
The Effect of Inflation, Unemployment and Population Growth on Economic Growth in Indonesia

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ABSTRACT

This study aims to identify the effect of inflation, unemployment and population growth on the country's economic growth. The study recommends several important policies on inflation, unemployment and population growth in Indonesia's economic growth. In this study, the "ordinary Least Square (OLS) method was used with different diagnostic tests to determine the suitability of the data in the investigation and the data were collected from 1991 to 2021. Econometric results show that the time series are stationary because t-statistic values are more than t-tables and values are also significant. The term error in ADF is significant and ensures a long-term relationship. ECM results show that inflation, unemployment, and population growth are approaching equilibrium. The results of multiple linear regression showed that inflation, unemployment and population growth were not statistically significant. There were no symptoms of multicollinearity, heteroscedasticity and autocorrelation in the study so that it showed determination in estimation, unbiased and consistent.

INTRODUCTION

In economic growth, the development of a country can be seen in the increase in the production of goods and services in a region within a certain period. The production level can be measured by gross domestic product (GDP) so that economic growth is equal to GDP growth. Therefore, in measuring indicators of a country's economic performance or seeing the success of the government in measuring the

economic sector, Gross Domestic Product (GDP) is used.

There are two price approaches used in the GDP concept, namely current prices and constant prices. Nominal GDP, based on current prices, refers to the total value of goods and services produced by a country in a given period and is calculated based on prices at that time. While real GDP, which is based on constant prices, measures the value of goods and services using constant prices (base year prices). Therefore, to calculate the economic growth rate, GDP based on constant prices is used to ensure that economic growth is not measured based on price fluctuations but based on the increase in the amount of goods and services produced by a country in its economy. Therefore, the focus is on the increase in output or production of goods and services rather than on changes due to price increases or decreases.

In economic development, inflation often occurs where demand for labor exceeds supply due to higher prices and wages, resulting in a very large amount of money in circulation. Domestic inflation can affect the Indonesian economy by affecting price changes in the domestic market. Several factors play a role in causing inflation, including an increase in the amount of money circulating in the economy, a decrease in the rupiah exchange rate, an economic crisis situation, and people's expectations or anticipation of higher inflation rates (Samuelson and Nordhaus, 2013).

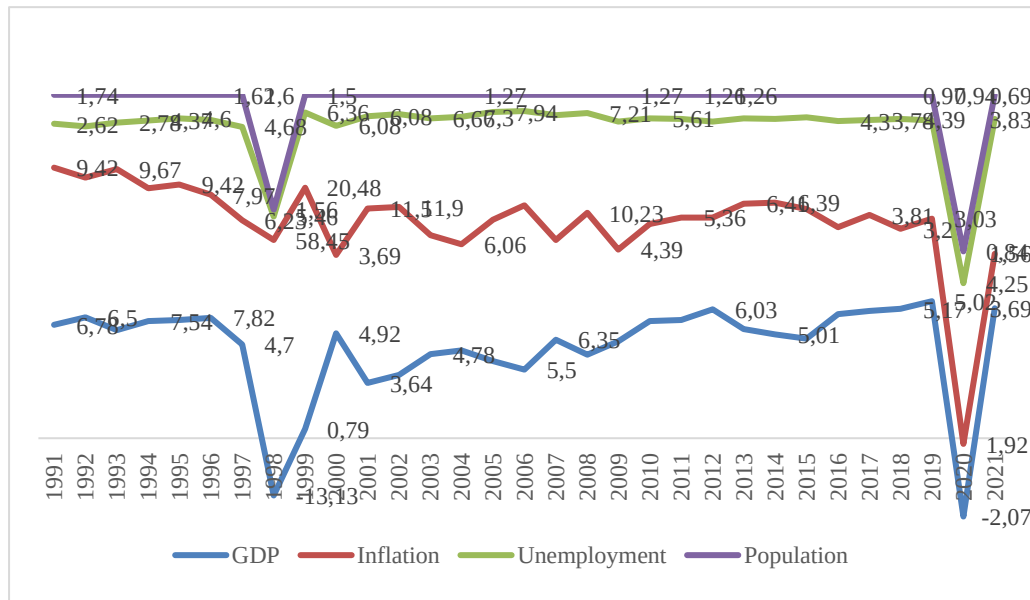
According to Philips (1958), a high inflation rate can lead to a decrease in unemployment, which will increase income. In this case, inflation does not always hurt a country's economy, but it depends on the level of inflation. Without the right level of inflation, there will be no positive movement in the economy with zero price movement. Therefore, inflation is practically within the reach of the country's ability or necessary if inflation is at a moderate level. The unemployment problem is experienced by all countries, including developed countries, especially developing countries such as Indonesia. In general, unemployment is caused by a lack of employment opportunities or an imbalance between the demand and supply of labor. According to Sri Budhi (2008), both developing and developed countries always face the problem of unemployment.

