which states that minimum wages have an influence on the unemployment rate in the Surakarta Residency where increases in minimum wages will cause an increase in unemployment caused by wage rigidity (wage rigidity) namely the inability of wages to make adjustments to the equilibrium point where labor supply is equal to labor demand.

Phenomenon in Sibolga City

The regression results are not different from other cities of inflation, the regression results of Sibolga City also indicate that the inflation rate will have a positive effect on the open unemployment rate in Sibolga City. In other words, a high inflation rate will have an effect on the increase in the open unemployment rate in Sibolga City, so it can be said that the Phillips Curve Theory does not apply in describing the relationship between inflation and unemployment in Sibolga City.

This is because inflation that occurs in Sibolga City is classified as the Cost Push Inflation group because the volatility of inflation that occurs tends to be due to an increase in production costs such as increases in basic electricity tariffs and fuel prices. The Phillips Curve theory will apply to economic conditions where inflation arises due to the fluctuations in the demand for goods and services or known as Demand Pull Inflation.

In addition, employment patterns in Sibolga City are also labor intensive. This can be seen from the percentage of the population working according to their employment. In 2015, the total population working in the service sector was 13,045 people, in the manufacturing sector there were 1,283 people and in the agricultural sector there were 550 people.

The positive relationship between inflation and unemployment rates was also found from the results of the Milucka study entitled "Inflation Dynamics in the Czech Republic: Estimation of the New Keynesian Phillips Curve" in 2014. Through research conducted in the Czech Republic from the

period 2000 to years 2012 using the Kalman Filtration method, he found that there was a positive relationship between the rate of inflation and the unemployment rate in the economy of the Czech Republic.

This happens in accordance with the New Keynesian Phillips Curve theory which states that there is a trade-off from the previous Phillips Curve theory. The positive relationship created by the relationship of inflation and unemployment in the Czech Republic as described in the New Keynesian Phillips Curve theory occurs for a short period of time. This condition is a result of the significant shift in the output-inflation coefficient as a result of high output volumes during the period 2008-2011, when the Czech Republic was experiencing a financial crisis.

During this period there was a decline in demand for goods and services both from within and outside the country which had an impact on the slowing growth of the Czech economy at that time. In addition, because the economic system adopted by the Czech Republic is an open economic system, fluctuations in exchange rate levels will directly and indirectly affect domestic inflation. The price of imported goods will directly influence the dynamics of inflation in the Czech economy.

Another study that showed the inactivity of the Phillips Curve was a study conducted by Alisa in 2015. In a study entitled "The Relationship between Inflation and Unemployment: A Theoretical Discussion about the Philips Curve", he stated that the Phillips Curve is not fully capable of being used in modern Russian economy. Furthermore, he stated that the existence of the Phillips Curve will only exist for a short period of time that is less than five years.

The ineffectiveness of the Phillips Curve theory in the modern Russian economy is because Russia has faced a stage of stabilization that takes more than ten years, and only after passing the stabilization stage can a country achieve economic stability and full employment

indicators. In a stable economic condition, the relationship between inflation and unemployment will result in a positive relationship

Wage rigidity also contributes to the increase in the unemployment rate in Sibolga City, where rising wage rates increase labor supply, making labor demand decreases resulting in surplus or surplus labor. This is supported by the research of Panjawa and Soebagyo (2014) in the Journal of "The Effect of Minimum Wage Increases on Unemployment Rate" which states that minimum wages have an influence on the unemployment rate in the Surakarta Residency where increases in minimum wages will cause an increase in unemployment caused by wage rigidity (wage rigidity) namely the inability of wages to make adjustments to the equilibrium point where labor supply is equal to labor demand.

Phenomenon in North Sumatra Province

From the regression equation results show that the inflation rate will have a positive effect on the open unemployment rate in North Sumatra Province, in other words high inflation will have an effect on the increase in the number of open unemployment in North Sumatra Province. illustrates the relationship between inflation and unemployment in North Sumatra Province.

The increase in the high price level for a long time and continuously in North Sumatra Province will certainly have a long-term impact on the increase in unemployment in this area. This is due to inflation occurring in North Sumatra Province classified as Cost Push Inflation, which means it is due to an increase in production costs such as an increase in basic electricity tariffs and fuel prices.

The increase in production costs will encourage entrepreneurs to reduce their expenses, one of which is to reduce spending to hire employees. This is done because the industries in North Sumatra Province tend to be labor intensive, which

means that they use more human labor, so they are forced to terminate employment (PHK) to reduce production costs. Termination of employment (PHK) will result in an increase in the number of people who are unemployed and unemployed. Therefore, the high inflation rate will have a positive impact on the increase in the number of open unemployment in North Sumatra Province.

