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Application of Phillips Curve in Indonesia (Long Term And Short Term Approach)

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ABSTRACT

Inflation and unemployment are macroeconomic problems experienced by many countries in the world where every policymaker in every country wants these two problems to be addressed together. However, Phillips Curve Theory states that there is a reciprocal relationship between inflation and unemployment so that when economic policymakers implement a policy to increase economic income, these two problems actually have a negative relationship between the two in the short term. This study aims to examine the relationship between inflation and unemployment in Indonesia with a sample of the inflation rate and unemployment rate in Indonesia in 2006-2020 in each semester. On the other hand, this research is carried out based on the Phillips Curve Theory which is relevant in different countries but also this theory is irrelevant in different countries thus causing uncertainty of the study. The research method used is an explanatory quantitative method with documentation techniques obtained from the Central Statistics Agency. The data analysis technique in this study used the Pearson Product Moment Correlation Test method, Granger Causality Test, Cointegration Test, and Error Correction Model. The findings in this study state that inflation and unemployment in Indonesia period have a positive causality relationship between the two where the direction of causality is unemployment to inflation in the long term and based on the results of this study, the Phillips Curve Theory does not apply in Indonesia.

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1. INTRODUCTION

Low inflation and unemployment are some indicators of a country's economic success in achieving economic achievements, which is the goal of policymakers through implemented economic policies (Alisa, 2015; Kusnendi, 2002 p 12; Mankiw, 2015 p. 418). The rate of inflation and unemployment in Indonesia in the last 10 years can be explained through the data in **table 1.1** below:

Table 1. 1 Level of education and unemployment in Indonesia Tahun 2011-2020

Year	Inflation Rate in Indonesia	Unemployment Rate in Indonesia
2011	5,36%	5,15%
2012	4,28%	4,47%
2013	6,41%	4,34%
2014	6,40%	4,05%
2015	6,36%	4,51%
2016	3,53%	4,3%
2017	3,81%	3,88%
2018	3,20%	4,4%
2019	3,03%	3,62%
2020	1,92%	4,11%

Source: World Bank, Consumption Price Index Estimated and ILO Estimated

If we look at the table of movements of the two macroeconomic indicators, namely inflation and unemployment in Indonesia in the last 10 years, we will find that the trade-off or reciprocal relationship between inflation and unemployment as the Phillips Curve theory could have occurred in Indonesia in the last 10 years. Table 1.1 shows the movement of rising inflation followed by the movement of unemployment which decreased or vice versa in several periods, namely in 2012-2013, 2016-2018, and 2019-2020. Several periods showed a decrease in inflation followed by a decrease in unemployment, namely in the period 2011-2012, 2013-2016, and 2018-2019.

The Philips Curve research is widely researched by researchers, among which is a study conducted by: Alisa (2015) in Russia that found that inflation and unemployment have a negative relationship in short-term in the period from 1999 to 2015; Friedman (1977) researching the Phillips Curve theory in 7 industrialized countries namely France, Germany, Italy, Sweden, The United Kingdom , Japan, and the United States found that in the period 1956-1975 there is a negative relationship between inflation and unemployment in some 5-year periods but after those 5 years , the relationship between the two variables becomes positive where inflation and unemployment both increased mainly in the countries of Great Britain and Italy; Singh (2016) found a reciprocal relationship between inflation and unemployment in India in the period 2009-2015;

Avfriandi and Triani (2019) exemplified the Phillips Curve theory in Indonesia in the period 1986-2017 and found that inflation and unemployment had a positive relationship where the rate unemployment will increase the inflation rate in Indonesia; Herman (2010) found a positive relationship between inflation and unemployment in Romania in the period 1990-2009, more precisely in the period 2000-2009 where the decline in unemployment followed by a decrease in inflation; Furuoka (2007) found that inflation and unemployment have a negative relationship in the short term, but the relationship becomes positive in the long term in Malaysia in the period 1974-2004; Priatna (2020) found that there was a relationship between inflation and long-term unemployment in Indonesia in the period 1996-2018; Derelli (2019) found that the Phillips Curve theory was relevant in Turkey in the period 1988-2017 where inflation and unemployment had a negative relationship in the short term and in the long term the relationship be positive. However, there are several studies stating that there is no relationship between the inflation rate and the unemployment rate in the short term or in the long term, as in the research of Nurhalima, et al (2015) which found inflation and unemployment do not affect each other in a significant in Indonesia in the period 2000-2019 and Elliot (2015) who found that the Phillips Curve theory was irrelevant in Ghana in the period 1970-2013 even inflation and unemployment had a positive relationship as well as negative in Ghana. This is what makes the research gap from philips curve theory unclear on the reciprocal relationship between inflation and unemployment.