Unemployment refers to a group of workers actively looking for a job with a certain wage level, but have not found a suitable job (Sukirno, 2004). Unemployment has a negative influence on the economy, such as a decrease in the level of income of the community, which then reduces the level of community welfare, reduces the income of a country which can hinder economic development, and political and social instability (Nanga, 2005).

Unemployment is influenced by the level of population in a region. Previous studies have shown that an increase in population can positively and negatively impact economic development. According to Brown and Moore (2001), higher population growth will lead to a decrease in per capita income, which in turn can affect economic

growth and increase the unemployment rate. However, an increase in population can also accelerate economic development if followed by expanding employment opportunities (Astuti et al, 2019).

Figure 1. Graph of GDP, Inflation, Unemployment and Population Growth in Indonesia 1991-2021



Source: World Bank Indonesia 2023 (processed)

Based on the data in the graph, it is known that GDP, Inflation, Unemployment, and population growth in Indonesia experienced symptoms of ups and downs for 30 years in the period 1991-2021. The drastic decline in GDP occurred in the vulnerable years 1997-1998 with a decrease of 17.83 which made the GDP level at its lowest point in 1998 with a value of -13.13 and its highest point occurred in 1995 with a value of 8.22. As for inflation, which also experienced symptoms of ups and downs, where major inflation occurred in the 1997 - 1998 time frame with an increase of 52.22 which made the highest inflation occur in 1998 with an inflation value of 58.45 with the lowest inflation occurring in 2021 with a value of 1.56.

On the other hand, the unemployment rate has also experienced waves of ups and downs over the past 30 years; the highest point occurring in 2007 form of 8.06, while the lowest level occurred in 1991 in the form of 2.62. And finally, the population level population growth, whose highest point occurred in 1991 and the lowest point of population occurred in 2021 at 2.69. However, the population level in Indonesia did not experience a drastic increase or decrease, so the population level or population growth in Indonesia is more.

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

This section will discuss the literature review by focusing on the theoretical and empirical frameworks. Several previous studies from national and international levels analyze and estimate the effect of inflation and unemployment on a country's economic growth.

Based on an analysis conducted by Muhammad Ramzan (2021) in a journal titled "Impact of Inflation and Unemployment on Economic Growth of Pakistan" states that the effect of the level of Inflation and unemployment on GDP is statistically insignificant; the results show that inflation has a dynamic effect on the Pakistani economy. Inflation has a strong effect on the economy where there is a high level of employment, discount rate, price level, and daily use items

Furthermore, research conducted by Lubbock, et al., 2022 analyzed the effect of inflation, unemployment rate and population on the economy in the Philippines 1991-2020 the results in the study revealed that from the results of The Ordinary Least Square (OLS) it is known that inflation has a positive influence on economic growth. Meanwhile, increasing population and unemployment have a negative impact on economic growth. The Unit Root Test confirms that unemployment, population growth, and economic growth are non-stationary while inflation is stationary. However, the 1st difference shows that unemployment, population growth, and economic growth become stationary through the Augmented Dickey-Fuller Test. Furthermore, the Johansen's Cointegration Test results show that the variables are cointegrated and have a relationship in the long run.

Mohammad Yelwa, et al., 2015 in analyzing the relationship of inflation, unemployment, and economic growth in Nigeria: 1987-2012. Using secondary data, this study shows that, the interest rate and total public expenditure on economic growth in Nigeria have a significant effect, while the unemployment rate and inflation have an inverse effect on economic growth in Nigeria. Empirical reduction from long-run to short-run disequilibrium has significant feedback, but there is a causal relationship between inflation and unemployment on economic growth in Nigeria.

