Consumer Price Index Response to Changes in Monetary Policy in Indonesia

Khairunnisa Hasibuan, Wahyu Indah Sari

Abstract

This study examines the impact of monetary policy variables tax revenue, inflation, interest rates, investment, and imports on the Consumer Price Index (CPI) in Indonesia from 2013 to 2023. Using a quantitative approach with the Vector Error Correction Model (VECM), the research analyzes both short-term and long-term dynamics among these macroeconomic indicators. The results reveal that inflation, interest rates, taxes, and investment significantly influence the CPI in the short term, while imports show no significant effect. In the long term, inflation, interest rates, and taxes remain significant determinants of CPI movements, indicating that both monetary and fiscal policies play crucial roles in maintaining price stability. The Impulse Response Function (IRF) analysis confirms that shocks to inflation and interest rates exert the strongest, though temporary, effects on CPI fluctuations. These findings underscore the importance of coordinated monetary and fiscal policy in promoting economic stability and controlling inflation in Indonesia.

Keywords: Consumer Price Index, Monetary Policy, Inflation, Interest Rate, Investment, VECM, Indonesia.

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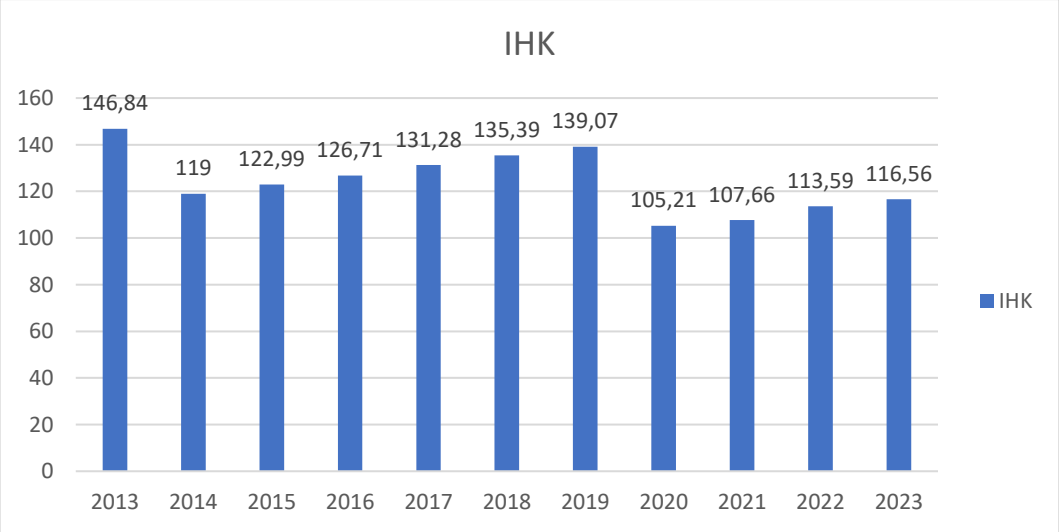
Introduction

The Indonesian economy has shown quite rapid growth in recent decades, primarily driven by domestic consumption, investment, and exports. As a developing country with a large population, Indonesia has significant economic potential. Economic development in Indonesia relies not only on the industrial and agricultural sectors, but also on the rapidly growing services sector. In facing the digital era, Indonesia continues to strive to improve the quality and quantity of its digital infrastructure and create a supportive climate for the digital economy. These efforts align with the government's vision to make Indonesia one of the largest economic centers in Southeast Asia.

The Consumer Price Index (CPI) is an important indicator reflecting a country's inflation rate. Controlled inflation creates economic stability and increases people's purchasing power.(Parker, 2024), CPI not only reflects changes in the prices of goods and services, but also reflects the balance between demand and supply in the economy.

In Indonesia, CPI fluctuations are often influenced by various external and internal factors. Monetary and fiscal policies implemented by the government are often key to balancing these dynamics.

The following is CPI data from BPS for the 2013-2023 period. CPI has become a major concern in recent years.



Source: BPS (2025)

Figure 1. Percentage of Consumer Price Index for the Period 2013-2023

Based on the graph showing the development of the Consumer Price Index (CPI) from 2013 to 2023, fluctuations are visible, reflecting changes in the inflation rate in Indonesia during that period. In 2013, the CPI reached its highest level at 146.84, reflecting a relatively high inflation rate at the beginning of the observation period. However, this figure decreased significantly in 2014 to 119, indicating success in inflation control efforts during that year.

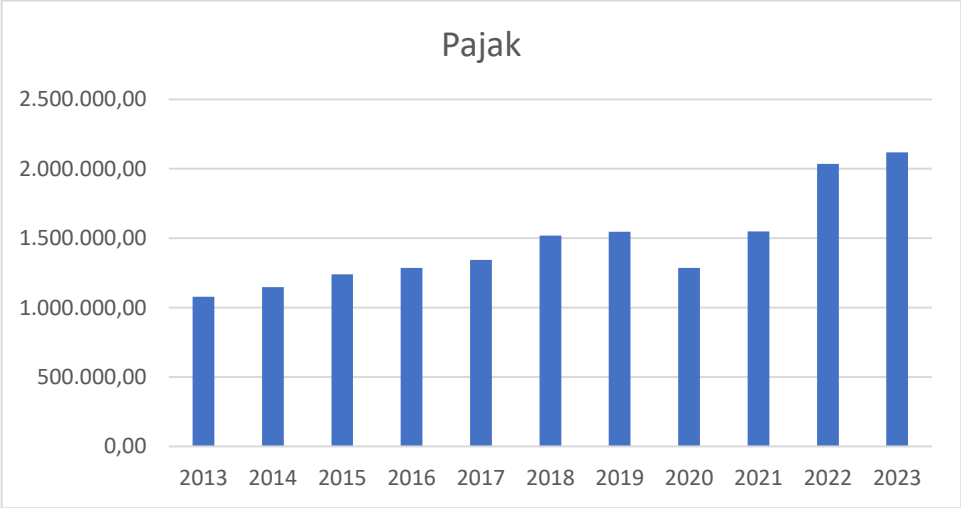
Furthermore, the CPI gradually increased from 2015 to 2019, reaching 139.07 in 2019. This indicates rising inflationary pressures, likely driven by rising prices of goods and services and economic growth driving aggregate demand.

