



CAUSALITY BETWEEN ECONOMIC GROWTH AND UNEMPLOYMENT IN INDONESIA

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Abstract

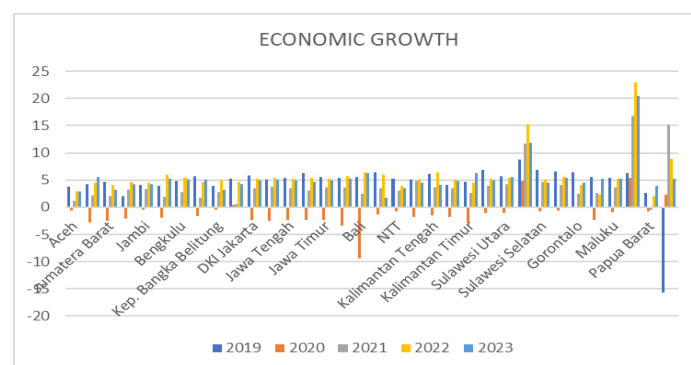
This study aims to examine the causal relationship between economic growth and the unemployment rate in Indonesia for the 2019–2023 period. This study uses of a quantitative approach with the data from the Statistics Indonesia and Bank Indonesia. Data is analyzed using Vector errors Correction model (VECM), Impulse response function (IRF), and Variance Decomposition version estimation. The research outcomes display that there is no short run causal relationship among economic growth and unemployment. However, the cointegration test shows that there may be a long-run relationship between the two variables. The VECM estimates show that each variable adjusts to long-run imbalances. The IRF and variance decomposition analyses confirm that the influence of one variable on another is relatively weak in the short run. However, the result shows the dynamics of adjustment in the long run. These findings highlight the importance of a long run economic policy approach that not only focuses on growth but also considers structural factors in the labor market to effectively address unemployment.

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INTRODUCTION

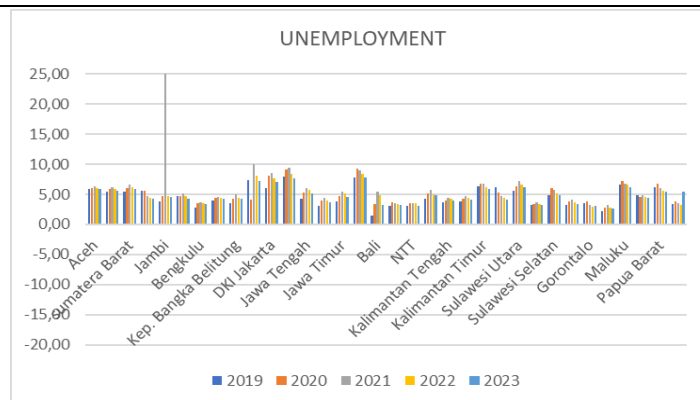
Indonesia is one of the countries with the highest unemployment rates in the ASEAN region. This condition is due to several provinces still having unemployment rates that exceed the national average (Kharisma & Wardhana, 2021). Economic growth is a vital indicator for assessing a country's development, as it reflects an increase in the production capacity of goods and services within a specific period of time (Ozili et al., 2023). In the Indonesian context, stable economic growth is expected to be able to create social welfare through increasing per capita income, creating jobs and reducing poverty (Fahrudin & Kusnadi, 2020). However, in reality, an increase in Gross Domestic Product (GDP) figures is not necessarily followed by a significant decrease in the unemployment rate (Karo Karo & Yusnida, 2024). In Indonesia, real GDP growth was recorded at 5.05% in 2023, a slight slowdown compared to the previous year (Indrawati et al., 2024). This phenomenon shows that there is a mismatch between economic growth and the ability of the labor market to absorb the workforce (Hamzah et al., 2021), which can be caused by structural factors such as skills mismatch, dominance of the informal sector, as well as growth in sectors that are capital intensive but have minimal labor absorption (Moridian, 2024).