Dimaksono Sekawati and Mbulaheni Albert (2022) in a journal entitled "Effect of Unemployment and Inflation on Economic Growth in South Africa" analyzed the effect of unemployment and inflation rates on economic growth rates in South Africa from 1994 to 2018, using quarterly data. The unit root test results using the Augmented Dickey Fuller and Phillips Perron tests show that all variables have unit roots in levels and become stationary after the first differentiation. The Johansen cointegration test results explain that each variable has a relationship in the long run, and the Vector error correlation model confirms that the unemployment rate and inflation negatively impact the economic growth rate. Then in research (Mehrnoosh and Feizolah, 2016) which analyzed the impact of unemployment and inflation rates on economic growth

in Iran (1996-2012) explained that inflation and unemployment have a significant and negative effect on economic growth in the long run, and indicated that the presence of inflation and unemployment can reduce economic growth in the long run.

Hypothesis

Based on the problems and literature references in building this research, the hypothesis of this study is as follows:

H_0 : Unemployment does not affect Indonesia's economic growth.

H_1 : Unemployment has a significant effect on Indonesia's economic growth.

H_0 : Inflation does not affect Indonesia's economic growth.

H_1 : Inflation has a significant effect on Indonesia's economic growth.

H_0 : Population does not affect economic growth in Indonesia.

H_1 : Population has a significant affect economic growth in Indonesia.

RESEARCH METHODS

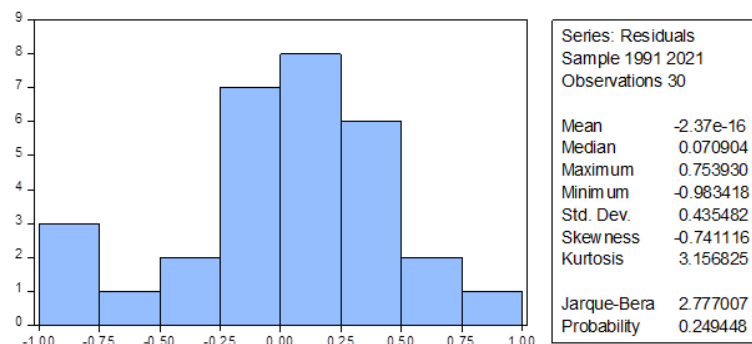
This research is based on the relationship of GDP experience on inflation, unemployment and population growth in the Indonesian economy. The researcher obtained data from the World bank website based on these objectives. The data collected from the period 1990-2021. Thirty-one years (31) of data were analyzed because it can provide a clear position of the Indonesian economy by assessing the main indicators of the economy which include the level of GDP as the dependent variable (Y), Inflation (X1), unemployment (X2) and population growth (X3) as the independent variables. In this study, the researcher has used OLS estimation method which can be used in different studies to test the relationship and secondary data sources. The variables and methodology of this study have been obtained by considering the relative significance empirically and theoretically. It also helps the researcher to include variables determined largely based on Indonesia's financial growth and growth rates.

ANALYSIS AND DISCUSSION

Descriptive Statistics

Descriptive statistical testing was carried out in this study to check data normality. In checking data normality, researchers use Jarque-Bera.

Figure 2. Normal Distribution Graph



Source: Data processed with Eviews 10

Based on the regression estimation results above, it is known that the Jerque-Bera value is 2.77 with a probability of 0.249 and $\alpha = 0.10$, then 0.249 is greater than the 10% significance level so that the regression model is normally distributed.

Pairwise Correlation

The correlation matrix illustrates the relationship of GDP with inflation, unemployment and population. The results show that GDP with inflation ($-0.79 < 0.10$), unemployment ($-0.07 < 0.10$) and population ($0.09 < 0.10$) have a significant relationship. Then the results also show that GDP with Population and Unemployment have a strong correlation (0.61-0.69), so the relationship between the three variables has the same direction with a strong level of closeness. However, GDP and Inflation (0.00) have a weak relationship.