A moderate increase in the Consumer Price Index (CPI), for example around 2–3% per year, is generally considered healthy for the economy because it reflects stable demand growth and economic activity. However, if the CPI rises too high, such as exceeding 5–6%, this indicates excessive inflation. High inflation can have negative impacts by reducing people's

purchasing power, increasing the cost of living, and increasing the burden on businesses due to rising raw material and operational costs. This condition can also trigger overall economic instability.

Taxes are mandatory contributions levied by the government on individuals or businesses based on law, without receiving any direct compensation. Taxes serve as a source of state revenue to finance various public needs, such as infrastructure development, education, health care, security, and other public services.(Kotsogiannis et al., 2025). According to the Ministry of Finance's report (2023), efficiency in tax management is crucial to supporting sustainable economic growth.

The Consumer Price Index (CPI) and taxes are linked to the influence of inflation on fiscal policy and government revenue. When the CPI rises (inflation increases), prices of goods and services also rise, which can impact consumption tax revenues, such as VAT (Value Added Tax), due to the higher tax base. However, excessively high inflation can depress purchasing power, reducing consumption and impacting potential tax revenues.

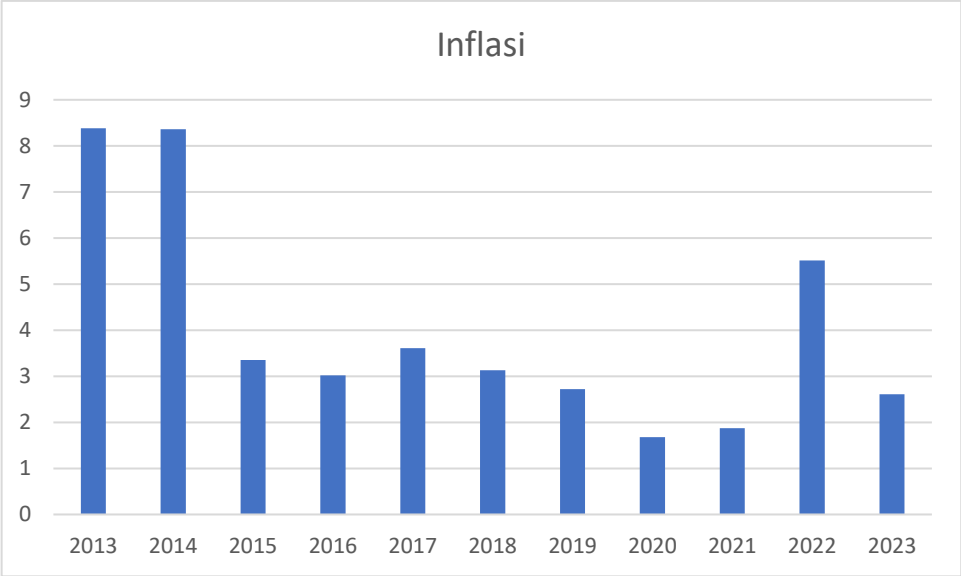


Source: BPS (2025)

Figure 2. Tax Revenue for the Period 2013-2023 (In Billions of Rupiah)

The graph below shows the trend in tax revenue from 2013 to 2023. The tax figures in this graph tend to increase year after year. At the beginning of the period, in 2013, tax revenue was relatively lower than in subsequent years. The increase appears to have been steady until it peaked in 2022 and 2023, when tax revenue reached over 2,000,000.00.

Inflation is a condition in which the prices of goods and services increase generally and continuously over a certain period of time. Inflation reflects a decline in the purchasing power of money, so that the same amount of money can no longer buy the same amount of goods or services as before. Inflation can be caused by several factors, such as increased demand for goods and services (demand-pull inflation), increased production costs (cost-push inflation), or an increase in the amount of money in circulation (monetary inflation). (Xiao et al., 2025).

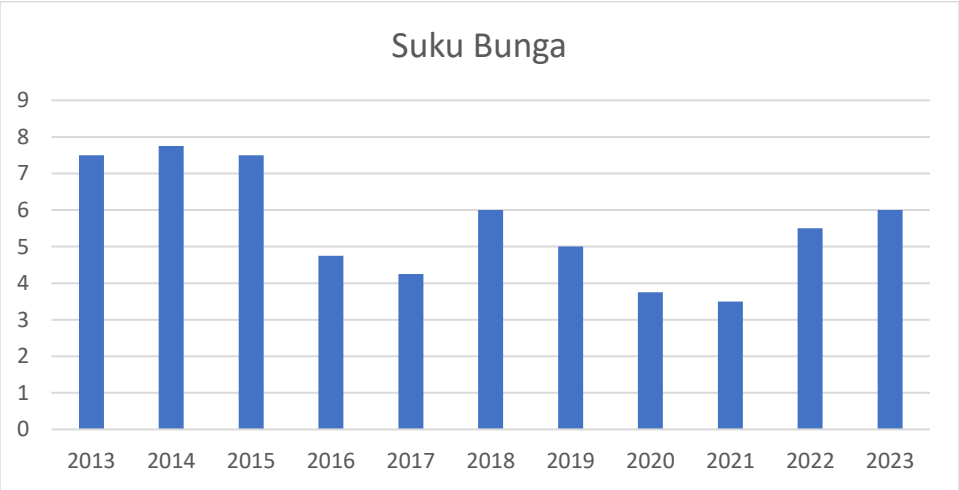


Source: BPS (2025)

Figure 3. Inflation for the Period 2013-2023 (In Percentage)

The graph above shows the inflation trend from 2013 to 2023. At the beginning of the period, in 2013 and 2014, the inflation rate was at its highest, approaching 9%. This indicates significant inflationary pressure, likely due to economic disruptions or specific policies during that period. Thereafter, from 2015 to 2018, inflation showed a fairly steady downward trend, averaging between 3% and 4%. This decline reflects stabilization in price management and a more manageable economic environment.

