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ANALYSIS OF THE RELATIONSHIP BETWEEN ECONOMIC GROWTH, INFLATION AND UNEMPLOYMENT IN INDONESIA

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Abstract:
Economic development is defined as an effort to achieve a sustainable level of growth in per capita income so that the country can increase its output faster than the growth rate. The goal of a country's development is to improve the welfare of society. Policy makers currently focus on economic growth, inflation and unemployment. According to theory, these variables are closely related. This research aims to analyze the relationship between economic growth, inflation and unemployment in Indonesia. The method used is Vector Error Correction Model (VECM) analysis and Granger Causality Test. This paper uses secondary time series data sourced from the World Bank. This research uses a causal-comparative quantitative approach. The research results show that in the long term, inflation has a significant positive relationship with economic growth, and unemployment has a negative and insignificant relationship. In the short term, inflation has nothing to do with economic growth, and unemployment has a significant relationship. The results of the causality test show that economic growth, inflation and unemployment do not have a reciprocal relationship.

Keywords: Economic Growth, Inflation, Unemployment, Causality

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INTRODUCTION

Economic development is defined as an effort to achieve a sustainable level of growth in per capita income so that the country can increase its output faster than the growth rate. According to (Todaro, 2006), economic growth is an increase in the long-term capacity of each country to provide various economic benefits to its population, whether progress or technical, institutional, or ideological, towards various current needs. While weakening macroeconomic problems, policymakers in developed and developing countries are currently focusing on the relationship between economic growth and inflation.

In other words, inflation can be interpreted as a measure of a country's good and bad economic problems. According to (Mulyani et al., 2020), inflation is a monetary event that decreases the currency's value for certain goods. High inflation can cause economic instability, reduce enthusiasm for saving and investment, and inhibit export activities. Inflation can also cause other economic problems, such as slowing economic growth, which ultimately, in the long term, affects unemployment and poverty levels.

The relationship between inflation and unemployment is a trade-off; when inflation is low, the unemployment rate will increase (Sembiring & Sasongko, 2019). The problems of inflation and unemployment can be problems in the short and long term for a country. Inflation and unemployment problems can create adverse economic, political, and social effects (Sukirno, 2010).

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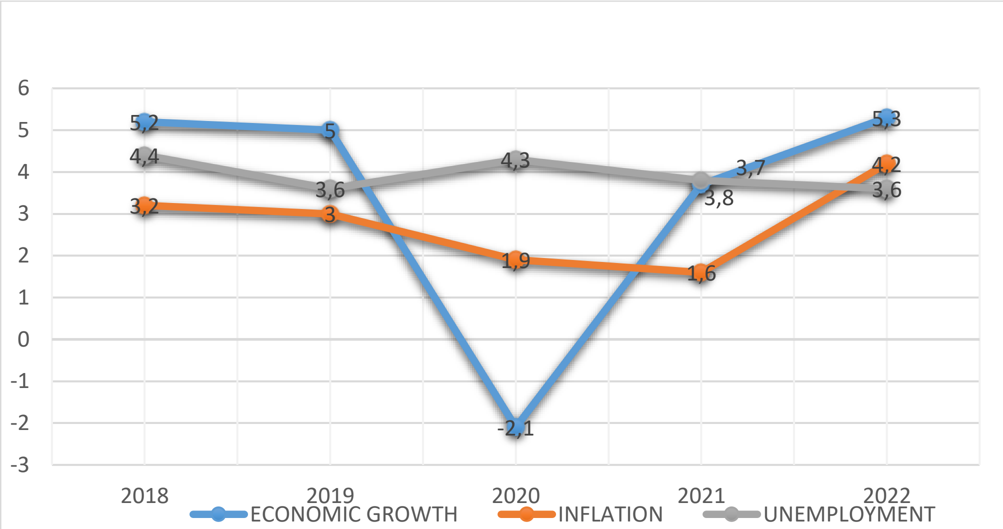
The unemployment rate is the leading indicator of economic health because the unemployment rate is closely related to economic growth (Case et al., 2012).