Table 1. Pearson Correlation

Correlation Probability	POPULASI	PENGANG...	INFLASI	GDP
POPULASI	1.000000 -----			
PENGANGGURAN	-0.010906 0.9536	1.000000 -----		
INFLASI	0.379767 0.0351	0.170996 0.3577	1.000000 -----	
GDP	0.092887 0.6192	-0.073536 0.6942	-0.794727 0.0000	1.000000 -----

Source: Data processed with Eviews 10

Time series testing

This test ensures that the time series has no significant trends or patterns and remains stable over time. In this study, the ADF test (Augmented Dickey_Fuller test)

is used to evaluate whether the time series is stationary or not. The results of the ADF test show that the GDP, inflation and unemployment variables can be declared stationary. Stationary test shows that at the level of GDP and Inflation prob. < 0.10 , meaning that the data is stationary. However, unemployment and population are not stationary because of prob. > 0.10 . To overcome the non-stationary evolution, the Augmented Dicky-Fuller ADF test is performed again for the 1st difference.

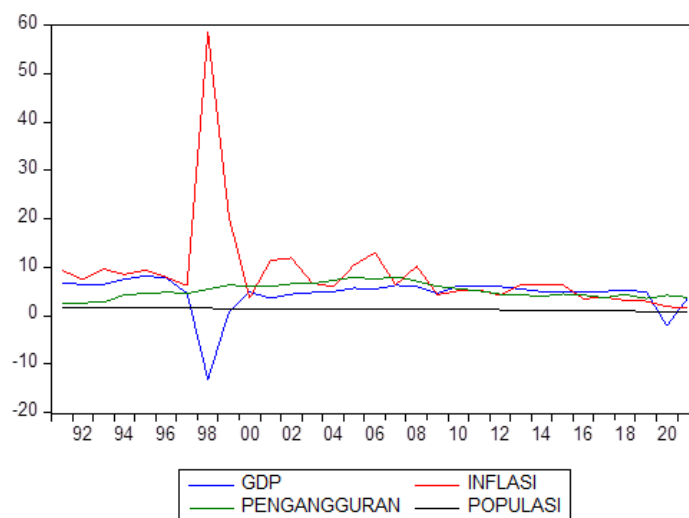
Table 2. ADF Test

	ADF Statistic	Prob*
Level		
GDP	-4.038758	0.0040
Inflation	-4.026196	0.0054
Unemployment	-1.599033	0.4707
Population	1.165679	0.9970
1st Difference		
GDP	-4.038758	0.0040
Inflation	-4.026196	0.0054
Unemployment	-4.800923	0.0006
Population	-5.037918	0.0004

Source: Data processed with Eviews 10

The results show that unemployment and population are stationary at 1st difference. All Prob. < 0.10 which indicates that there is a unit root or stationary. The ADF results can also be explained with the help of graphs. This research is supported by previous research that variable GDP, inflation, unemployment and population in the Philippines from 1991 to 2020. The data was stationary in that study, which strongly supports this study.

Figure 3: Stationary Time Series Graphs



Source: Data processed with Eviews 10

Johansen cointegration results using the Trace statistic approach indicate that the data is cointegrated at a significant level of 0.10. So there is an equilibrium in the long run. So there is a balance in the long run. the results of the study are by the findings of previous research conducted by Muhammad Ramzan (2021), Lubbock, et al., 2022 and Mohammad Yelwa, et al., 2015 where in these studies all variables show balance in long-term relationships.

Table 3. Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.1 Critical Value	Prob.
None*	0.575527	47.71607	44.49359	0.0515
At most 1	0.313266	22.86577	27.06695	0.2527
At most 2	0.228617	11.96732	13.42878	0.1585
At most 3*	0.141953	4.439799	2.705545	0.0351

The first requirement that must be met to use this method is that the data must be corrected for equal variance, but not at this level. In this case, the data must contain at least one cointegrating equation. Basically, the purpose of this method is to recalibrate the transient regression equation at the corrected level over time. It can be seen in the table below that there is a short-run relationship between inflation, unemployment, population and GDP. The significant ECM coefficient estimated at 10% significance level is also negative. This indicates that inflation, unemployment and population are close to their equilibrium values. The R-squared term is 0.79, indicating a 79% correction to the short-run equilibrium. This shows the changes in Indonesia from year to year. The results of this study are not in line with research conducted by Muhammad Ramzan (2021) that inflation and unemployment are far from the equilibrium value.