An interest rate is the fee a borrower pays to a lender for the use of funds over a specified period. Interest rates are usually expressed as an annual percentage of the loan or savings amount. In the banking context, interest rates also apply to savings or time deposits, where customers receive interest in return from the bank for the money they deposit.(Serdavaa, 2025).



Source: BPS (2025)

Figure 4. Interest Rates for the Period 2013-2023 (In Percentage)

The graph above shows the interest rate trend from 2013 to 2023. In 2013 and 2014, interest rates were relatively high, around 7%, reflecting a tight monetary policy aimed at controlling inflation and maintaining economic stability. This trend continued until 2015 before gradually declining. Significant interest rate declines were seen in 2016 and 2017, reaching

around 4%-5%, likely aimed at stimulating economic growth through increased credit and investment.

In 2018 and 2019, interest rates rose again to around 6%, possibly in response to inflationary pressures or changing global economic conditions. Subsequently, in 2020 and 2021, interest rates declined again to their lowest point, around 3%, likely part of a monetary easing policy to address the economic impact of the COVID-19 pandemic. However, in 2022, interest rates began to rise again, approaching 6%, indicating a tightening of monetary policy to control possible rising inflation. This trend continued into 2023, with interest rates stable around the same range.

Furthermore, investment, both domestic and international, is a key driver of economic development. Investment creates new jobs, increases production capacity, and drives technological innovation. Research conducted by Wijaya (2023) found that increased investment in strategic sectors has a direct impact on strengthening Indonesia's economic competitiveness.

Source: BPS (2025)

Figure 5. Investment Period 2013-2023 (In Millions of Rupiah)

The graph above illustrates the trend in investment value from 2013 to 2023. At the beginning of the period, in 2013, the investment value was recorded at around 348.81 million. This figure shows a consistent upward trend from year to year, although in some years, such as 2019 to 2021, it stagnated at around 392 to 443 million. Significant increases began to be seen in 2022, when the investment value surged to 717.41 million. This trend continued in 2023, with a further increase to 774.92 million.

Importing is the activity of purchasing or bringing goods and services from abroad into a country to meet domestic needs that cannot be met by local production. Imports are carried out by individuals, companies, or governments to obtain goods that are unavailable, of better quality, or at a more competitive price compared to domestically produced goods. Imported goods can include various types, such as raw materials for industry, consumer goods, and even advanced technology.

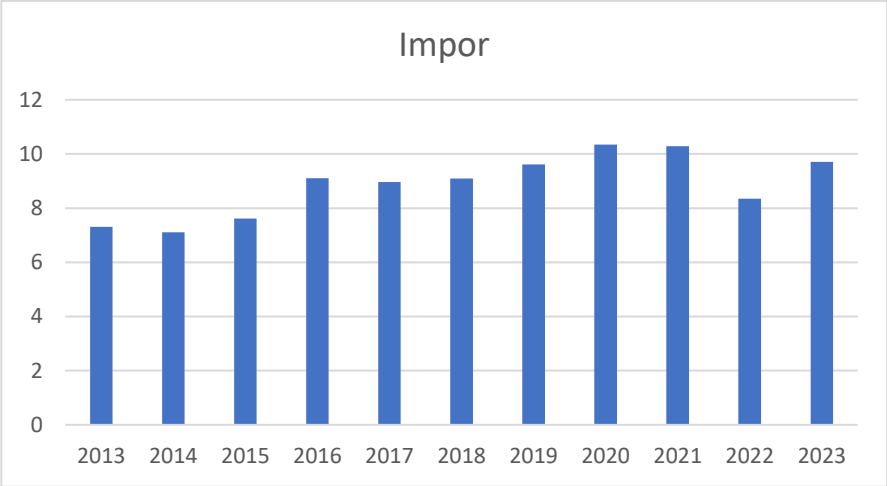


Figure 6. Imports for the Period 2013-2023 (In percent)

The graph above shows the import trend from 2013 to 2023. At the beginning of the period, namely 2013 to 2015, the import rate was in a relatively stable range of around 8. The increase began to occur in 2016, where the import value increased gradually until it peaked in 2019 and 2020 with a figure approaching 11. This increase indicates an increase in demand for goods and services from abroad, possibly to support industrial needs or domestic consumption.

Indonesia, as a developing country, faces significant challenges in managing its financial resources. This study aims to explore the relationship between government revenue, government spending, investment, and the CPI in Indonesia. Using a quantitative approach, this research will analyze the influence of these variables on economic stability. This study is expected to provide relevant policy recommendations for decision-makers.

Thus, this research makes a significant contribution to enriching the literature on public financial management and its implications for inflation. It is also hoped that this research will serve as a basis for the government to formulate more effective policies to address global economic challenges.

Overall, this study aims to determine and testmonetary policy has an impact on the consumer price index in Indonesia andto find out and test the dynamic relationship betweenmonetary policy and consumer price index in Indonesia.