Source: Central Statistics Agency

Figure 1. Economic Growth Graph for The Years 2019–2023

Unemployment itself is a serious condition in the economy, because apart from having an impact on the loss of individual income (Junaedi, 2023), it also has negative implications for people's purchasing power, national productivity and social stability (Prasetyo, 2021). When economic growth is not inclusive enough or is uneven sectorally, the problem of unemployment will remain a threat even though economic growth figures look positive (Wau et al., 2022). Unemployment, also referred to as joblessness, refers to individuals who do not have any form of employment, are actively seeking work, work less than two days a week, or are attempting to find a job that better matches their skills and expectations (Agustina et al., 2023). According to Mantra (2020) unemployment is part of the workforce who is not working but is actively trying to get a job (Priambodo, 2021). This term is generally associated with the concept of open unemployment, namely the condition when someone is ready and willing to work but has not yet received a job opportunity (Triatmanto & Bawono, 2023).



Source: Central Statistics Agency

Figure 2. Unemployment Graph for The Years 2019–2023

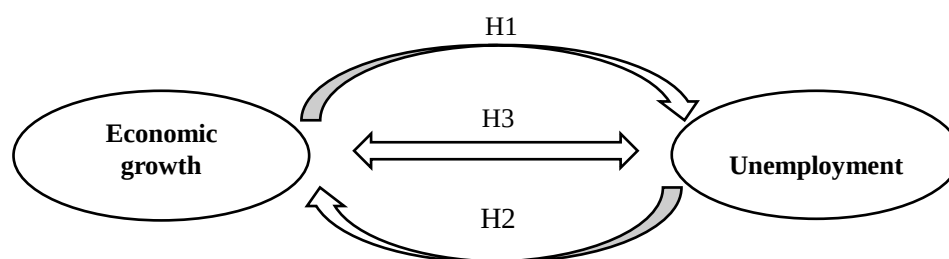
In general, unemployment may be classified into four types based on its important causes, namely frictional unemployment (occurring due to transitions between jobs), structural (caused by a mismatch between worker skills and labor market needs), seasonal (occurring due to seasonal fluctuations in economic activity), and cyclical (caused by a decline in overall economic activity). The existence of these various types of unemployment reflects the complexity of employment problems that require appropriate and sustainable solutions from the government and the private sector (Marini & Putri, 2020). This situation arises from an imbalance between the labor force and the availability of job opportunities. From both economic and social perspectives, unemployment can lead to various issues (Dewi & Djinar Setiawina, 2022).

Therefore, it is necessary to carry out an in-depth study of the relationship between economic growth and unemployment, not only to determine whether there is a correlation or not, but also to analyze the direction and form of causality between the two (Boďa & Považanová, 2020). Does economic growth significantly reduce unemployment? Or is it actually high unemployment that hinders economic growth? In fact, there could be a reciprocal relationship where the two influence each other. To answer this question, the problem formulation in this research is formulated as follows: the extent of the causal relationship between economic growth and the unemployment rate in Indonesia, what is the direction of influence between these two variables, and how much contribution each variable has in influencing the dynamics of the national economy. Based on this formulation, this research aims to empirically and quantitatively test the relationship between economic growth and unemployment, assess the direction of causality that occurs, and measure how much contribution or impact the variables have on each other, both inside the quick and long term.

Theoretically, this research refers to various macroeconomic theories. One of the most relevant is Okun's Law, which states that there is a negative relationship between economic growth and the unemployment rate, namely when GDP increases, unemployment tends to decrease, and vice versa (Wilms et al., 2021). However, in practice, various studies show that this relationship does not always apply consistently, especially in developing countries like Indonesia, where the workforce structure is still dominated by the informal sector (Badrudin et al., 2025). Apart from Okun's Law, this research also utilizes a Keynesian approach which emphasizes the importance of aggregate demand in job creation (Adi, 2022). As well as modern theories such as endogenous growth theory and institutional approaches which see growth and employment in a more complex context (Coşar & Yavuz, 2021). Neoclassical theory as proposed by Solow and Schumpeter is also relevant in understanding the role of technology, capital accumulation and innovation in creating quality growth and being able to absorb labor optimally (Doré & Teixeira, 2023).