The problem of inflation and unemployment is an economic problem that dominates almost all countries in the world, especially developing countries such as Indonesia because every economic policymaker in a region always wants to achieve a low inflation rate and unemployment rate, but often between these two problems there is an opposite mutual relationship (Hibbs Jr, 1979). The rising unemployment rate can affect people's well-being as measured by the level of poverty. Poverty occurs when a person has no income caused by the person not working or unemployed (Rosenstone, 1982) . Inflation that increases significantly and uncontrollably will cause the price of basic needs of the people to increase and this affects the welfare of the people in fulfilling their daily needs. Therefore, studies and research on the problems of inflation and unemployment are quite important to discuss in order to find ways to overcome it through government policies in maintaining the inflation rate and the unemployment rate.

2. THEORETICAL FRAMEWORK

2.1. Hierarchy by Minimum

A.W. Phillips (in Alisa, 2015; Friedman, 1977; Mankiw, 2003 p. 354) reveals a theory that states that there is a trade-off (reciprocal relationship) between the inflation rate and the unemployment rate, this theory is called the Phillips Curve Theory where when the inflation rate increases, the unemployment rate will decrease and vice versa. So often government policy cannot reduce both because there is a sacrifice where one of these two problems increases.

"The Phillips curve is a reflection of the short-term aggregate supply curve" (Mankiw, 2003, p. 351). The aggregate supply and demand curves in the short and long term can be seen in **figure 2.1** below:

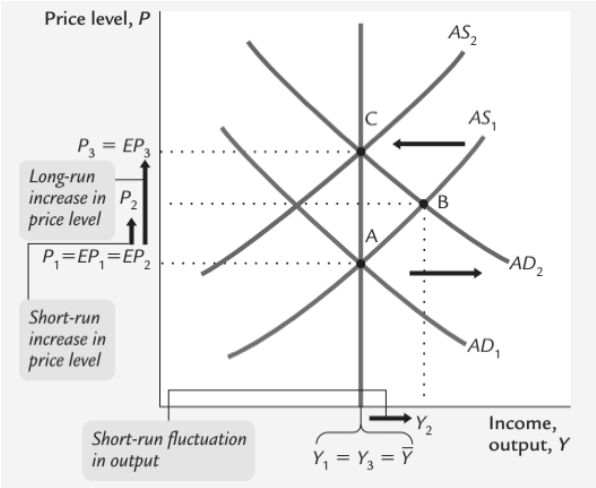

Figure 2.1 Short-Term and Long-Term Aggregated Demand and Supply Curves

Source : Mankiw (2003, p. 351)

Mankiw (2003, p. 350) elaborates that economic policies implemented by policymakers to enlarge and minimize aggregate demand can affect the inflation rate and the unemployment rate. If policymakers implement monetary or fiscal policy to magnify aggregate demand, then output revenues will move on the aggregate supply curve (US 1) to point B as illustrated by figure 3.1. With the increase in output income, the price level will also increase to point B following the movement of output income (P2). This happens in the short term. However, in the long run, the increase in output income will return to its original level followed by a fixedly increasing price level so that demand and supply aggregates have a new equilibrium at the natural level of output income but at higher price levels.

This increase and decrease in output is a reflection of the decline and increase in the unemployment rate because the company will need more labor to meet the increasing output level and will reduce its workforce as the output level decreases. On the other hand, the increase and decrease in the price level is a reflection of the increase and decrease in the inflation rate can be seen in **figure 3.2** below:

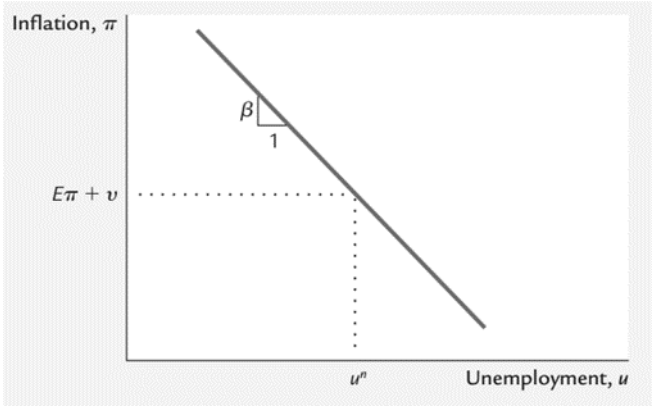

Figure 3. 2 Phillips Curve Theory

Source : Mankiw (2003, p. 354)

Mankiw (2003, p 352) The Phillips curve in its modern form states that the rate of inflation depends on three forces, namely: expected inflation, the deviation of unemployment from its scientific level , and the shock of bidding. Figure 3.2 is a curve showing the reciprocal relationship between inflation and unemployment where πc which is expected inflation is a picture that inflation has inertia. In the aggregate supply and demand model, inflation inertia is interpreted as a continuous upward shift on the aggregate supply and demand curve (Mankiw, 2003, p 354). In such curves the aggregate supply will be affected by the expected price level. If the price increases rapidly, then the aggregate supply curve will shift upwards all the time in the short term. An aggregate supply curve that continues to shift upwards will change inflation and change the government's expectations of inflation predicted for the year that follows.