Table 4. Error Correction Model

Dependent Variable: D(GDP)				
Method: Least Squares				
Date: 03/28/23 Time: 11:19				
Sample (adjusted): 1992 2021				
Included observations: 30 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.384368	0.606354	-0.633901	0.5317
D(INFLASI)	-0.323414	0.033467	-9.663569	0.0000
D(PENGANGGURAN)	-0.125416	0.699671	-0.179250	0.8591
D(POPULATION)	-5.782122	12.76450	-0.452985	0.6543
R-squared	0.787363	Mean dependent var	-0.102819	
Adjusted R-squared	0.762828	S.D. dependent var	4.668127	
S.E. of regression	2.273394	Akaike info criterion	4.603990	
Sum squared resid	134.3763	Schwarz criterion	4.790817	
Log likelihood	-65.05986	Hannan-Quinn criter.	4.663758	
F-statistic	32.09132	Durbin-Watson stat	2.487227	
Prob(F-statistic)	0.000000			

The Ordinary Least Squares (OLS) method does not reduce the total term error, but reduces the total squared error. To get the value of the regression coefficient, set the regression coefficient to zero and calculate the derivative. MRL is a statistical method that uses various explanatory variables to predict the outcome of a response variable. This study adopts the MRL approach in its analysis. This is due to three independent variables, namely inflation rate, unemployment and population and one dependent variable, namely GDP. The following table shows the results of the Multiple Linear Regression Model

The equation of the regression line

$$Y = a + bX_1 + bX_2 + bX_3$$

$$Y = -2.250723 - 0.377702 \text{ inflation} + 0.252471 \text{ Unemployment} + 6.751782 \text{ Population}$$

Where:

Y = GDP (Gross Domestic Product)

X₁ = Inflation

X₂ = Unemployment

X₃ = Resident population

Table 5. Multiple Linear Regression

Dependent Variable: GDP
Method: Least Squares
Date: 03/28/23 Time: 11:47
Sample: 1991 2021
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.250723	1.960640	-1.147953	0.2611
INFLASI	-0.377702	0.033944	-11.12724	0.0000
PENGANGGURAN	0.252471	0.205924	1.226040	0.2308
POPULATION	6.751782	1.259614	5.360201	0.0000
R-squared	0.823460	Mean dependent var		4.598521
Adjusted R-squared	0.803844	S.D. dependent var		3.810301
S.E. of regression	1.687563	Akaike info criterion		4.004362
Sum squared resid	76.89242	Schwarz criterion		4.189392
Log likelihood	-58.06761	Hannan-Quinn criter.		4.064677
F-statistic	41.97987	Durbin-Watson stat		1.975480
Prob(F-statistic)	0.000000			

In the above model, the R-square value is 0.82, which indicates that the explanatory power of the model is 82%. The R-square value also shows that 82% of the variation in GDP is due to the variation in inflation, unemployment rate, and population. All variables are insignificant as all t-values exceed the 10% significance level. The f-value is also 0.00 which is less than 10% significance level indicating the model is not significant and also the f-statistic number is 41.9 which is more than 4. The intersection indicates that if there is no inflation, unemployment, and population,

the value of GDP is -2.25%. The value of X1 indicates that if inflation increases by 1% then GDP will decrease by -0.37%, keeping other things constant. The value of X2 indicates that if the value of unemployment accelerates by 1%, then GDP will increase by 0.25%, and the value of X3 indicates that if population increases by 1% then GDP will decrease by 6.75%. The results of this study are in line with research conducted by Muhammad Ramzan (2021), Lubbock, et al., 2022, Mohammad Yelwa, et al., 2015 and Dimaksono Sekawati & Mbulaheni Albert (2022), it has been found that inflation, unemployment, and population have a negative impact on economic growth. Interestingly, in the study of Lubbock, et al., 2022 it was found that inflation actually has a positive impact on economic growth.

Causality is a reciprocal relationship between two variables. There are several analytical methods to measure the causality relationship, one of which is the Granger Causality Test (Gujarati 2010). The following are the results of Granger causality testing at lags 1.