Source: World Bank (2023)

Figure 1. Data On Economic Growth, Inflation And Poverty In Indonesia For 2018 - 2022

From 2018 to 2019, economic growth, inflation, and unemployment in Indonesia experienced a decline. In 2020, the Covid-19 pandemic caused economic growth to fall to -2.1 percent. Inflation remained stable at 1.9 percent, and unemployment rose to 4.3 percent. In 2021 and 2022, economic growth will continue to rise to 5.3 percent, inflation in 2022 will rise to 4.2 percent, and unemployment will decline to 3.6 percent. After the COVID-19 pandemic, economic growth and unemployment became the government's focus, with several policies implemented.

Based on several studies have found that the problem of unemployment will affect several aspects, for example, poverty levels (Wilkinson & Pickett, 2009) and cases of increased risk of suicide (Milner et al., 2013). Unemployment also hurts mental health (Harkko et al., 2018; Norström et al., 2014; Øverland, 2016).

Research conducted by (Chowdhury & Hossain, 2014) states that economic growth and the exchange rate hurt the unemployment rate, while inflation has a positive relationship with unemployment in Bangladesh. Meanwhile, in Pakistan, economic growth negatively influences unemployment in the long term, and in the short term, this needs to be identified (Abbas, 2014). Several other studies also produced the same findings in Sri Lanka (Thayaparan, 2014), Turkey (Bayar, 2014), and Jordan (Alrabba, 2017; Jaradat, 2014) that economic growth influences the unemployment rate and the relationship inverted or negative. The findings are varied and exciting to discuss based on several studies above. Thus, the author further discusses the relationship between economic growth, inflation, and unemployment in Indonesia.

METHODS

This paper uses time series secondary data sourced from the World Bank. This research uses a quantitative causal-comparative approach. Causal research aims to determine the cause-and-effect relationship between the independent and dependent variables (Sugiyono, 2018). This research aims

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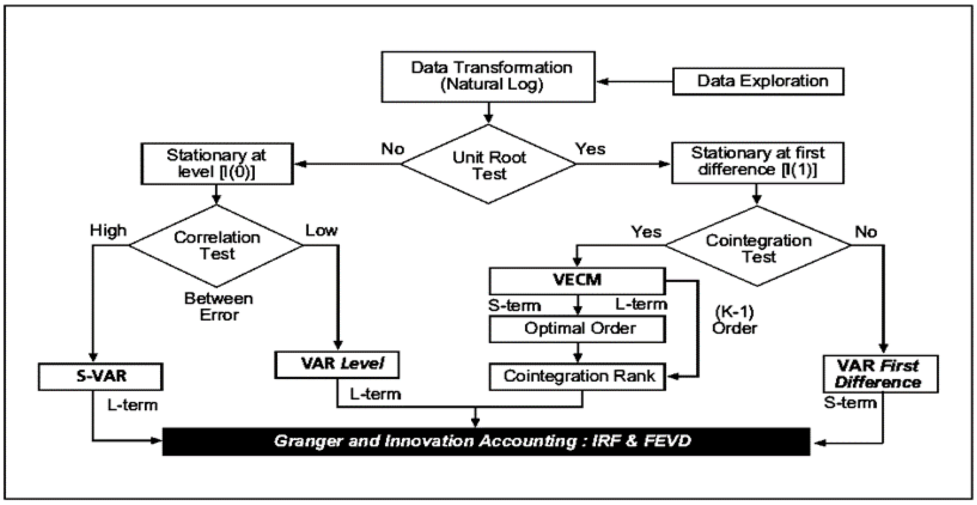
to find a causal relationship between economic growth, inflation, and unemployment in Indonesia from 1976 to 2022.