β is a parameter that measures inflation's response to cyclical unemployment. The minus sign before the symbol of cyclical unemployment (un) is a reflection of high unemployment likely to reduce inflation. This parameter indicates demand-pull inflation because increased aggregate demand will affect the inflation rate, where when aggregate demand increases, inflation is also will increase.

v is a supply shock or exogenous factor that can affect the inflation rate such as the world oil price, which will cause the value of v to increase and increase the inflation rate. This is called cost-push inflation because of supply shocks that will affect production costs so that prices increase and cause inflation rates to increase.

3. METHODS

We tried The research methods used in this study are pearson product moment correlation test, U ji Kgranger ausality (Granger's Causality) and Error Regression Model (Error Correction Model).

3.1. Pearson Product Moment Correlation Test

Pearson Product correlation is carried out to see the trend of the relationship and state the amount of contribution between the two variables between Inflation and Unemployment in Indonesia in 2006-2020 which is expressed in percent. Budiwanto (2017, p. 67) states Pearson Product correlation is seen from the resulting r value in the range of values -1 to +1 where the + and - signs express a positive and negative relationship between the two variables and the magnitude of the value of r indicate the strong correlation between the two variables, , where the conditions are described in the **table 3.1** as follows:

Table 3. 1 Pearson Product Moment Value Terms

r (in absolute value)	Interpretation
0	Uncorrelated
0,01-0,20	Very Low Correlation
0,21-0,40	Low Correlation
0,41-0,60	Rather Low Correlation
0,61-0,80	Correlation Is Quite High

0,81-0,99	High Correlation
1	Very High Correlation

Source : Usman and Pramono (2020, p. 192)

Budiwanto (2017, p. 67) states that the significance test of the value of pearson's Product Moment correlation coefficient was carried out by comparing the r count with r table. The R of the table is determined using a predetermined degree of significance (α = 0.05) and using the degree of freedom db = n-1.

Usman and Pramono (2020, p. 191) state that the assumptions that must be met before conducting pearson's Product Moment correlation test are normally distributed data , data on both balance variables, and variables connected is the data of intervals or ratios. The data between the two variables is already balanced and is ratio data, therefore, a normality test is carried out on each data

3.2. Granger Causality Test

Pramono (2001) states that in a relationship in economic theory often has a reciprocal or causal relationship, where there is an influence of a free variable on a bound variable, on the other hand a bound variable can affect a free variable. In a study, there are often errors regarding the direction of causality relationships. In this study, the inflation rate can affect the unemployment rate but on the other hand, the unemployment rate can affect the inflation rate. Therefore, to see how the relationship between these two variables is, this study uses the Granger Causality Test method (Granger's Causality).

Furthermore, to strengthen the indications of the presence of various forms of causality, a t-test was then carried out for each regression model. The stipulation is that if the probability value is less than the significance value (α=0.05), then Ho is rejected and Ha is accepted.

Gujarati (2004 p. 698) in carrying out the Granger causality test, it is assumed that:

1. The variable data tested is stationary data
2. The value of inertia (lag) must be determined through the value of the least Akaike or Schwarz criteria. This is because the direction of causality depends on the inertia value used in the Granger causality test
3. Error Terms on both variables have no correlation (no autocorrelation)

3.3. Johansen Cointegration Test

Rohmana (2013 p. 305) states that this cointegration test is used to determine the balance between a number of variables in the long term. Rohmana (2013, p. 305) states that the determination of the presence or absence of cointegration is based on the Likelihood Ratio (LR) test. Provided that:

1. If the calculated value of LR is greater than the critical value of LR then it means accepting the cointegration of a number of variables (Ha is accepted)
2. If the calculated value of LR is less than the critical value of LR then it means accepting the absence of cointegration on a number of variables (H0 is accepted)
3. The critical value of LR is obtained from a table developed by Johansen and Juselius, as for an alternative LR statistical test known as Maximum Eigenvalue Statistic.

3.4. Fault Regression Model

Rohmana (2013, p. 311) states that the Engle Granger model assumes that if two variables are not stationary but co-integrated then there is an influence between the two that can be explained by the ECM model. Error Correction Model (ECM) was carried out to see

how much influence between the two variables in this study. Rohmana (2013, p. 312) states that the Engle-Granger model of allegiance correction requires two stages, namely:

1. The first stage calculates the residual value of the initial regression equation
2. The second stage, perform regression analysis again by entering residual from the first step

The condition is that if the probability value of the result of the regression of the second stage is less than α = 0.05, then H1 which states that there is an influence in the short term between the two variables is accepted, and H0 which states that there is no influence between the two variables in the short term is rejected, and vice versa.