Based on this theoretical understanding, the proposed research hypothesis consists of three parts: First, H1 states that economic growth has an influence on the unemployment rate in Indonesia

(one-way causality). Second, H2 states that the unemployment rate has an impact on the rate of economic growth (causality is in the opposite direction). Third, H3 states that there is a reciprocal relationship between economic growth and unemployment (two-way causality). These three hypotheses will be tested using a quantitative approach with econometric models based on time series data, which allows testing not only short run relationships but also long run relationships. This study uses the Granger causality test method with the help of Eviews 9 software. Granger causality test is used to identify the direction of causality between the variables under investigation (Wiradnyana & Bendesa, 2021). This study expects to contribute to the method of more effective macroeconomic regulations, both in encouraging inclusive growth and in reducing unemployment in a sustainable manner.



Source: Author Compilation 2025

Figure 3. Concept Framework Diagram

RESEARCH METHODS

This research makes use of a quantitative approach with causality evaluation methods to analyze the relationship between economic growth (GDP) and the unemployment rate in Indonesia for the 2019–2023 period. This study uses the data from Statistics Indonesia (BPS) and Bank Indonesia. This study uses annual data covering each province in Indonesia. Analysis was carried out through descriptive statistical tests, stationarity tests using Augmented Dickey-Fuller (ADF), and Granger causality tests to see dynamic relationships between variables. If both variables are stationary at the same level, the Vector Autoregression (VAR) method is used. Meanwhile, if a cointegration relationship is found, the Vector Error Correction Model (VECM) approach is used. In addition, classical assumption tests such as normality, autocorrelation, heteroscedasticity, and multicollinearity were applied to ensure the reliability and validity of the model (Daly et al., 2024). Impulse response function (IRF) analysis and variance decomposition were also carried out to deepen understanding of the direction, strength and duration of influence between variables (Yoshimura et al., 2025). The final results are analyzed to determine the direction of causality, whether one-way or two-way, as well as to understand the short-run and long-run relationships between economic growth and unemployment rates in Indonesia.

RESULTS AND DISCUSSION

This study uses Augmented Dickey-Fuller Stationarity Test (ADF) to test the stationary. In research, secondary data generally has a trend which can cause the data to be non-stationary. This non-stationary data can result in false regression (spurious regression), so that the estimates obtained are invalid (Uddin et al., 2025). Therefore, so that the estimates produced are more accurate, the data used must be stationary. To ensure data stationarity, an Augmented Dickey-Fuller (ADF) unit root test was carried out. Table 1 shows the stationary test result.

Table. 1
Economic Growth Variables

	t-Statistic	Probabilitas
Augmented Dickey-Fuller test statistic	-2,671	0,112
Test critical values		
1% level	-4,297	
5% level	-3,213	
10% level	-2,748	

Source: Research Data 2025

Because the economic growth variable is not stationary at level level, first differencing is carried out to achieve stationary conditions. The results after the first differencing are showed by Table 2.

Table 2
Economic Growth Variables

	t-Statistic	Probabilitas
Augmented Dickey-Fuller test statistic	-3,625	0,0133
Test critical values		
1% level	-3,753	
5% level	-2,998	
10% level	-2,639	

Source: Research Data 2025.

Based on existing data, variable X shows the presence of a unit root at the level, which indicates that the variable is not stationary in its original form. However, after the first differentiation ($D(X)$), the variable becomes stationary. This shows that the variable has first order integration ($I(1)$), which means it requires an approach such as VAR in the form of differentiation or VECM if there is a cointegration relationship.

Table 3
Unemployment Rate Variable

	t-Statistic	Probabilitas
Augmented Dickey-Fuller test statistic	-0,696	0,8288
Test critical values		
1% level	-3,753	
5% level	-2,998	
10% level	-2,639	

Source: Research Data 2025

Table 3 shows the result of stationarity test unemployment rate variable. Because the unemployment rate variable is not stationary at level, first differencing is carried out to achieve stationary conditions. After first differencing, the variables show stationary properties, which means the mean, variance and covariance are regular over the years. This is important to avoid biased or spurious regression results, so that the analysis is more valid to continue to the cointegration test stage and dynamic models such as VAR or VECM. The results after the first differencing are showed by Table 4.