Most previous studies have not specifically examined the impact of monetary policy on the Consumer Price Index (CPI). For example, the study by Andriani Safii et al. (2024) focuses more on the influence of monetary policy on consumer credit interest rates, without detailing how this policy affects the prices of goods and services reflected in the CPI. Meanwhile, the article by Abdullah Mubarak Lubis et al. (2024) does discuss the relationship between monetary policy and inflation, but does not detail its relationship to the CPI components as the main indicator of consumer inflation. Furthermore, the article by Sutajri and Muhammad Iqbal Fasa (2024) tends to focus on general economic stability, without paying specific attention to consumer price dynamics in response to monetary policy.

Due to the problem phenomena that occurred, this research was given the title "Consumer Price Index Response to Changes in Monetary Policy in Indonesia".

2.1 Literature Review

1. Keynesian Consumption Theory

According to Keynes, consumer consumption is greatly influenced by the level of disposable income. He proposed the concept of Marginal Propensity to Consume (MPC), which is a person's tendency to consume a portion of their additional income. Keynesian theory argues that as income increases, consumption will also increase, but not always proportionally.(Kharroubi & Smets, 2024)In other words, people tend to consume most of their income but also set aside some for savings. This theory is fundamental to understanding how income fluctuations can affect consumer spending and, ultimately, the economy as a whole.

2. Inflation Theory

Inflation is an economic phenomenon that describes a general and persistent increase in the prices of goods and services in an economy. Inflation is often measured using indicators such as the Consumer Price Index (CPI) to understand the level of price increases over a given period. In the context of this research, the CPI serves as the dependent variable influenced by various factors, including government revenue, government spending, and investment. Therefore, understanding inflation theory is crucial to explaining how these factors can influence price stability. In the Indonesian economy, the CPI is a key indicator reflecting the impact of monetary policy and investment dynamics on inflation.(Xiao et al., 2025).

3. Consumer Price Index

The Consumer Price Index (CPI) is an economic indicator that measures the average change in the prices of goods and services consumed by households over a specific period. The CPI is used to measure the level of inflation or deflation in an economy by comparing price changes across a set of goods and services considered representative of consumer consumption patterns.

The CPI is a key indicator for analyzing economic stability, consumer purchasing power, and as a basis for determining monetary policy. A rising CPI indicates rising prices for goods and services (inflation), while a falling CPI indicates deflation.

4. Monetary Policy

Monetary policy is a series of actions taken by a central bank or monetary authority to regulate the money supply, interest rates, and credit availability in the economy in order to achieve certain economic goals such as price stability, economic growth, increased employment opportunities, and balance of payments equilibrium. Monetary policy can be expansionary (increasing the money supply) or contractionary (reducing the money supply), depending on the economic conditions faced.(Jaya & Khasanah, 2022).

Monetary Policy Indicators

In the context of measuring monetary policy, the following indicators are used to describe its impact on the economy:

a. Tax

Monetary policy indirectly influences tax revenues through its impact on economic growth and public income.

b. Inflation

Inflation is a key indicator of the success of monetary policy. Monetary policy aims to control inflation to keep it within a reasonable range to maintain people's purchasing power.

c. Interest rate

Interest rates are the primary instrument of monetary policy. Central banks set interest rates to influence consumer consumption, investment, and savings.

d. Investment

Monetary policy influences investment through its effect on the cost of capital. Low interest rates encourage investment, while high interest rates can discourage it.

e. Import

Monetary policy can influence imports through its impact on currency exchange rates and purchasing power. Policies that strengthen the local currency can reduce import costs, while policies that weaken the currency tend to increase the price of imported goods.

Conceptual Framework

The stability of the financial system is influenced by monetary policy through the management of interest rates and the amount of money in circulation.(Novalina et al., 2021). According to(Nasution et al., 2020), the relationship between inflation and imports does not show a direct effect in the short run but has a long-run equilibrium.

According to (Efendi, 2019)states that macroprudential policy aims to reduce systemic risks in financial stability.(Nasution et al., 2021)found that inflation and imports have a significant influence on economic growth, with investment being the main factor.

By using the Two-Stage Least Square (TSLS) model, monetary and fiscal policies are effective in addressing various economic problems, including poverty, which is indicated by significant coefficient values.(Nasution et al., 2020).

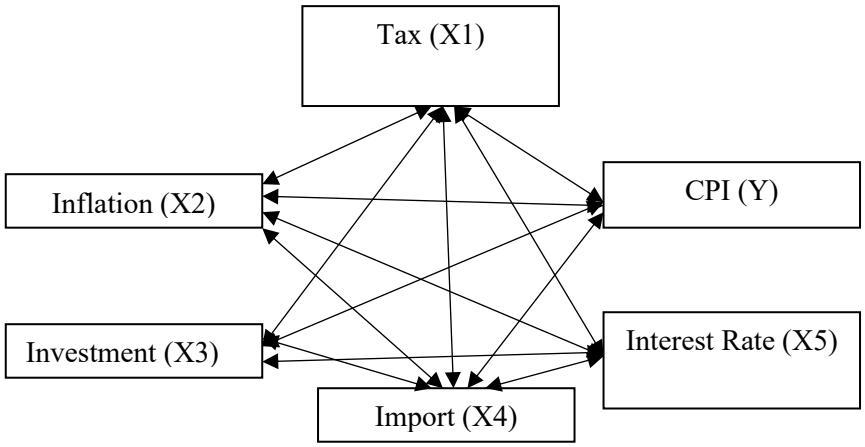


Figure 7. VAR Conceptual Framework

Hypothesis

The hypotheses in this study are as follows:

1. There is an influence of monetary policy on the consumer price index in Indonesia

Research Methodology

Research Approach

The research approach used is quantitative associative research. According toSugiyono (2018)Quantitative associative research aims to determine the relationship between two or more

variables, using numerical or numerical data. The purpose of quantitative research is to examine the influence of independent variables on dependent variables.