4. RESULTS AND DISCUSSION

4.1. Pearson Product Moment Correlation Test

4.1.1. Normality Test

A normality test is performed to test the normality of the distribution of a data. In this study, the normality test was carried out using the Jarque-Fallow Test (JB test). Conditions:

- If the Jarque-Fallow probability value is greater than 0.05, then the variable data is normally distributed
- If the Jarque-Fallow probability value is less than 0.05, then the variable data is not normally distributed, be explained through the data in **table 4.1** below:

Table 4. 1 Jarque-Bera Test Normality Test Results

Series	Skewness	Kurtosis	Jarque-Fallow	Prob.
INF	0,280749	2,182512	1,229459	0,540787
UNM	0,853726	2,668010	3,782009	0,150920

Based on the table above, the JB test results show that the variable data on inflation and unemployment in this study are normally distributed. This is evidenced by the JB value of the inflation variable which is 1.229459 with a probability value of 0.540787 and the JB value of the unemployment variable which produces a value of 3.782009 with a probability value of 0.150920 where the JB probability value of the two variables is greater than 0.05.

4.1.2. Pearson Product Moment Correlation Test

The correlation test is performed to see the relationship between the two variables. In this study, pearson's Product Moment correlation test was carried out to see the magnitude of the contribution of one variable to another by being expressed in percent and looked at the direction of the relationship between the two variables, namely the positive and negative relationships by looking at the resulting r value. Conditions be explained through the data in **table 4.2** and **table 4.3** below:

Table 4. 2 Pearson Product Moment Correlation Test Terms

r (in absolute value)	Interpretation

0	Uncorrelated
0,01-0,20	Very Low Correlation
0,21-0,40	Low Correlation
0,41-0,60	Rather Low Correlation
0,61-0,80	Correlation Is Quite High
0,81-0,99	High Correlation
1	Very High Correlation
Coefficient Signs	Interpretation
-	Negative
+	Positive

Table 4. 3 Pearson Product Moment Correlation Test Results

	INF	**UNM**
INF	1	0,394015
UNM	0,394015	1

Based on table 4.3,the resulting r value of 0.394015 which interprets that the relationship between inflation and unemployment is positively related and the correlation strength is low at 39%.

4.2. Granger Causality Test

4.2.1. Stationaryity Test

Before conducting a causality test, it is necessary to conduct a stationaryity test through a unit root test of the data of each variable using the Augmented Dickey-Fuller (ADF) method. The conditions are:

- The absolute value of the ADF statistics is greater than the critical value in the MacKinnon table at various confidence levels (1%.5%, and 10%) then the data is stationary
- The probability value is less than α=5% (0.05) then the data is stationary

the test results are written in **table 4.5** below :

Table 4. 4 Unit Root Test Results with ADF Test (level level)

Variable	**None**	**Intercept**	**Intercept + Trend**

INF	1.228576	1.477379	2.245805
UNM	2.373627**	3.410178**	0.255700

** Significant at a 1% degree of confidence*

*** Significant at 5% degree of confidence*

Significant at a 10% degree of confidence

Based on the table above, the ADF values of the two variables at the level with intercept, intercept and trend, and none are insignificant at a degree of confidence of 1%, 5%, or 10%. This shows that the data from the Inflation and Unemployment variables are not stationary at the level level. Therefore, it is necessary to test the roots of the ADF unit at the first fermentation level and the results are as shown in the **table 4.5** below:

Table 4. 5 Unit Root Test Results With ADF Test (Dif Level 1)

Variable	None	Intercept	Intercept + Trend
INF	15.45606*	15.21302*	14.92816*
UNM	4.434176*	4.770757*	6.618013*

** Significant at a 1% degree of confidence*

*** Significant at 5% degree of confidence*

Significant at a 10% degree of confidence

Based on the table above, the ADF values of the two variables in the first differentiation level (first difference) with intercept, intercept and trend, and none are significant at a confidence degree of 1%, 5%, or 10%. This shows that the data from the inflation and unemployment variables are stationary at the level of first differentiation

4.2.2. Determination of Lag Value

Widarjono (2013, p 337) states that the optimal length of inaction (lag) of variables is required to capture the influence of each variable on other variables. There are several criteria for determining the optimal lag length, but in this study, the determination of the lag length used the AIC (Akaike Information Criterion) criteria. The optimal lag length is determined by the AIC value that has the least absolute value. To determine the AIC value that has the smallest absolute value, a VAR estimate is carried out with the help of the Eviews 10th Edition application as in the **table 4.6** below :

Table 4. 6 VAR Estimation Results

VAR Estimation Results						
Endogenous Variables: D(INF) D(UNM)						
Lag	LogL	Lr	FPE	AIC	Sc	Hq

0	-35.94674	Na	0.127246	3.613975	3.713453	3.635564
1	-21.91250	24.05869	0.049120	2.658334	2.956769	2.723102
2	-18.20721	5.646164	0.051266	2.686401	3.183792	2.794347
3	-17.23303	1.298902	0.070777	2.974574	3.670923	3.125700
4	-12.84177	5.018582	0.072792	2.937312	3.832617	3.131616
5	-10.04690	2.661786	0.091391	3.052085	4.146347	3.289568
6	-6.455081	2.736621	0.114504	3.090960	4.384178	3.371622
7	0.283955	3.850878	0.120118	2.830100	4.322274	3.153940
8	18.55042	6.958653	0.052872	1.471389	3.162520	1.838407

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Based on table 4.1, the lowest AIC value is at the 8th lag value, then the optimal length of lag of the variable required to capture the influence of each variable on other variables is 8. Therefore, the analysis of the Granger causality test in this study used a degree of inaction of 8 or lag 8.