Table 4.
Unemployment Rate Variable

	t-Statistic	Probabilitas
Augmented Dickey-Fuller test statistic	-3,617	0,014
Test critical values		
1% level	-3,770	
5% level	-3,005	
10% level	-2,642	

Source: Research Data 2025

According to Table 4, where variable Y has a unit root at level, which means it is not stationary in level. However, after the first differentiation ($D(Y)$), the variables become stationary. This shows that the variable is first order integration ($I(1)$), which means it requires an approach such as VAR in the form of differentiation or VECM if there is a cointegration relationship.

Table 5.
Granger causality test

Null Hypothesis	F-Statistic	Prob.	Conclusion
Y does not cause X	197,968	0,175	There is no causal relationship
X does not cause Y	0,000	0,991	There is no causal relationship

Source: Research Data 2025

The Granger Causality test is a statistical technique used to decide whether or not one time series variable can be used to are expecting some other variable (Nasution, 2023). A variable is said to "motive" every other variable within the Granger sense if past facts about that variable extensively allows in predicting the opposite variable.

Table 5 explains the result of Granger Causality Test. At a 5 percent significance level, no causal relationship is found between economic growth and unemployment, indicating that changes in one variable do not directly cause changes in the other in the short run. This shows that an increase or decrease in economic growth does not necessarily affect the unemployment rate directly in a shorter period, so that economic policies that only focus on economic growth may not have a direct impact on reducing unemployment in the short run.

Johansen Cointegrity Test is a statistical approach used to test whether there's a long run relationship (cointegration) between or more time series variables, each of which is not stationary, but the linear combination between these variables is stationary (Jumiarti & Hayet, 2021). This test is based on the Vector Autoregression (VAR) model and produces two main statistics: trace data and maximum Eigenvalue information, which might be used to decide the wide variety of cointegration vectors that exist. If there is cointegration, it means that even though the variables move randomly in the short run, they have a stable equilibrium relationship in the long run. The Johansen test is superior to other methods such as Engle-Granger because it can test the cointegration of more than two variables simultaneously (Rakhmawati, 2024).

Table 6.
Johansen Cointegration Test

Hypothesis	Eigenvalue	Trace Statistic	Critical Value (5%)	Prob.	Conclusion
None	0,620403	2,644,633	1,549,471	0,0008	There is cointegration
Hypothesis	Eigenvalue	Trace Statistic	Critical Value (5%)	Prob.	Conclusion
At most 1	0,252263	6,104,793	3,841,465	0,0135	There is cointegration

Source: Research Data 2025

Table 6 explains the trace test using Johansen Cointegration Test. The trace test shows the existence of two cointegration relationships at a significance level of 5 percent, as evidenced by a trace statistical value of 2,644,633 and a probability of 0.0008. Those findings imply that although within the short time period there's no causal relationship among economic growth and the unemployment rate, in the long time there's a considerable balance relationship among the two variables. In different words, changes in economic boom do no longer necessarily affect the unemployment rate inside the brief term, but in the long term, the two will interact and adjust to return to the balance path.

Therefore, even though growth-based economic policies do not show a direct impact on unemployment in the short term, they will still have a positive influence on gradually reducing the unemployment rate in the long term, so it is important for the government to maintain and strengthen an inclusive and sustainable economic growth strategy.

Estimated Vector Error Correction Model (VECM) test results, VECM combines a short-term model (in the form of differencing) with correction for long-term imbalances (via error correction term) (Hauzenberger et al., 2020). Thus, VECM is able to show how variables adjust in the short term to return to their long-term relationships (Kismawadi, 2024). In VECM, the error correction coefficient shows the speed of variable adjustment to long-term balance after a shock or imbalance occurs (Sari et al., 2023).