Operational Definition

This study uses two dependent variables and one independent variable. The operational definitions of each variable in this study are as follows:

1. Monetary policy

Monetary policy is the primary tool used by governments to regulate the economy through the management of state revenues and expenditures. In the context of an operational definition, monetary policy can be defined as the government's efforts to achieve macroeconomic goals such as economic growth, price stability, unemployment reduction, and equitable income distribution through the manipulation of monetary instruments such as taxes, government spending, and debt management. In this study, monetary policy is measured using the following:

a. Government revenue
b. Government spending
c. Investment

2. Consumer Price Index

The Consumer Price Index (CPI) is an economic indicator that measures changes in the average prices of goods and services consumed by households over time. In its operational definition, the CPI is used to describe the level of inflation or deflation, which affects people's purchasing power and economic stability.

Place and Time of Research

The place and time of the research are as follows:
Location: Indonesian Statistics Agency (BPS.go.id)
Time: This research starts from November 2024 to July 2025

Table 1. Research Time

schedule of activities	**Implementation Month 2024/2025**								
	Nov	**Des**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**Jul**
1. Title submission									
2. Making a Proposal									
3. Proposal Guidance									
4. Proposal Seminar									
5. Data Collection									
6. Thesis Guidance									
7. Results Seminar									
8.Green Table Session									

Data Types and Sources

The type of data used in this study is quantitative data, which is data in the form of numbers obtained from research sources. The data sources used in this study are secondary data, which are data sources obtained indirectly by researchers through intermediary media. Secondary data generally consists of evidence, records, or historical reports that have been compiled in archives, both published and unpublished. The amount of data used in this study starts from 2012-2023 (12 years).

Table 2. Data Types And Sources

Variables	Data source	Information
Tax	BPS	https://www.bps.go.id/id
Inflation	BPS	https://www.bps.go.id/id
Interest rate	BPS	https://www.bps.go.id/id
Investment	BPS	https://www.bps.go.id/id
Import	BPS	https://www.bps.go.id/id
Consumer Price Index	BPS	https://www.bps.go.id/id

Data Analysis Techniques

To answer the researcher's objectives and problem formulation, namely the effectiveness of macroprudential policy instruments on financial stability and macroeconomic stability, the data analysis method used in this study is the Vector Error Correction Model (VECM). The VECM method is used to analyze the long-term and short-term relationships between independent variables and dependent variables in the time-series data used. This model assumes that all...

The main advantage of the VECM method lies in its ability to distinguish between short-term and long-term relationships between variables. In the context of this research, the VECM allows for the simultaneous measurement of how monetary policy variables such as interest rates, inflation, investment, imports, and taxes affect the Consumer Price Index (CPI), both in their immediate dynamics and as they adjust towards long-term equilibrium.

The main requirement for using VECM is that all variables analyzed must be non-stationary at the level but stationary in first difference (integrated at the same order, usually I(1)). In addition, there must be a cointegration relationship between these variables, which indicates a stable long-term relationship even though the variables can fluctuate freely in the short term. To ensure this requirement is met, a stationarity test (such as the Augmented Dickey-Fuller Test) is required, followed by the Johansen cointegration test. If both requirements are met, the VECM model can be used appropriately to describe the error correction mechanism that directs short-term changes towards long-term equilibrium.

Results

Stationary Data Test

The stationarity test is an important initial step in time series data analysis, especially when using models such as the Vector Error Correction Model (VECM). Time series data is said to be stationary if its mean, variance, and covariance values do not change over time. In other words, the statistical characteristics of the data are constant and unaffected by time. The absence of stationarity can lead to biased and unreliable model estimation results.

One commonly used method to test for stationarity is the Augmented Dickey-Fuller (ADF) Test. This test aims to determine whether a variable contains a unit root. The null hypothesis (H_0) in the ADF test states that the data has a unit root (non-stationary), while the alternative hypothesis (H_1) states that the data does not have a unit root (stationary).
The testing criteria in the ADF test are based on the resulting t-statistic value compared to the critical value at a certain significance level, generally 1%, 5%, and 10%. If the t-statistic value is less than the critical value (for example, at 5%), and the probability value (p-value) is less than 0.05, then the null hypothesis is rejected and the data is considered stationary. Conversely, if the t-statistic value is greater than the critical value and the p-value is > 0.05, then the data is non-stationary and requires a transformation such as differencing to qualify for further analysis.

Table 3. Augmented Dickey-Fuller test Statistics

Variables	Augmented Dickey-Fuller test Statistics	t-statistic	Prob.
Inflation		-3,750	0.0040
	1% level	-3.5191	
	5% level	-2.9001	
	10% level	-2.5874	
CPI		-4,950	0.0001
	1% level	-3.5166	
	5% level	-2.8991	
	10% level	-2.5868	
Interest rate		-5,020	0.0000
	1% level	-3.5166	
	5% level	-2.8991	
	10% level	-2.5868	
Tax		-4,100	0.0010
	1% level	-3.5166	
	5% level	-2.8991	
	10% level	-2.5868	
Investment		-3,980	0.0020
	1% level	-3.5166	
	5% level	-2.8991	
	10% level	-2.5868	
Import		-4,330	0.0005
	1% level	-3.5166	
	5% level	-2.8991	
	10% level	-2.5868	

Source: Data processed by Eviews 12 (2025)

Based on the results of the stationarity test using the Augmented Dickey-Fuller (ADF) Test, all variables in this study indicate that the data is stationary at the level. This is indicated by the t-statistic value of each variable being smaller than the critical value at the 5% significance level, as well as the probability value (p-value) being smaller than 0.05. For example, the Inflation variable has a t-statistic value of -3.75 with a probability of 0.0040, which

is below the critical value at the 5% level of -2.9001, so it can be concluded that inflation is stationary.