4.2.3. Granger Causality Test

The Granger causality test was performed to see a reciprocal relationship between the two variables. This study examines the reciprocal relationship between inflation and unemployment variables in Indonesia. The conditions:

- If the p value < from a significant level of 5% (0.05) then H0 is rejected and H1 is accepted
- If the p value < from a significant level of 5% (0.05) then H0 is rejected and H1 is accepted

the test results are written in **table 4.7** below :

Table 4. 7 Granger Causality Test Results

Lags : 8		
Null hypothesis	F-Statistics	Prob.
UNM does not Granger Cause INF	6,07366	0,0495
INF does not Granger Cause UNM	0,52298	0,7981

The table above shows the results of the Granger causality test between the variables Y1-Y2. The P value of the UNM hypothesis does not produce Granger's causality to the INF is 0.0495 which is less than 0.05 so that H0 is rejected and H1 is accepted i.e. that UNM

produces a causality relationship to the INF . The P value of the INF hypothesis does not produce Granger's causality to UNM is 0.7981 i.e. less than 0.05 so that H0 is accepted and H1 is rejected, i.e. that the INF does not produce a causality relationship against UNM. Based on the results of the granger causality test, it was found that there is a one-way causality relationship between inflation and unemployment in Indonesia, namely that unemployment has an influence on the inflation rate.

4.3. Johansen Cointegration Test

Cointegration tests are performed to test for residual stationaryness of regression. Residual stationaryity is important for developing a dynamic model. The cointegration relationship indicates the existence of a long-term relationship between two variables. In this study, the Johansen cointegration test was carried out. The conditions:

- If the trace statistic is greater than the critical value of 5%, then there is a co-integration between the two variables
- If the trace statistic is smaller than the critical value of 5%, then there is no cointegration between the two variablel
- If the Max-Eigen Statistic is greater than the critical value of 5%, then there is a cointegration between the two variables
- If the Max-Eigen Statistic is greater than the critical value of 5%, then there is no cointegration between the two variables

the test results are written in **table 4.8** below :

Table 4. 8 Cointegration Test Results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None*	0.725785	29.35327	15.49471	0.0002
At most 1 *	0.098712	2.182540	3.841466	0.1396
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistics	0.05 Critical Value	Prob.**
None*	0.725785	27.17074	14.26460	0.0001
At most 1*	0.098712	2.182540	3.841466	0.1396

The table above shows the results of the Johansen Cointegration test conducted to see the relationship between variables in the long term (cointegration). The results of the cointegration test showed that the trace statistical value of 29.35327 was greater than the critical value with a significance level of 5%, which was 15.49471. Likewise, the maximum

eigenvalue of 27.17024 is greater than the critical value with a 5% significance level of 14.26460. It can be concluded that there is a long-term relationship or co-integration between the variables inflation and unemployment.

4.4. Fault Regression Model

The Error Corection Model (ECM) model is performed to see the relationship between the two variables in the short term. Based on Granger's causality test, Unemployment (UNM) affects Inflation (INF), therefore, in the ECM Model, unemployment regression is carried out on inflation to see the effect of unemployment on inflation. in the short term. The stipulation is that if the p value < α=0.05, then H0 that there is an influence in the short term between the two variables is rejected, and H1 which states that there is an influence in the short term is accepted. Conversely, if the p value > α=0.05 then H0 is accepted andn H1 is rejected. The result are written in **table 4.9** below :

Table 4. 9 Model Error Correction Model Regression Results

Variables	Coefficient	Std. Error	t-Statistics	Prob.
C	0.031470	0.066007	0.476772	0.6377
D(D(UNM))	0.122949	0.093922	1.309054	0.2024

The form of the analysis equation through the ECM method obtained the following equation:

Y= 0.031470 + 0.122949X1t + et

Table 4.9 shows the results of the regression of the ECM variable unemployment against the variable inflation. The regression results state that unemployment has no effect on inflation in the short term, this is because the probability value obtained of 0.2024 is greater than the significance level of 5% (0.05). Therefore, H0 which states that there is no influence between variables in the short term is accepted.

4.5 Test of Classical Assumptions

4.5.1 Normality Test

A normality test is performed to test the normality of the distribution of a data. In this study, the normality test was carried out using the Jarque-Fallow Test (JB test). Conditions:

- If the Jarque-Fallow probability value is greater than 0.05, then the variable data is normally distributed
- If the Jarque-Fallow probability value is less than 0.05, then the variable data is not normally distributed

The result are written in **table 4.10** below :

Table 4. 1 Normality Test Results

Series	Skewness	Kurtosis	*Jarque-Fallow*	Prob.
Residuals	-0,344174	2,365467	1,022531	0,599736

Source : Appendix 21

Based on the table above, the results of the JB test show that the data in this study are normally distributed. This is evidenced by the JB value of 1.022531 with a probability value of 0.599736 where the JB probability value is greater than 0.05.