The data analysis technique used in this research is Vector Auto Regression (VAR) analysis to test the causal relationship between variables using the Granger causality test. According to (Ajija et al., 2011), this model assumes and treats all variables as endogenous (no distinction is made between independent and dependent). The analysis technique used in this research includes several stages:



Source: Ascarya, et al. (2008)

Figure 2. VAR analysis process

Stationary Test. According to (Ariefianto, 2012), stationarity testing is a critical test in regression analysis of time series data. The unit root test is used to test the stationary assumption based on the Augmented Dickey-Fuller (ADF) test. If the data does not pass the unit root test at a level, the data may be tested again in first or second differences.

Cointegration Test. The cointegration test is carried out to determine whether there is a long-term relationship between variables. If it is cointegrated, there is a stable long-term relationship; conversely, if it is not cointegrated, the implication is that there is no long-term relationship. The cointegration test is interpreted as a long-term balance relationship between variables (Ichsan, 2020).

Optimal Lag. Determination of lag order is sought using Akaike's Information Criterion (AIC), Schwarz Criterion (SC), or Hannan Quinn (HQ). The lag that will be selected in the model is the model with the smallest AIC, SC, and HQ values.

Impulse Response Function and Variance Decomposition. Impulse Response Function (IRF) analysis is used to examine the response of specific variables to other variables due to the shock given in the equation. IRF also explains how long a variable can return to equilibrium after a shock occurs in another variable. Variance decomposition will provide information regarding the proportion of movements in the influence of a shock on a variable and other variables in the current and future periods.

Granger Causality Test. The Granger causality test is a method to determine where a dependent variable (dependent variable) can be influenced by other variables (independent variables). On the other hand, the independent variable can occupy the position of the dependent variable (Gujarati, 2009).

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According to (Gujarati, 2009), the following Granger causality test method is expressed in the form of an autoregression vector in the following equation :

$$Yt = \sum_{j=1}^{m} ajXt-1 + \sum_{j=1}^{m} \beta jXt-j + U1t$$

$$Xt = \sum_{j=1}^{m} ajYt-1 + \sum_{j=1}^{m} \beta jXt-j + U2t$$

Which are X, Y is a variable, m is the amount of lag, and U_t is an error term.

The results of the two model forms above will produce possible values regarding the respective regression coefficients, namely (Gujarati, 2009) :

$$\sum_{j}^{m} = a_j \neq 0 \text{ and } \sum_{j}^{m} = a\beta_j = 0$$

There is one-way causality from variable X to variable Y

$$\sum_{j}^{m} = a_j = 0 \text{ and } \sum_{j}^{m} = a\beta_j \neq 0$$

There is one-way causality from variable Y to variable X

$$\sum_{j}^{m} = a_j = 0 \text{ and } \sum_{j}^{m} = a\beta_j = 0$$

There is no one-way causality from variable X to variable Y or from variable Y to variable X.

$$\sum_{j}^{m} = a_j \neq 0 \text{ and } \sum_{j}^{m} = a\beta_j \neq 0$$

There is causality from variable X to variable Y or from variable Y to variable X.

The model in this research is :

$$GDP_t = \gamma_1 + \sum_{i=1}^{k} \alpha_{1i}\, GDP_{t-i} + \sum_{i=1}^{k} \beta_{1i}\, INF_{t-i} + \sum_{i=1}^{k} \theta_{1i}\, UNEMP_{t-i} + \mu_{1t}$$

$$INF_t = \gamma_2 + \sum_{i=1}^{k} \alpha_{2i}\, GDP_{t-i} + \sum_{i=1}^{k} \beta_{2i}\, INF_{t-i} + \sum_{i=1}^{k} \theta_{2i}\, UNEMP_{t-i} + \mu_{2t}$$

$$UNEMP_t = \gamma_3 + \sum_{i=1}^{k} \alpha_{3i}\, GDP_{t-i} + \sum_{i=1}^{k} \beta_{3i}\, INF_{t-i} + \sum_{i=1}^{k} \theta_{3i}\, UNEMP_{t-i} + \mu_{3t}$$

These are: γ is an intercept, α, β, θ is a variable coefficient, $GDPt-i$ is an economic growth variable in year t, $INFt-i$ is an inflation variable in year t, $UNEMPt-i$ is an unemployment variable in year t, μ is an error term.