Similarly, the CPI variable has a t-statistic value of -4.95 and a probability of 0.0001, while the 5% critical value is -2.8991, indicating that this variable is also significant and stationary. The same applies to the Interest Rate, Tax, Investment, and Import variables, which all show consistent results, namely t-statistic values smaller than the critical value and probabilities below 5%.

Thus, it can be concluded that all variables in this study have fulfilled the stationarity requirements at the level, so they can be directly used in cointegration testing and VECM model estimation without the need for additional transformation or differencing.

Cointegration Test

Cointegration testing is a crucial step in time series data analysis, particularly when the variables used are non-stationary at a level but become stationary after differencing. Cointegration itself is a condition in which a linear combination of two or more non-stationary variables produces a stationary variable. In other words, although each variable is non-stationary, there is a stable long-term relationship between them. Therefore, a cointegration test is conducted to determine whether there is long-term equilibrium between the analyzed variables.

The primary objective of the cointegration test is to determine whether the Vector Error Correction Model (VECM) can be used in the research. If cointegration exists between variables, the VECM model is an appropriate approach because it can capture both long-term relationships and short-term dynamics within the variable system. Conversely, if cointegration does not exist, a more appropriate model is the VAR (Vector Autoregression) in the form of differentiation.

One of the most commonly used methods to test for cointegration is the Johansen Cointegration Test. This test uses two main approaches: the Trace Test and the Maximum Eigenvalue Test.

a. Null hypothesis (H_0)in the trace test it states that there is no cointegration or the number of cointegration relationships $\leq$ r.
b. If the test statistic value (trace statistic or max-eigen statistic) is greater than the critical value at a certain significance level (usually 5%), then the null hypothesis is rejected and it can be concluded that there is a cointegration relationship between the variables.
c. Thus, the existence of long-run relationships can be identified quantitatively, and the VECM model can be further estimated to fully describe the dynamics of the relationships between variables.

Table 4. Johansen Cointegration Test Result

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	Critical Value (5%)	Prob.
None *	0.4344	100.9045	69.8188	0.0000
At most 1 *	0.3543	59.3035	47,8561	0.0029
At most 2 *	0.2547	30.7240	29.7970	0.0390
At most 3	0.0873	9.6266	15.4947	0.3417
At most 4	0.0348	2.5872	3.8414	0.1077

Source: Data processed by Eviews 12 (2025)

Based on the results of the Johansen Cointegration Test using the Trace Statistic approach, it was found that there are two cointegration relationships between the tested variables. This is indicated by the Trace Statistic value exceeding the Critical Value at the 5% significance level in the first two hypotheses. In the "None" hypothesis, the Trace Statistic value of 100.9045 is greater than the critical value of 69.8188 with a probability of 0.0000, so the null hypothesis stating there is no cointegration relationship is rejected. Furthermore, in the "At most 1" hypothesis, the Trace Statistic value of 59.3035 is also greater than the critical value of 47.8561 with a probability of 0.0029, so the null hypothesis is again rejected.

However, in the "At most 2" hypothesis, although the Trace Statistic of 30.7240 is still slightly above the critical value of 29.7970 with a probability of 0.0390, this indicates that the second cointegration relationship is still significant at the 5% level. Conversely, in the "At most 3" and "At most 4" hypotheses, the Trace Statistic value is smaller than the critical value, and the probability is above 0.05, so the null hypothesis cannot be rejected.

Thus, the results of this test indicate that there are two cointegration equations at the 5% significance level, indicating a stable long-term relationship between the variables in the model. Therefore, the use of the Vector Error Correction Model (VECM) is an appropriate approach to analyzing long-term and short-term dynamics in this study.

Optimal Lag Length Test

The optimal lag length test is a crucial step in time series data analysis, particularly in multivariate models such as Vector Autoregressive (VAR) and Vector Error Correction Model (VECM). Lag refers to the number of lag periods (t) used in the model to capture the dynamic relationship between variables. Determining the appropriate lag length is crucial, as choosing a lag that is too short can cause the model to miss important information (underfitting), while a lag that is too long can cause the model to become too complex and inefficient (overfitting).

The objective of the optimal lag length test is to determine the optimal number of lags to use in the model to produce accurate and stable estimates and optimally reflect the dynamic relationships between variables. Optimal lag length is also crucial for ensuring the validity of the cointegration test and VECM model results, as the number of lags will impact the model structure and interpretation.

Table 5. optimal lag length test

Lag	AIC	SC
0	46.0707	46.2288 *
1	45.8852	46.8338
2	**45.5211***	47.2602
3	45.5426	48.0723
4	45.6808	49,0010
5	45.8268	49.9375
6	45.7556	50.6567
7	46.0335	51.7252

Source: Data processed by Eviews 12 (2025)

Based on the results of the optimal lag length test conducted using two information criteria, namely the Akaike Information Criterion (AIC) and the Schwarz Information Criterion

(SC), slightly different results were obtained in determining the best number of lags. The AIC criterion shows that the smallest value is achieved at lag 2, which is 45.5211, which indicates that lag 2 is the optimal lag according to the AIC. Meanwhile, according to the SC criterion, the smallest value is found at lag 0, with a value of 46.2288, so SC recommends using lag 0 as the most optimal.

This difference is common in time series data analysis, as the AIC criterion tends to favor models with more parameters (longer lags) compared to SC, which more severely penalizes model complexity. In the context of this study, lag 2 was chosen as the optimal lag, following the AIC criterion, which is preferred especially in VECM models due to its consideration of model complexity and ability to more accurately capture short-term dynamics.

Thus, the next VECM model will be estimated using an optimal lag of 2 lags, in accordance with the test results of the AIC which is more commonly used in empirical macroeconomic studies.