4.5.2 Heteroskedasticity Test

The Heteroskedasticity test is performed to find out whether the residual variance of the research model is constant or not. A good regression model is one that is free of symptoms of heteroskedasticity because it produces a Best Linear Unbiased Estimator (BLUE) estimator (Rohmana, 2013 p. 160). In this study, a white test was carried out to test the presence of heteroskedasticity in this research model. Conditions:

If the value is prob. Obs*R-squared is greater than 0.05 hence there is no heteroskedasticity in the research model

If the value is prob. Obs*R-squared is smaller than 0.05 hence there is heteroskedasticity in the research model

The result are written in **table 4.11** below :

Table 4. 2 Heteroskedasticity Test Results

Heteroskedasticity Test: White			
F-statistics	0.095134	Prob. F(1.27)	0.9921
Obs*R-squared	0.592586	Prob. Chi-Square(1)	0.9883

Based on the results of the heteroskedasticity test shown by the table above, it can be seen that the Obs*R-squared value in this study model is 0.592586 with a probability of 0.9883. An Obs*R-squared probability value greater than 0.05 indicates that the residual variance of the study model is constant or there is no heteroskedasticity in the data in this study model.

4.5.3 Autocorrelation Test

The autocorrelation test was carried out to determine whether there was a correlation between residuals in this research model or not. A good regression model is one that is not exposed to autocorrelation. The autocorrelation test in this study was carried out with the Durbin-Watson test. Conditions:

If the statistical value of D-W is greater than du and less than 4-du, then it can be concluded that there is no autocorrelation in this research model.

The result are written in **table 4.12** below :

Table 4. 3 Autocorrelation test results

Breusch-Godfrey Serial Correlation LM Test:				
F-statistics	0.576324		Prob. F (8.19)	0.7834
Obs*R-squared	5.973766		Prob. Chi-Square (8)	0.6502
Variables	Coefficient	Std. Error	t-statistics	Prob.
C	-0.001307	0.071923	-0.018171	0.9857
D(D(UNM))	-0.042860	0.112834	-0.379851	0.7088
Durbin-Watson stat			1.841337	

Based on the table above, the results of the autocorrelation test resulted in a Durbin-Watson statistical value of 1.841337. This study has a total of 30 n and there is 1 free variable, then the dl value is 1.352 and the du value is 1.489 (Rohmana, 2013 p. 331). The results of the autocorrelation test can be seen in the Durbin-Watson(**Figure 4.3**) Chart below:

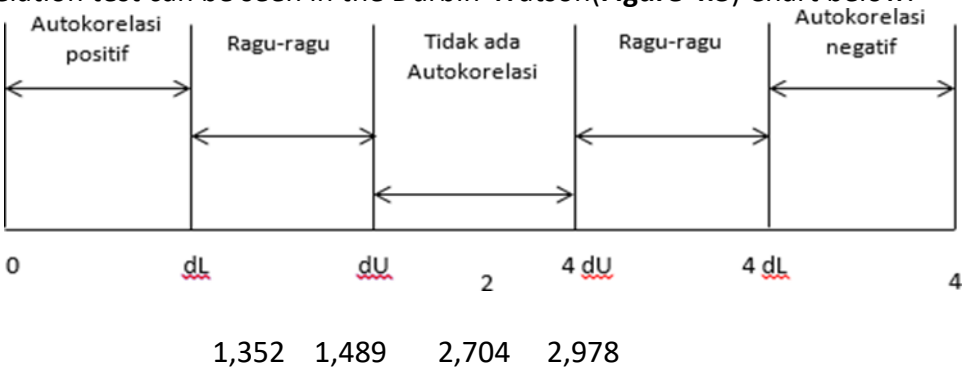

Figure 4. 1 Durbin-Watson autocorrelation test graph

Based on the D-W graph, durbin-Watson's statistical value obtained from the ECM regression results in this study of 1.841337 is in the graph there is no autocorrelation or free from autocorrelation which shows that there is no correlation between residuals in this study model.