Table 7.
VECM estimation test results

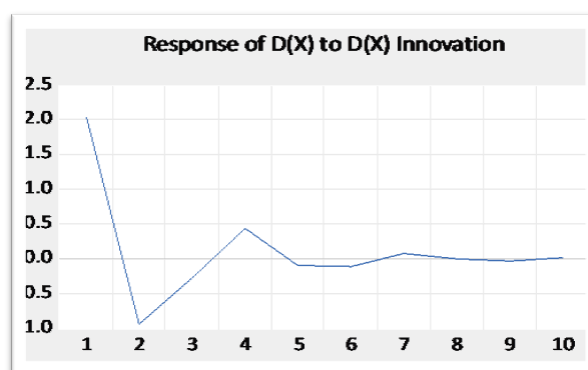
(Long Term Relationship)		
Economic Growth (-1)	1,000,000	
Unemployment Rate(-1)	-0.021	
	(0.414)	
	[0.0493]	
	No Sign	
C	-0.082	
Error Correction:	Economic growth	Unemployment Rate
CointEq1	-1,888,220	0.298
	(0.403)	(0.139)
	[4.683]	[2.144]
	Sign (5%)	Sign (5%)
	0.294	-0.120
Economic Growth (-1)	(0.231)	(0.0796)
	[1.272]	[-1.506]
	No Sign	No Sign
	-0.536	-0.147
Unemployment Rate(-1)	(0.791)	(0.272)
	[0.678]	[-0.540]
	No Sign	No Sign
C	-0.095	-0.043
	(0.446)	(0.153)
	[-0.212]	[-0.283]
	No Sign	No Sign
Statistik Model	Economic Growth	Unemployment Rate
R-squared	0.718	0.3281
Adj. R-squared	0.668	0.209
Sum sq. resid	7,006,888	8,390,532
S.E. equation	2,438,868	0.795
F-statistic	1,440,778	2,767,322
Log likelihood	4,253,882	-1,037,675
Akaike AIC	4,432,269	2,398,485
Schwarz SC	4,637,286	2,603,502
Mean dependent	0.048	0.309
S.D. dependent	3,503,370	0.789
Determinant Residual Covariance	Value	
Determinant resid covariance (dof adj.)	0.790	

Determinant resid covariance	0.523563
Log likelihood	-5,280,836
Continue:	
Akaike information criterion	5,867,750
Schwarz criterion	6,474,828
Number of coefficients	10

Source: Research Data 2025

The error correction coefficient in the $D(X)$ equation is significantly negative (-1.8882), indicating that economic growth adjusts to disturbances towards long run balance, while the error correction coefficient in the $D(Y,2)$ equation is significantly positive (0.2975), indicating that unemployment also adjusts to disturbances. In other words, although there is no causal relationship in the short run, economic changes and unemployment have a stable long-term relationship, where the two variables adjust to each other to reach equilibrium.

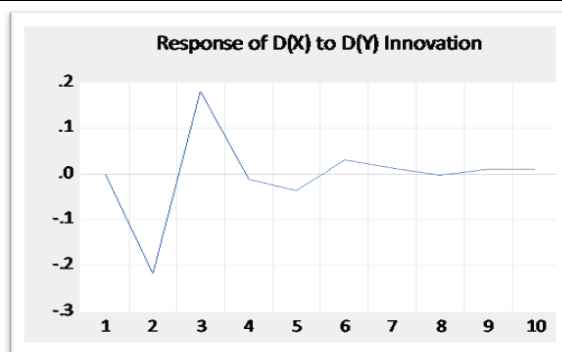
Impulse Response Function (IRF), is used to analyze how a shock to one variable can affect that variable and other variables in an economic system. IRF describes how dynamic changes occur due to certain shocks and shows the response patterns of other variables in the system to the changes that occur (Yoshimura et al., 2025). In other words, IRF provides a picture of how the impact of an economic shock propagates in a model and how long the effect lasts before finally subsiding. Through IRF analysis, we can understand how much influence a shock to a variable has on the system as a whole, including whether the impact is temporary or lasts in the long term (Chencho et al., 2024). In addition, IRF also helps in identifying which variables are most sensitive to change and how interactions between variables in the system occur over time. Thus, IRF becomes an important tool in macroeconomic analysis, especially in understanding the dynamic relationship between economic growth and unemployment.