If causality occurs in an econometric model, there are no independent variables; all are dependent variables. Whether causality is tested through the F test or can be seen from the probability (Widarjono, 2010), to see the Granger causality relationship, it can be seen by comparing the F-statistics with the critical value of the F-table at the confidence level (5%) and also comparing the magnitude of the probability value with the confidence level (5%). Suppose all variables have an F-statistical value more significant than the F-table value at the significance level or a probability value smaller than the confidence level. In that case, the two variables have two-way causality.

RESULT AND DISCUSSION

Stationary Test. Based on the test results using the Augmented Dickey-Fuller (ADF) approach, it is known that the economic growth and inflation variables have a probability below 0.05, so the

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data is stationary. The non-stationary unemployment variable has a probability above 0.05 because some of the data is not stationary, and a cointegration test needs to be carried out. The stationary test results will appear in the table below :

Table 1. Stationary Test Result

Variable	t-statistic	Probability
GDP	-4.8445	0.0003
INF	-5.2834	0.0001
UNEMP	-1.8309	0.3616

Source: Processed Eviews 13 (2023).

Because several variables are still not stationary, the stationarity test must be continued using the degree of integration in the first difference. The degree of integration test is carried out to obtain stationary data. This stage is an advanced stage of the stationarity test at level level or first difference test.

Table 2. Stationary Test at First Difference Result

Variable	t-statistic	Probability
GDP	-7.3700	0.0000
INF	-8.5710	0.0000
UNEMP	-7.6142	0.0000

Source: Processed Eviews 13 (2023).

Based on the test results at the first difference, it is known that all variables have a probability below 0.05, so the data is stationary.

Cointegration Test. Based on the test results using the Johansen Trace Statistic Test with a level of 5%, the cointegration test results will appear in the table below :

Table 3. Johansen cointegration test Result

Hypothesized No. of CE (S)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability
None*	0.511738	62.34744	24.27596	0.0000
At most 1*	0.388481	31.52062	12.32090	0.0000
At most 2*	0.214337	10.37280	4.129906	0.0015

Source: Processed Eviews 13 (2023).

Three rank variables have a cointegration relationship. This can be proven by the respective Trace Statistics values of 62.34744, 31.52061, and 10.37280, which are more significant than the Critical Value of 0.05, 24.27596, 12.32090, and 4.129906. Thus, the variables used in this research have a long-term relationship (cointegration).

Optimal Lag. Determination of lag order is sought using Akaike's Information Criterion (AIC), Schwarz Criterion (SC), or Hannan Quinn (HQ). The lag that will be selected in the model is the model with the smallest AIC, SC, and HQ values.

Table 4. Optimal Lag Result

Lag	LR	FPE	AIC	SC	HQ
1	12.3057	659.5893	15.0035	15.4999*	15.1854
2	26.3983*	479.9252*	14.6778*	15.5466	14.9963*

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3	10.4554	541.3170	14.7796	16.0208	15.2346
4	6.7731	681.3221	14.9747	16.5882	15.5561

Source: Processed Eviews 13 (2023).

Based on the table above, it can be seen that Lag 2 has the smallest Akaike Information Criterion (AIC), Schwarz Criterion (SC), or Hannan Quinn (HQ) value. This means that the optimal influence of a variable on other variables occurs within a time horizon of 2 periods known from the highest number of asterisks. That way, the optimal lag recommended is lag 2.

Vector Error Correction Model (VECM). The Vector Error Correction Model (VECM) estimation results show that long-term and short-term equations can be analyzed. The long-term equation model of the VECM equation model based on test results is as follows: $D(GDP)$ = 1.000000 + 0.820815 $D(INF(-1))$ − 0.805333 $D(UNEMP(-1))$

The VECM estimation results for economic growth use lag two as the optimal lag. A partial significance test with t-statistics was carried out to analyze the influence of the variables in the model. The t-test was carried out at the level of significance (α) = 5% with a t-table value of 2.015368.