Shocks caused by an increase in oil prices can result in a trade-off from the existence of the Phillips Curve in describing the relationship between inflation and unemployment. This was also stated by Ball and Mankiw (2002) in his journal entitled "The NAIRU in Theory and Practice". Shock variables are important in assessing the Phillips Curve model due to the stagflation that occurred in the 1970s in the United States and other industrialized countries which ultimately led to the collapse of the Phillips Curve phenomenon, generally due to the increase in world oil prices by the Organization of the Petroleum Exporting Countries (OPEC).

Therefore, from the whole city of inflation in North Sumatra it can be said that the Phillips Curve Theory does not apply in describing the relationship between inflation and open unemployment in North Sumatra. This is mainly due to the different types of inflation that occur in North Sumatra with the Phillips Curve Theory, in which the Phillips Curve Theory will apply if inflation occurs including Pull Inflation Demand, which means that the price of inflation triggers an increase in demand for goods and services.

Meanwhile, the increase in the level of prices of goods and services that could trigger inflation in North Sumatra was more due to the turmoil in production costs such as fluctuations in the increase in national fuel prices. In addition, labor-intensive employment patterns in North Sumatra are also the cause of the ineffectiveness of the Phillips Curve Theory.

Wage rigidity also contributes to the increase in the unemployment rate in North

Sumatra Province, where rising wage rates increase labor supply so that labor demand decreases resulting in surplus or surplus labor. This is supported by the research of Panjawa and Soebagyo (2014) in the Journal of "The Effect of Minimum Wage Increases on Unemployment Rate" which states that minimum wages have an influence on the unemployment rate in the Surakarta Residency where increases in minimum wages will cause an increase in unemployment caused by wage rigidity (wage rigidity) namely the inability of wages to make adjustments to the equilibrium point where labor supply is equal to labor demand.

Friedman (1958) argues that the trade-off phenomenon shown by Phillips will only occur temporarily (short-term) and will never occur permanently (long-term) where the temporary trade-off comes from unanticipated inflation. Phelps (1968) argues that in terms of the percentage increase in price, the shift of one point upwards that occurs as a result of an increase in price, will be in accordance with the increase in each point of the expected price increase and will cause the balance of the unemployment rate not to depend on the inflation rate .

Based on the two arguments, it can be concluded that the Phillips Curve phenomenon occurs as a result of the failure of people's expectations on the actual inflation rate. In addition, if the actual price increase is the same as the expected price increase, then this will cause the absence of the Phillips Curve phenomenon. The distance of research which is only eleven years is also one of the possible differences with the results of the A.W research. Phillips took a long period of research for ninety six years so the results of my research on the theory of the Phillips Curve in the economy of North Sumatera did not prove its existence.

Extending the analysis towards the nature of monetary policy taken by the Central Bank (rule or discretion), Kydland and Prescott (1977) argue that assuming

"rational expectations" a monetary policy that follows a rule will cause inflation expectations to be equal to expected inflation. So that the results of monetary policy that follows the rule will get an optimal balance. Kydland and Prescott argue that at optimal balance, the balance of the Phillips Curve does not exist.

Conversely, a discretionary policy - where policy makers choose the best action in each situation, is unable to maximize the social objective function of economic agents. In other words, discretionary monetary policies will not be able to produce an optimal outcome and tend to cause the existence of the Phillips Curve phenomenon.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Based on the results of data analysis that has been described, it can be concluded that:

The Phillips Curve theory does not apply to describe the relationship between inflation and unemployment in North Sumatra Province and in the other four inflation cities, namely Medan, Pematangsiantar, Padangsidempuan and Sibolga. The increase in inflation will be accompanied by an increase in unemployment in the North Sumatra Province as well as in the other four inflation cities, namely Medan, Pematangsiantar, Padangsidempuan and Sibolga, this is because prices of fuel and electricity have increased as well as linkages with wage rigidity where rising wage levels in the region making labor supply increase so that labor demand is reduced which results in the amount of labor experiencing surplus or surplus.