Source: Research Data 2025

Figure 4. Economic Response to The Economy

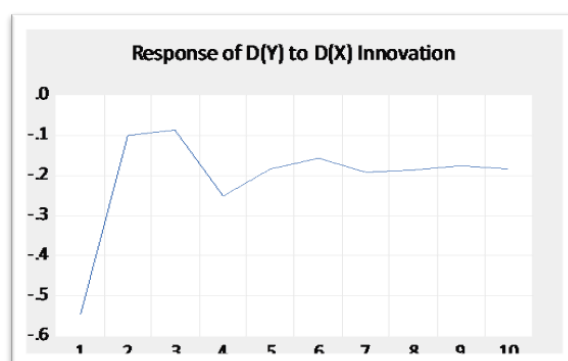
The diagram in Figure 1 shows how the Economic Growth variable responds to shocks from itself, where the initial response tends to be positive and may decrease over time. If the impact persists in the long run, this indicates that the variable has a strong persistent effect on itself or has high autocorrelation. On the other hand, if the shock effect quickly dissipates and returns to zero within a few periods, then the impact of the innovation on this variable is temporary and has no long run effect.



Source: Research Data 2025

Figure 5. Economic Response to Unemployment Levels

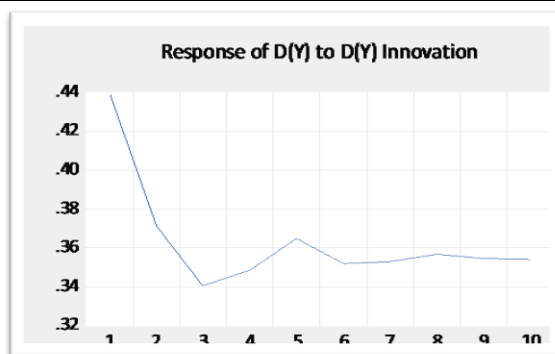
This diagram illustrates how the economic growth variable reacts to shocks originating from the unemployment rate, which shows the extent to which changes in the unemployment rate affect economic growth in the next few periods. If the response is initially negative but gradually returns to zero, then the impact of the shock is only temporary and has no long run effect on economic growth. This can indicate that although there is a relationship between the two variables, the effect quickly subsides and does not create a strong link in the system. Conversely, if the response remains significant in the long run, this indicates that the unemployment rate has a stronger influence on economic growth, which could be an indication of a structural or causal relationship between the two variables. The magnitude of the impact may also reflect the sensitivity of economic growth to changes in the unemployment rate, where a high response indicates a close relationship, while a weak or insignificant response indicates that changes in the unemployment rate have no effect on economic growth.



Source: Research Data 2025

Figure 6. Unemployment Rate Response to The Economy

Figure 6 shows how the unemployment rate variable responds to shocks or innovations originating from economic growth, which illustrates the extent to which changes in economic growth affect the unemployment rate in several future periods. If the response is initially positive or negative but gradually subsides and returns to zero, then the impact is only temporary, indicating that the relationship between the two variables is not sustainable in the long run. Conversely, if the effects of such shocks persist over a longer period, this may indicate the existence of a long run causal relationship between economic growth and the unemployment rate, where changes in economic growth have a more significant role in determining the dynamics of the unemployment rate.



Source: Research Data 2025

Figure 7. Response of Unemployment Rate to Unemployment Rate

Figure 7 shows how the unemployment rate reacts to innovation in itself, reflecting the degree of its dependence on previous values. If the response line remains high over several periods, it means that the unemployment rate has a strong persistence effect, where shocks tend to persist in the long run. Conversely, if the response quickly subsides and returns to zero, the impact is only temporary, indicating that the unemployment rate is more influenced by external factors. The magnitude of this effect also reflects the degree of autocorrelation, with longer-lasting effects indicating greater stability.