4.2.6 Hypothesis Testing

Table 4. 4 Hypothesis Testing

Lags : 8			
Null hypothesis	F-Statistics	Prob. (*p-value*)	F-Table
Unemployment does not affect Inflation	6,07366	0,0495	4,2000
Inflation does not affect Unemployment	0,52298	0,7981	4,2000

Adjusted R-squared	0.870771
F-statistics	91,96599
t-statistics	1,309054
F-table	4,20
t-table	1,701

β_1/Se_1	0,122949

4.2.6.1 Partial Hypothesis Test (t-test)

The partial hypothesis test (t test) aims to determine the degree of significance of each free variable against the bound variable. It is known that the number of observations is 30 and the number of variables is 2, so with a significance level of 5% (0.05), a t-table of 1.701 (df=30-2=28) (Rohmana, 2013 p. 322) was obtained. Based on the ECM regression results, it was found that the t-statistic value was 1.309054. The provision is that if the t-statistical value > t-table, then H0 which states that the unemployment variable has no effect on inflation in the short term is rejected, and H1 which states that the unemployment variable has an effect on inflation in the short term is accepted, and vice versa. In this study, the t-statistical value of the < the t-table (1.309054<1.701) with a probability value of 0.2024, greater than the alpha of 5%, then H0 which states that the unemployment variable has no effect on inflation in the short term is accepted. So, this study states that unemployment does not affect inflation in the short term in Indonesia for the period 2006-2020 per semester.

4.2.6.2 Simultaneous Signification Test (F Test)

The simultaneous signification test (Test F) aims to determine the influence of all free variables together on the bound variable. Simultaneous tests were carried out using the F test with a significance level of 5% (0.05). If F-statistics > F-table then H0 which states that all free variables have no effect on bound variables are rejected and H1 which states that all free variables have an effect on bound variables are accepted. Similarly, if the opposite happens.

In the Granger causality test, the F-statistic of H0 which states that unemployment does not affect inflation is valued at 6.07366 where this value is greater than the F-table of 4.20 so that H0 is rejected and H1 is accepted which shows that unemployment can affect the inflation rate in Indonesia. On the other hand, the F-statistical value of H0 which states that inflation does not affect unemployment is valued at 0.52298 where the value is smaller than the F-table which is 4.20 so that H0 is accepted and H1 is rejected, shows that inflation does not affect unemployment in Indonesia for the period 2006-2020 based on each semester.

Based on the ecm regression results in this study, it is known that the F-statistical value or F-calculation is 0.000 (the result is obtained from ecm regression in the table). Based on the F-table obtained from Rohmana (2013, p. 323) with the k-1 being 2-1=1 and the n-k being 30-2=28 then the F-table is 4.20. This shows that unemployment did not have a significant influence on inflation in the short term in Indonesia in the period 2006-2020 per semester.

4.2.6.3 Coefficient of Determination Test (R2)

The coefficient of determination (R2) is a value used to measure the degree of the model's ability to explain free variables. The value of R2 has a fundamental drawback in that there is a bias towards the number of free variables included in the model. This study used an adjusted coefficient of determination (adjusted R2) which has a range of values from 0 to 1. If the adjusted value of R2 is getting closer to the value of 1, then the model's ability to describe the bound variable.

The adjusted R2 value in this study obtained a value of 0.870771 (this result was obtained from the ECM test results in table 4.9). With the value of the coefficient of determination (R2) in this study which is close to the number 1, the research model for examining the two variables is considered quite good. Based on the value of the coefficient of determination obtained, the contribution of the unemployment variable in explaining the inflation variable is 87%. The remaining 13% is explained by other variables outside the model.

4.3 Discussion of Research Results

The discovery of the relationship between inflation and unemployment in Indonesia can be explained through the behavior of wages and labor productivity in Indonesia based on data from the Central Statistics Agency is written in **figure 4.4 and figure 4.5** as follows:

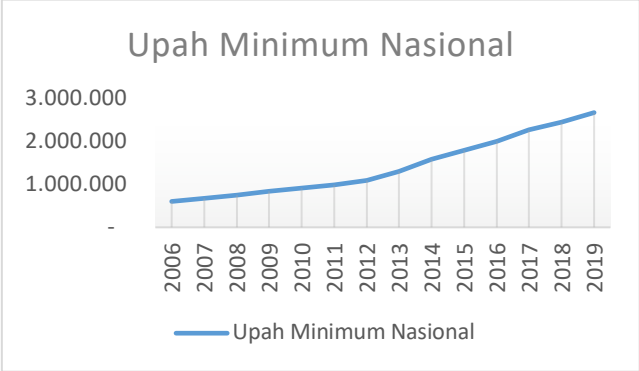

Figure 4. 4 National Minimum Wage in Indonesia in 2006-2020

Source: Central Bureau of Statistics

Figure 4. 5 Labor Productivity in the Industrial Sector in Indonesia in 2008-2020

Source : Central Statistics Agency

The data presented in chart 4.4 shows that the nominal minimum wage in Indonesia in 2006-2020 has increased every year. Sukirno (2008, p. 245) states that an increase in employment opportunities will increase the level of wages received by the workers. BPS (2012, p. 64) states that the government's economic policies in the last 15 years have created jobs to reduce the unemployment rate because the Indonesian economy has been quite stable. Therefore, a decrease in the unemployment rate with an increase in the level of employment opportunities causes the minimum wage to increase.