Table 6. General Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
INFLATION does not Granger Cause GDP	30	1.13002	0.2972
GDP does not Granger Cause INFLATION		0.01202	0.9135
UNEMPLOYMENT does not Granger Cause GDP	30	0.19962	0.6586
GDP does not Granger Cause UNEMPLOYMENT		1.43784	0.2409
POPULATION does not Granger Cause GDP	30	0.00054	0.9817
GDP does not Granger Cause POPULATION		6.56047	0.0163

It can be seen in the estimation results above that there is no relationship between inflation and GDP because the prob. values of 0.29 and 0.91 exceed the 10% significance level. Then unemployment also has no two-way relationship with GDP because the prob. value of 0.65 and 0.24 is more than the 10% significance level. Furthermore, GDP has a two-way relationship with population because the prob. value of 0.01 is smaller than the 10% significance level. While the population does not have a two-way relationship because the value of prob.0.98 is greater than the 10% significance level.

Suppose the VIF value of the four variables is in the range of 5 to 6. In that case, it can be concluded that there is moderate multicollinearity in the study and if the VIF value is above 6 then there is high multicollinearity between regressors. From the multicollinearity test results above, it is found that the value of the correlation VIF value of the four variables is less than <10, so it can be concluded that there are no signs of multicollinearity symptoms in the research model.

Table 7. Variance Inflation Factor

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
INFLATION	0.001152	2.185870	1.211974
UNEMPLOYMENT	0.042405	13.38236	1.037303
POPULATION	1.586626	30.99698	1.176676
C	3.844111	41.84444	NA

Based on the results of the heteroscedasticity test using the Eviews 12 program with the Breusch pagan godfery method, it is known that the prob value is $0.4935 > 0.10$ so it can be concluded that there are no symptoms of heteroscedasticity in the research model.

Table 8. Breusch-Pagan-Godfrey Test

F-statistic	0.755417	Prob. F(3,27)	0.5289
Obs*R-squared	2.400506	Prob. Chi-Square(3)	0.4935
Scaled explained SS	5.414684	Prob. Chi-Square(3)	0.1438

The results of the autocorrelation test can be obtained through the Breusch-Godfrey test, if the prob value < 0.05 indicates the presence of autocorrelation symptoms. Conversely, if the value of prob > 0.05 indicates the absence of autocorrelation symptoms. Based on the results of the autocorrelation test below, it is known that the prob value is $0.9990 > 0.05$, therefore it can be concluded that there are no autocorrelation symptoms in this research model.

Table 9. Serial Corelation LM Test

F-statistic	0.000826	Prob. F(2,25)	0.9992
Obs*R-squared	0.002050	Prob. Chi-Square(2)	0.9990

In this study, the data obtained is for 30 years, starting in 1991-2021, where the data comes from four variables, namely GDP, Unemployment, Inflation, and population growth (population). The results of descriptive statistics in this study show that the dataset is normally distributed. The econometric results show that GDP and inflation have stationary data because the prob value is smaller than the significance level. The next step is to check for cointegration by running ADF on the error term,

this aims to ensure the existence of a long-term relationship. The results of the ECM state that the variables of inflation, unemployment and population growth (population) are close to the equilibrium value.

The analysis results on the Multiple Linear Regression (MLR) model show that none of the variables are significant as all t-values exceed the 10% significance level. However, in the two-way relationship assessment, it was found that inflation has a two-way relationship with GDP, GDP has a two-way relationship with population, and population has no two-way relationship. Furthermore, no multicollinearity symptoms were found in the classical assumption test because the VIF value was <10 . There were no heteroscedasticity symptoms because the probability value in the heteroscedasticity test was $0.4935 > 0, 10$. The autocorrelation test showed no autocorrelation symptoms in the study with a prob value of $0.9990 > 0.10$. Finally, a good model specification test is carried out with the Ramsay Reset test which shows that the model used is not well-defined because the significance value is <10 .

CONCLUSIONS

In this study, the data obtained is for 30 years, starting in 1991-2021, where the data comes from four variables, namely GDP, Unemployment, Inflation, and population growth (population). The results of descriptive statistics in this study show that the dataset is normally distributed. The econometric results show that GDP and inflation have stationary data because the prob value is smaller than the significance level. The next step is to check for cointegration by running ADF on the error term, this aims to ensure the existence of a long-term relationship. The results of the ECM state that the variables of inflation, unemployment and population growth (population) are close to the equilibrium value.

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