Table 5. Long-Term VECM Result

Variable	Coefficient	t-statistic
GDP	1.000000	
INF	0.820815	8.77116
UNEMP	-0.805333	-1.02986

Source: Processed Eviews 13 (2023).

Based on the table above, inflation (INF) has a positive and significant relationship to economic growth (GDP) of 0.820815 in the long term. A positive coefficient indicates that an increase in inflation of 1% will cause an increase in economic growth of 0.82%. This is based on research conducted by Kartika and Pasaribu (2023) and Moore (2013).

Meanwhile, the unemployment rate (UNEMP) in the long term has a negative and insignificant relationship to economic growth (GDP) of 0.805333, where for every 1% increase in unemployment, it will cause a decrease in economic growth of 0.80%. These results are from the research findings of Jonaidi (2012) and Paramita and Purbadharmaja (2014), which show that unemployment negatively affects economic growth.

VECM will also be estimated in the short term with the t-test carried out at the level of significance (α) = 5% with a t-table value of (2.015368) as follows :

Table 6. Long-Term VECM Result

Endogenous Variable	Exogenous Variable	Coefficient	t-statistic
D(GDP)	CointEq1	0.464589	1.47999
	D(GDP(-1))	-1.058613	-3.89637
	D(GDP(-2))	-0.827955	-3.45145
	D(INF(-1))	-0.244818	-1.33812
	D(INF(-2))	-0.187082	-1.61951
	D(UNEMP(-1))	1.260749	2.22717
	D(UNEMP(-2))	2.531285	4.46728
	R-square	0.681469	
	Adj. R-Square	0.628380	
	F-statistic	12.83645	

Source: Processed Eviews 13 (2023).

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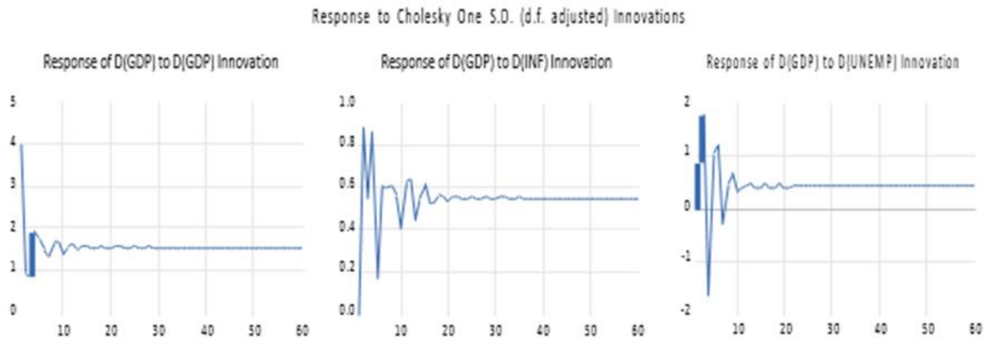
The table above shows that each GDP variable at lags 1 and 2 in the short term has a significant relationship with the variables of 3.89637 and 3.45145. Meanwhile, the INF variables at lags 1 and 2 in the short term have no relationship to GDP at 1.33812 and 1.61951, respectively. Meanwhile, in the short term, UNEMP at lags 1 and 2, respectively, has a significant relationship to GDP of 2.22717 and 4.46728. The ability of exogenous variables to explain the D(GDP) variable based on the goodness to fit (Adjusted R Square) is 68.1%. In comparison, the remaining 31.9% of D(GDP) can be explained by other variables not included in the model.