The Phillips Curve Theory of wages in Sukirno (2008, p. 246) states that increased employment opportunities would increase the wage rate so that there was a negative relationship between the wage rate and the unemployment rate. On the other hand, increased employment opportunities will cause real national income to increase and an increased level of wages will cause production costs so that in the end the price level of goods and services will increase. Therefore, an increase in the level of wages and an increase in real national income should result in a decrease in the unemployment rate and an increase in the inflation rate. However, in this case this did not happen and the findings in this study also stated that there was no negative relationship between inflation and unemployment in Indonesia.

In the case of Indonesia, BPS (2006) and Bank Indonesia (2014) stated that the increase in the inflation rate in Indonesia was due to the increasing world oil prices and import restrictions. Oleh therefore, it can be concluded that the increase and decrease in the level of prices in Indonesia is influenced by the factor of production costs where when the world oil price increases and other production materials also increase due to import restrictions will increase the level of prices of goods and services in Indonesia and vice versa, it can be concluded that inflation in Indonesia is a cost-push inflation and not a cost-push inflation (demand-pull inflation) where inflation is a cost drive is an assumption from the Phillips Curve Theory. Based on this description, the Phillips Curve Theory states that if the government wants to increase national income, there will be a trade-off between inflation and unemployment where inflation and unemployment have a negative relationship between the two.

On the other hand, the results of this study state that inflation and unemployment have a positive relationship between the two in the long term where the causality is unemployment to inflation. This can be explained by the level of labor productivity in figure 4.5 which has increased from 2006-2020 reflecting that the availability of goods and services in Indonesia is stable to meet consumption needs in Indonesia so that prices are stable and even the inflation rate decreases due to the increasing availability of goods and services. The increasing level of productivity of the Indonesian workforce is due to an increase in the working force, which is a reflection of the decline in the unemployment rate.

Therefore, in this case inflation and unemployment in Indonesia have a positive causality relationship in the long term between the two where the direction of causality is unemployment to inflation. This is because a decrease in the unemployment rate will cause the level of productivity to increase and the availability of goods and services to increase so that inflation decreases.

5. CONCLUSION

1.The causality relationship between inflation and unemployment in Indonesia has one positive causality direction where the causality direction is unemployment to inflation in the long term where an increase in the unemployment rate will lead to an increase in the inflation rate, and a decrease in the unemployment rate will lead to a decrease in the inflation rate or a decrease in the unemployment rate in the long term. In the case of Indonesia, the unemployment rate has decreased in the last 15 years which has caused labor productivity to increase so that the availability of goods and services increases which causes the inflation rate to decrease and vice versa, if the unemployment rate increases, then the inflation rate increases because labor productivity decreases so that the availability of goods and services decreases which causes prices to increase.

2.The inflation rate has no effect on the unemployment rate in the short term or in the long term and the unemployment rate can affect the inflation rate in the long term but does not affect the inflation rate in the short term. This is due to the inflation rate in Indonesia is influenced by the availability of goods and services resulting from labor productivity so that if the unemployment rate increases, then labor productivity will decrease so that the availability of goods and services decreases which causes the price level to increase. Vice versa, if the unemployment rate falls, then labor productivity will increase and will cause the availability of goods and services to stabilize so that the price level decreases. The effect of unemployment on inflation occurs in the long term.

5.2 Implications

The results of this study state that the Phillips Curve Theory which states that inflation and unemployment have a negative relationship do not apply in Indonesia because inflation in Indonesia is a type of cost-push inflation where the increase and decrease in prices of goods and services is influenced by an increase and decrease in production costs, one of which is the world oil price and not inflation caused by an increase in aggregate demand that is greater than aggregate supply (demand pull inflation) which is an assumption from Phillips Curve Theory. However, inflation in Indonesia is caused by the availability of goods and services so that the unemployment rate can positively affect the inflation rate in the long term because the productivity of goods and services is determined by the working workforce. Therefore, as long as inflation in Indonesia is a cost-boost inflation, the Phillips Curve Theory cannot apply in Indonesia.

5.3 Recommendations

Based on this research, several suggestions can be submitted as recommendations, including:

5.3.1 For the Government

The government's policy in the last 15 years has been good in reducing the unemployment rate by opening up many jobs, because with the declining unemployment rate, the availability of goods and services will be stable. However, the government must pay attention that inflation in Indonesia is a cost-boost inflation, where if production costs increase, business actors or companies cannot open more jobs because of the very expensive production costs. Therefore, the government cannot continue to implement a policy of reducing the unemployment rate because it will cause deflationary economic conditions in the long term and will actually cause the unemployment rate to increase because companies are unable to meet production costs, namely the increasing minimum wage and other increasing production costs, such as raw materials or fuel oil.

5.3.2 For Future Researchers

The reciprocal relationship between inflation and unemployment can be developed by testing the relationship between inflation and unemployment in cities that are used as a reference for the Consumer Price Index (CPI) in Indonesia with a fairly long period of time starting from 2007. This research was unable to carry it out due to the lack of samples and the period of time required to carry out the study. Therefore, researchers can then test the Phillips Curve Theory using unemployment and inflation data in cities that are used as a reference for the Consumer Price Index in Indonesia.

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