Table 8.
Variance Decomposition Test Results of Economic Growth

Period	S.E.	Economic growth (%)	Unemployment rate (%)
1	2,039	100,000	0,000
2	2,255	99,067	0,933
3	2,280	98,464	1,536
4	2,321	98,515	1,485
5	2,324	98,494	1,506
6	2,327	98,480	1,520
7	2,328	98,478	1,521
8	2,328	98,478	1,521
9	2,328	98,477	1,523
10	2,328	98,475	1,524

Source: Research Data 2025

Vector Autoregression (VAR) or Vector Error Correction Model (VECM) analysis techniques are used to find out how much each variable contributes to explaining the variations (fluctuations) of a particular variable in the system during a certain period (Sari et al., 2023). In the initial period, economic growth ($D(X)$) fully explains its own variability (100 percent), while the influence of the unemployment rate ($D(Y)$) is still zero. Over time, the contribution of unemployment to the variability of economic growth increases slightly, but remains small, only around 1,52 percent in the 10th period. This shows that economic growth is more influenced by internal factors than by changes in the unemployment rate. In other words, shocks or changes in the unemployment rate have very little impact on fluctuations in economic growth, indicating that this variable is more independent and less responsive to changes in unemployment.

Table 9.
Results of the Variance Decomposition Test of Unemployment Rate

Period	S.E.	Economic growth (%)	Unemployment rate (%)
1	0,701	60,959	39,041
2	0,800	48,472	51,527
3	0,874	41,670	58,330
4	0,974	40,292	59,708
5	1,057	37,325	62,675
6	1,125	34,921	65,079
7	1,195	33,584	66,416
8	1,261	32,367	67,632
9	1,322	31,265	68,735
10	1,381	30,432	69,568

Source: Research Data 2025

In the initial stage, changes in economic growth ($D(X)$) have a dominant influence on variations in the unemployment rate ($D(Y)$), with a contribution of 60,96 percent. In contrast, the unemployment rate is only able to explain 39,04 percent of the changes that occur in itself. However, over time, the influence of economic growth on unemployment decreases, while the role of internal factors in determining the unemployment rate becomes increasingly dominant. In the 10th period, the contribution of unemployment to itself increased significantly to reach 69,57 percent, while the influence of economic growth on unemployment variability decreased to 30,43 percent.

These findings suggest that in the short term, fluctuations in the unemployment rate are largely caused by the dynamics of economic growth, meaning that any changes in economic growth directly affect the unemployment rate. However, in the long term, the unemployment rate is more influenced by factors originating from within the employment system itself, such as changes in labor market policies, labor force participation rates, or other structural factors (Kurniawan et al., 2023). As a result, the impact of economic growth on the unemployment rate diminishes over time, because unemployment tends to move according to its own internal dynamics.

Overall, this pattern reflects that in the short run, economic policies that encourage growth can play an important role in reducing the unemployment rate (Rosul, 2024). However, in the long run, a strategy that focuses more on structural factors in the labor market is needed to control the unemployment rate effectively. This confirms that economic growth is not the only determining factor in unemployment dynamics, especially from a long run perspective (Fakhri et al., 2024).

CONCLUSIONS AND SUGGESTIONS

Based on the results of research regarding the causal relationship between economic growth and unemployment rates in Indonesia for the 2019–2023 period, it was found that there is no significant causal relationship in the short term, as shown by the results of the Granger Causality test with probabilities of 0,991 and 0.1748 respectively, exceeding the 5 percents significance level. However, the Johansen cointegration test shows that there is a long-term relationship with a trace statistic value of 2,644.633 and a probability of 0,001, indicating that there is a balance between the two variables in the long term. The variance decomposition results also show that the effect of economic growth on unemployment, and vice versa, is very small, only around 1.5 percents each. Vector Error Correction Model (VECM) estimates confirm the existence of a long-term relationship, with significant error correction coefficients for both variables (Haladi, 2023). Overall, although a direct causal relationship

is not found in the short term, economic growth and unemployment in Indonesia adjust to each other in the long term (Puspitasari et al., 2022).

This research is limited by the short analysis period (2019–2023) and the limited variables used, only covering economic growth and unemployment rates, without considering other factors such as inflation or investment. In addition, the use of linear models such as Granger Causality and VECM do not yet capture possible nonlinear relationships (Mayer et al., 2024). Therefore, it is recommended that future research use a longer time span, add supporting variables, and apply more complex analytical methods to obtain more comprehensive and accurate results.

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