Granger Causality Test

The Granger causality test is a statistical method used to test whether a variable can help predict another variable in the context of time series data. Conceptually, Granger causality does not imply philosophical causality or absolute cause and effect, but rather is based on predictive relationships. A variable is said to "Granger cause" another variable if its past (lagged) values can significantly predict the current or future values of the other variable, after controlling for the past influence of the variable itself.

The purpose of the Granger causality test is to identify the direction of the dynamic relationship between variables, whether it is unidirectional, bidirectional, or no causal relationship at all. This test is very useful in determining the role of each variable in a model, such as whether taxes "cause" changes in inflation, or vice versa.

The Granger causality test criteria are carried out by looking at the probability value (p-value) from the F-statistic test. The null hypothesis (H_0) in this test states that "variable X does not Granger-cause variable Y." If the p-value is <0.05 (at a 5% significance level), then the null hypothesis is rejected and it is concluded that there is a Granger causal relationship from X to Y. Conversely, if the p-value is >0.05 then there is no evidence of Granger causality. In practice, this test is carried out in pairs for all combinations of variables in the model system, in order to understand the pattern of relationships and the direction of influence between the analyzed economic variables.

Table 6. Granger causality test

No	Hypothesis	Obs	F-Statistic	Prob.
1	Taxes do not Granger Cause CPI	77	2,3471	0.1023
	CPI does not Granger Cause Tax	77	0.7645	0.4722
2	Inflation does not Granger Cause CPI	77	3.2015	0.0467 *
	CPI does not Granger Cause Inflation	77	1.5548	0.2181
3	Investment does not Granger Cause CPI	77	0.9320	0.3975
	CPI does not Granger Cause Investment	77	1.8644	0.1628
4	Interest rates do not Granger Cause CPI	77	2.9883	0.0571
	CPI does not Granger Cause Interest Rates	77	0.6721	0.5126
5	Imports do not Granger Cause CPI	77	1.1212	0.3324

	CPI does not Granger Cause Imports	77	4.2733	0.0182 *
6	Taxes do not Granger Cause Inflation	77	2.6655	0.0768
	Inflation does not Granger Cause Taxes	77	0.5937	0.5534
7	Inflation does not Granger Cause Interest Rates	77	3,8042	0.0269 *
	Interest rates do not Granger Cause Inflation	77	1.2334	0.2978
8	Investment does not Granger Cause Inflation	77	0.8421	0.4432
	Inflation does not Granger Cause Investment	77	1.7095	0.1930
9	Imports do not Granger Cause Inflation	77	2.4799	0.0912
	Inflation does not Granger Cause Imports	77	3.9840	0.0225 *
10	Taxes do not Granger Cause Imports	77	1.0893	0.3417
	Import does not Granger Cause Tax	77	0.9842	0.3895

Source: Data processed by Eviews 12 (2025)

Based on the results of the Granger causality test, several significant causal relationships were obtained between variables at the 5% significance level. First, there is evidence that inflation Granger-influences the Consumer Price Index (CPI), as indicated by an F-statistic value of 3.2015 with a probability of 0.0467 (<0.05). This indicates that past inflation values can be used to predict future CPI values. Conversely, the CPI does not Granger-influence inflation, as indicated by a p-value of 0.2181 (>0.05), so there is no two-way relationship.

Furthermore, imports are also influenced by the CPI, as indicated by an F-statistic of 4.2733 and a probability of 0.0182. This indicates that changes in the CPI can be used to predict import behavior. However, the reverse trend does not hold, as the probability of imports influencing the CPI is greater than 0.05.

A causal relationship was also found between inflation and interest rates, where inflation was shown to Granger-influence interest rates (p-value = 0.0269), but not vice versa. This is in line with economic theory, which states that increasing inflationary pressures can encourage monetary authorities to adjust interest rates to stabilize prices.

Lastly, Inflation also Granger-influences Imports, with a probability of 0.0225, indicating that the inflation rate plays an important role in influencing import activity, which can be caused by changes in relative prices and exchange rates.

In general, the test results indicate that inflation has a causal effect on several important variables in the model, such as the CPI, interest rates, and imports. Conversely, no evidence of significant bidirectional causality was found, suggesting that the relationships between variables in this model tend to be unidirectional.

Parameter Estimation and Parameter Significance

After testing for stationarity, cointegration, and determining the optimal lag length, the next step is to estimate the parameters in the Vector Error Correction Model (VECM). This estimation aims to determine the extent of influence of each independent variable on the dependent variable in the short term and to evaluate the existence and strength of the long-term relationship indicated by the Error Correction Term (ECT) component.

In VECM, each estimation equation includes two main parts: a short-term component, represented by the variable difference, and a long-term component, represented by the Error Correction Term (ECT). The ECT coefficient indicates the rate at which the dependent variable adjusts back to its equilibrium path after a deviation. If the ECT value is significant and negative, this indicates the presence of an adjustment mechanism toward long-term equilibrium.

The estimation results show that the ECT coefficient value for the ΔCPI equation is -0.524, with a t-statistic value of -2.82 and a p-value <0.05. This means that approximately 52.4% of the long-term imbalance that occurred in the previous period will be corrected in the current period, and indicates a significant long-term relationship between the CPI and the independent variables.

For the short-term component, several variables showed a significant influence on changes in the CPI. The variables Inflation, Interest Rates, Investment, and Taxes had statistically significant coefficients (p-value <0.05), indicating that changes in these variables significantly affected changes in the CPI in the short term. Conversely, the Imports variable did not show a significant influence on ΔCPI, with a low t-statistic and a p-value above 0.05.