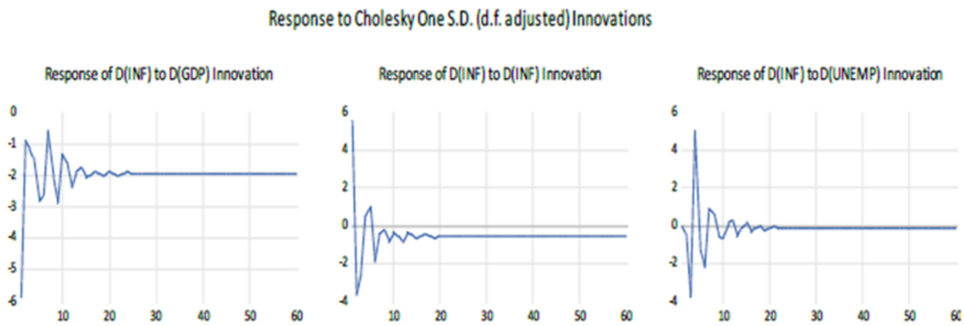
Impulse Response Function. The following is a summary of the results of the Impulse Response Function analysis for the influence of exogenous variables on the stability of the endogenous variable GDP, as follows :



Source: Processed Eviews 13 (2023).

Figure 3 . Impulse Response Function GDP

All variables show shock and permanent influence on the GDP between 0.42 and 1.57. Of the three exogenous variables that impact the GDP variable, the shock of the UNEMP variable to GDP is the one that reaches stability the fastest (period 23). Then, the shock to the GDP variable of 1.57 was stable (Period 29). Meanwhile, INF was the exogenous variable shock that took the longest to reach stability. The INF variable or inflation only started to stabilize again (period 34).



Source: Processed Eviews 13 (2023).

Figure 4 . Impulse Response Function INF

All variables have shown shock and permanent influence on the INF variable between -0.10 and -1.95. Of the three exogenous variables that impact the INF variable, the shock of the INF variable to INF is the one that reaches stability the fastest (20th period). Then, the shock of the

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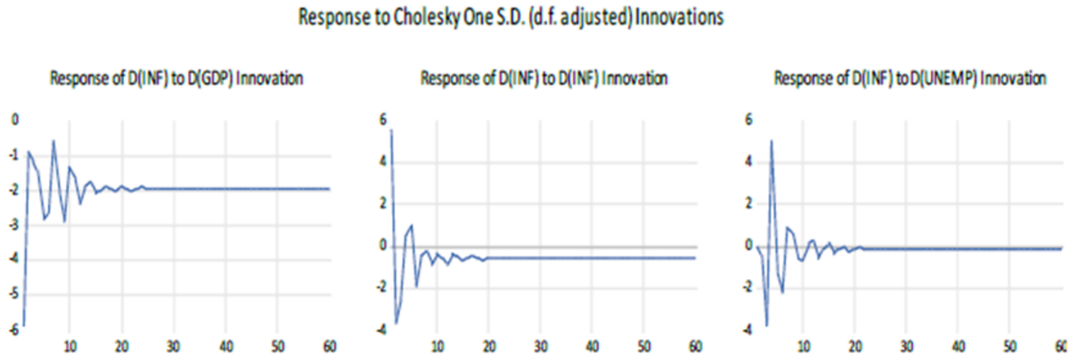
UNEMP variable to INF was -0.10, stable in (Period 24). Meanwhile, the exogenous variable shock that took the longest to reach stability was GDP starting (period 26).



Source: Processed Eviews 13 (2023).

Figure 5. Impulse Response Function UNEMP

All variables have shown shock and permanent influence on the UNEMP variable between -0.25 and 0.39. Of the three exogenous variables that impact the UNEMP variable, the shock of the UNEMP variable to UNEMP is the one that reaches stability the fastest (19th period). Then, the shock of the INF variable to UNEMP was 0.12, stable in (25 Period). Meanwhile, the exogenous variable shock that took the longest to reach stability was GDP starting (period 26).