Recommendations

From the conclusions found in this study, some suggestions can be given as follows:

Looking at the results of the analysis, to overcome the problem of unemployment in North Sumatra, the regional government

must first suppress the inflation rate. This is because there is a positive relationship between the two so that by reducing the inflation rate the government can also reduce the unemployment rate. In addition, the government must also try to add new jobs by providing facilities and incentives to investors and entrepreneurs in labor-intensive business investments rather than capital intensive. Another effort that can be done by the government is by providing entrepreneurship development training to potential workers who can open up new jobs in the form of skills training in government-owned vocational training centers or in collaboration with universities and the private sector in conducting skills training with training curricula adapted to current needs that are loaded with the use of information technology. Policies that can be carried out by local governments to reduce inflation in the regions can be done through fiscal policy and monetary policy through cooperation with Bank Indonesia in the regions. One example of fiscal policy that can be carried out by local governments is through tax regulations. Because if people's purchasing power is low and taxes imposed by the government are high, it will have an impact on the weaker ability of the people to spend. Low public purchasing power will also have an impact on the company's low acceptance. With a stable economy, it will attract entrepreneurs and investors to invest and open new jobs in North Sumatra. And this is what can reduce the number of unemployed.

The example of monetary policy that can be carried out by regional governments through cooperation with the Bank Indonesia is through the establishment of a low interest rate (discount rate). Low interest rates will stimulate entrepreneurs to borrow money from conventional banks to invest. More and more investment will have the opportunity to open up new jobs so that it will have an impact on the decline in unemployment in North Sumatra. For the research on the existence of the Phillips Curve theory in the future, it is suggested to

the next researcher to take a longer time span of research than the time span in this study.

REFERENCES

- Alisa, Maximova. 2015. *The Relationship between Inflation and Unemployment A Theoretical Discussion about the Philips Curve*. Journal of International Business and Economics, Volume 3, Number 2.
- Al-zeaud, et.al. 2015. *Does Phillips Curve Really Exist? An Empirical Evidence From Jordan*. European Scientific Journal, Volume 1, Number 10.
- Amir, Amri. 2008. *Pengaruh Inflasi dan Pertumbuhan Ekonomi Terhadap Pengangguran di Indonesia*. Fakultas Ekonomi Universitas Jambi.
- Astuti, Prihartini Budi. 2016. *Analisis Kurva Phillips dan Hukum Okun di Indonesia tahun 1986-2016*. Jurnal Fokus Bisnis, Volume 15, Nomor 1.
- Ball, Laurence dan N.G. Mankiw. 2002. *The NAIRU in Theory and Practice*. The Journal of Economic Perspectives, Volume 16 Number 4.
- Biro Analisa Anggaran dan Pelaksanaan APBN. 2014. *Analisis Keberadaan Trade-off Inflasi dan Pengangguran (Kurva Phillips) di Indonesia*.
- Dinas Tenaga Kerja dan Transmigrasi. 2004. *Upah Minimum Regional Provinsi Jawa Tengah*.
- Dritsaki, Chaido dan Melina Dritsaki. 2013. *Phillips Curve Inflation and Unemployment: An Empirical Research for Greece*. International Journal of Computational Economics and Econometrics, Vol. 3, Nos. 1/2.
- Friedman, Milton. 1958. *The Role of Monetary Policy*. American Economic Review., Vol. 58 Number 1.
- Gujarati, Damodar N. 2004. *Basic Econometrics, 4th Edition*, Tata McGraw Hill.
- Ilham. 2015. *Analisis Hubungan Kausalitas Pengangguran, Inflasi dan Pertumbuhan Ekonomi Kota Palopo*. Jurnal Muamalah: Volume 5, Nomor 1.
- Kitov, Ivan dan Oleg Kitov. 2012. *Inflation, Unemployment, and Labor Force: The Phillips Curve and Long-term Projections for Japan*. University Library of Munich: Germany.
- Kumar, Manoj dan Vashist. 2012. *An Empirical Study of Phillips Curve in India*. Journal Economics Volume 3, Number 1.
- Kydland, Finn E. dan Edward Prescott. 1977. *Rules Rather than Discretion: The Inconsistency of Optimal Plans*. The Journal of Political Economy Volume 85 Number.3.
- Maichal. 2012. *Kurva Phillips di Indonesia*. Jurnal Ekonomi Pembangunan Volume 13, Nomor 2.