Variance Decomposition. This analysis measures the composition and contribution of the influence of each independent variable on the dependent variable. Variance Decomposition results are sequentially caused by the shock itself or other variables. With that, each variable can be explained as follows :

1. Variance Decomposition GDP

The GDP variable is influenced most dominantly by the GDP variable itself, while the UNEMP and INF policy variables are in second and third place, starting from the 2nd to the 60th period. In the first period, fluctuations in the GDP variable were influenced by shocks to the GDP variable itself by 100 percent. In the forecasting interval for subsequent periods, the influence of shocks on the GDP variable decreases and influences GDP variability, but it is still very dominant. Meanwhile, the UNEMP variable of 4.270702 and INF of 4.211395 play a significant role in the second and third periods, namely in the second period. In the period up to 60, variations in the GDP variable can be explained as becoming weaker by the UNEMP variable and more substantial by the INF variable.

2. Variance Decomposition INF

The INF variable is influenced most dominantly by the GDP variable of 52.36932, while the INF and UNEMP policy variables are in second and third place, respectively. In the second period, the dominance of the GDP variant began to decrease, namely by 44.10253, while the INF shock to itself began to increase by 55.62244, followed by UNEMP 0.275031. In the third period, the INF shock to itself continues to decrease. In the fifth period, the GDP variant continues to increase and dominates the influence of INF, followed by INF and UNEMP, respectively. This condition persists from period 5 to period 60.

3. Variance Decomposition UNEMP

UNEMP is most dominantly influenced by the variable, amounting to 96.54709, while the INF and GDP policy variables are in second and third place. In the second period, the dominance of the variant over itself began to decrease, namely by 91.07301; this was accompanied by an increase in

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the influence of INF 5.213932 and GDP 3.713059. In the third period, the UNEMP shock to itself continued to decrease, and in the ninth period, the INF variant continued to increase. However, it still needed to dominate the influence of UNEMP, followed by GDP. This condition persists from period 9 to period 60.

Granger Causality Test. From the following table, the test results can be seen that there is a reciprocal relationship between variables, namely as follows :

Table 7. Granger Causality Test Result

Null Hypothesis	F-statistic	Probability
INF does not Granger Cause GDP	1.26565	0.2931
GDP does not Granger Cause INF	1.42533	0.2524
UNEMP does not Granger Cause GDP	0.48663	0.6183
GDP does not Granger Cause UNEMP	0.87860	0.4232
UNEMP does not Granger Cause INF	0.08306	0.9205
INF does not Granger Cause UNEMP	0.99883	0.3773

Source: Processed Eviews 13 (2023).

Based on the data in the table above, it can be concluded that the INF variable has no significant relationship with the GDP variable at the 5% level (probability 0.2931>0.05). The GDP variable has no significant relationship with INF at the 5% level (probability 0.2524>0.05) at lag 2. This means that inflation in the previous period did not significantly influence economic growth, or there was no two-way causality between economic growth and inflation.

In the table above, the UNEMP variable has no significant relationship with the GDP variable at the 5% level (probability 0.6183>0.05), and the GDP variable has no significant relationship with UNEMP at the 5% level (probability 0.4232>0.05), at lag 2. This means that unemployment in the previous period did not significantly influence economic growth or that there was no two-way causality between economic growth and unemployment.

In the table above, the UNEMP variable has no significant relationship with the INF variable at the 5% level (probability 0.9205>0.05), and the INF variable has no significant relationship with UNEMP at the 5% level (probability 0.3773>0.05), at lag 2. This means that unemployment in the previous period did not significantly influence inflation, or there was no two-way causality between inflation and unemployment.

CONCLUSION

Based on the results of data processing from research conducted, namely to analyze the causal relationship between economic growth, inflation, and unemployment in Indonesia using the VECM method, it is concluded that :

1. In the long term, the variable used in the research, namely the inflation variable, has a positive and significant influence on economic growth. In contrast, the unemployment variable has no significant and negative influence on economic growth in Indonesia.
2. In the short term, the inflation variable does not significantly affect economic growth, while the unemployment variable significantly affects growth. The variables of economic growth and unemployment each have a significant effect on inflation. Meanwhile, the variables of economic growth and inflation do not have a significant effect on unemployment in Indonesia.
3. The Granger causality relationship between the three variables of economic growth, inflation, and unemployment does not have a causal relationship between the variables.

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