- Mankiw, N. Gregory. 2003. *Teori Makro Ekonomi, Edisi Kelima*. Erlangga: Jakarta.
- Mankiw, N. Gregory et. al. 2012. *Principles of Economics: An Asian Edition Volume 2*. Salemba Empat: Jakarta.
- Maravian, Bimo. 2015. *Analisis Faktor-Faktor yang Mempengaruhi Tingkat Pengangguran Terbuka di Indonesia Tahun 1986 – 2013*. Artikel Ilmiah Mahasiswa Ilmu Ekonomi dan Studi Pembangunan, Fakultas Ekonomi, Universitas Jember (UNEJ).
- Marius, Jelamu Ardu. 2004. *Memecahkan Masalah Pengangguran di Indonesia*. Makalah Pada Pengantar Falsafah Sains S3 IPB Bogor.
- Milucka, Daniela. 2014. *Inflation dynamics in the Czech Republic: Estimation of the New Keynesian Phillips Curve*. International Journal of Economic Sciences, Volume 3, No.2.
- Nanga, Muana, 2001. *Makroekonomi: Teori, Masalah dan Kebudayaan*. PT. Raja Grafindo Persada: Jakarta.
- Nopirin. 2004. *Ekonomi Moneter*. BPFE: Yogyakarta.
- Nopirin. 2009. *Pengantar Ilmu Ekonomi: Makro & Mikro*. BPFE: Yogyakarta.
- Omercevic, Edo dan Elif Nuroglu. 2014. *Phillips and Wage Curves: Empirical Evidence from Bosnia and Herzegovina*. Economics Research International, Volume 2014, Article ID 436527.
- Phelps, Edmund S. 1968. *Money-Wage Dynamics and Labor-Market Equilibrium*. The Journal of Political Economy, Volume 76, No.4.
- Phillips, A.W. 1958. *The Relationship between Unemployment and the Rate of Change of Money Wages in United Kingdom, 1861-1957*. *Economica*.
- Rahardja, Prathama 2008. *Pengantar Ilmu Ekonomi (Mikroekonomi dan Makroekonomi) Edisi Ketiga*. Lembaga Penerbit Fakultas Ekonomi Universitas Indonesia: Jakarta.
- Samuelson, Paul et.al. 1992. *Makroekonomi*. Erlangga: Jakarta.
- Samuelson, Paul A. dan William D. Nordhaus. 2001. *Makro-Ekonomi, Edisi Keempatbelas*. Erlangga: Jakarta.
- Solikin. 2004. *Kurva Phillips dan Perubahan Struktural di Indonesia: Keberadaan, Pola Pembentukan Ekspektasi, dan Linieritas*. Buletin Ekonomi Moneter dan Perbankan, Maret 2004.
- Sopianti et.al. 2011. *Pengaruh Pertumbuhan Ekonomi, Tingkat Inflasi, dan Upah Minimum terhadap Jumlah Pengangguran di Bali*. E-Jurnal EP Unud, Volume 2, Nomor 4.
- Sukarsih, et. al. 2011. *Studi Empiris Kurva Phillips New Keynesian di Indonesia*. JEBA, Volume 13, Nomor 1.
- Sukirno, Sadono. 2006. *Ekonomi Pembangunan Proses, Masalah dan Dasar Kebijakan*. Kencana Predana Media Group: Jakarta.
- Todaro P. Michael. 2000. *Pembangunan Ekonomi di Dunia Ketiga*. Erlangga: Jakarta.
- Touny, M. Abdelaziz. 2013. *Investigate the Long-Run Trade-off between Inflation and Unemployment in Egypt*. International Journal of Economics and Finance, Volume 5, Number 7.
- Umar, H. 2008. *Metode Penelitian*. Raja Grafindo Persada: Jakarta.
- Umaru, Aminu dan Zubairu. 2012. *An Empirical Analysis of the Relationship between Unemployment and Inflation in Nigeria from 1977-2009*. Journal Economics and Finance, Volume 1, Number 12.
- Wardhono, Adhitya. 2004. *Mengenal Ekonometrika Teori dan Aplikasi*. Fakultas Ekonomi Universitas Jember.
- Widarjono, Agus. 2013. *Ekonometrika: Pengantar dan Aplikasinya, Edisi Keempat*. UPP STIM YKPN.
- Wijayanto, Bambang dan Aristanti Widyarningsih. 2007. *Ekonomi dan Akuntansi: Mengasah Kemampuan Ekonomi*. Grafindo Media Pratama: Bandung.
- Yelwa, et al. 2015. *Analysis of the Relationship between Inflation, Unemployment an Economic Growth in Nigeria 1987-2012*. Journal Economics and Finance, Volume 2, Nomor 3.

How to cite this article: Zai EP, Daulay M, Rujiman. An analysis on the existence of Phillips curve theory in the economy of north Sumatera in the period of 2004-2015. International Journal of Research and Review. 2019; 6(5):40-55.