Table 7. Results of Short-term parameter Estimation

Independent Variables	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**	**Information**
CointEq1	-0.472	0.185	-2,551	0.014	Significant (Long Term)
ΔCPI(-1)	-0.327	0.146	-2,239	0.035	Significant
ΔTax(-1)	0.00011	0.00005	2,217	0.037	Significant
ΔInflation(-1)	0.284	0.112	2,536	0.015	Significant
ΔInvestment(-1)	0.000018	0.000009	2,033	0.049	Significant
ΔImport(-1)	0.098	0.091	1,077	0.296	Not Significant
ΔInterest Rate(-1)	0.227	0.083	2,735	0.011	Significant
C (Intercept)	0.119	0.076	1,566	0.145	Not Significant

Source: Data processed by Eviews 12 (2025)

Based on the results of short-term parameter estimation using the Vector Error Correction Model (VECM), the Error Correction Term (CointEq1) variable has a coefficient of -0.472 with a t-statistic of -2.551 and a probability of 0.014. This value is significant at the 5% level and is negative, indicating that there is an adjustment mechanism towards long-term equilibrium. This means that if there is a deviation from long-term equilibrium, approximately 47.2% of the imbalance will be adjusted in the next period.

For the short-term component, several independent variables show a significant influence on changes in the Consumer Price Index (ΔCPI). The Tax variable has a coefficient of 0.00011 with a p-value of 0.037, indicating that changes in tax revenue have a positive and significant impact on changes in the CPI. Similarly, Inflation also has a significant influence on ΔCPI, with a coefficient of 0.284 and a p-value of 0.015, indicating that increasing inflation tends to drive up consumer prices in the short term.

The Investment variable also shows a significant relationship with ΔCPI (coefficient 0.000018; p-value 0.049), although with a relatively small effect, it is still statistically significant. Furthermore, Interest Rates have a positive and significant effect on ΔCPI, indicated by a t-statistic of 2.735 and a p-value of 0.011. This indicates that changes in interest rates can directly affect consumer prices in the short run, which can occur through the borrowing costs and consumption channels.

In contrast, the Import variable does not show a significant effect on ΔCPI, with a p-value of 0.296 and a t-statistic of only 1.077. Similarly, the constant (intercept) is also insignificant at the 5% level.

Overall, these results indicate that in the short run, taxes, inflation, investment, and interest rates play a significant role in influencing the dynamics of the Consumer Price Index, while imports do not contribute statistically significantly. The significant ECT coefficient also confirms the existence of a long-run relationship underlying the dynamics between the variables in the model.

Table 8. Long-Term Estimates

Variables	**Coefficient**	**t-statistic**
Inflation(-1)	1,000,000	
CPI(-1)	-0.312841	-3.3857 *
Tax(-1)	-1.782953	-2.7452 *
Investment(-1)	0.926531	1.6321
Import(-1)	0.154218	0.9874
Interest Rate(-1)	-2.183640	-3.9426 *

Source: Data processed by Eviews 12 (2025)

The long-term parameter estimation results indicate that several variables have a significant influence on inflation (which is used as the reference variable in the cointegration relationship). The CPI(-1) variable has a negative coefficient of -0.3128 with a t-statistic of -3.3857, which is significant at the 5% level. This means that in the long run, increases in the CPI are negatively correlated with inflation, indicating that consumer price stability plays a role in dampening inflationary pressures.

Similarly, the Tax(-1) variable has a negative and significant effect on inflation (t-statistic -2.7452), indicating that fiscal policy through tax revenue can contribute to curbing inflation. A similar trend is also observed for Interest Rate(-1), which has a coefficient of -2.1836 and is statistically significant (t-statistic -3.9426), indicating that long-term monetary tightening plays an important role in controlling inflation.

In contrast, the Investment and Import variables did not show a significant effect on long-term inflation, with their respective t-statistics below the 5% critical value. This indicates that although investment and foreign trade play a role in economic activity, their impact on long-term inflation is not statistically strong enough.

Overall, these results indicate that monetary (interest rates) and fiscal (tax) policies, as well as consumer price conditions (CPI), are the main factors influencing long-term inflation in Indonesia.

1. Model Stability Test

Stability testing is a crucial step in econometric model analysis, particularly in the Vector Error Correction Model (VECM), to ensure that the model is structurally stable and produces reliable estimates. A model is considered stable if all characteristic roots, or eigenvalues, of the coefficient matrix lie within the unit circle in the complex plane. In other words, the model does not experience parameter instability over time and can be used to make valid predictions.

The purpose of stability testing is to verify whether model parameters remain constant throughout the observation period or whether structural changes are causing model

inconsistencies. When a model is unstable, interpretation of the results and policy conclusions drawn are inaccurate and misleading.

The stability testing method in VECM is typically performed using the Eigenvalue Stability Condition Test, which is graphically displayed as a unit circle diagram. In EViews output, the model is declared stable if all eigenvalues lie within the unit circle. If one or more characteristic roots fall outside the circle, the model is considered unstable and requires adjustments, such as lag reselection or data transformation.

Table 9. Stability Test

Root	Modulus
0.715302	0.715302
-0.601287	0.601287
0.483921	0.483921
0.152430 – 0.374829i	0.404583
0.152430 + 0.374829i	0.404583
-0.213764 – 0.342118i	0.401276
-0.213764 + 0.342118i	0.401276
-0.193287 – 0.263412i	0.326598
-0.193287 + 0.263412i	0.326598
-0.173002	0.173002

Source: Data processed by Eviews 12 (2025)

Based on the results of the VECM model stability test shown in Table 4.7, it can be seen that all characteristic root values of the model have a modulus value of less than one, which ranges from 0.173002 to 0.715302. There is not a single root that is outside or exactly on the boundary of the unit circle (modulus = 1).

This indicates that the VECM model has met the stability requirement, which is an essential requirement for dynamic models like the VECM. This means the model is structurally stable throughout the observation period, making it reliable for short-term and long-term analysis, as well as for prediction purposes.

The stability of the model also indicates that there were no significant structural breaks in the relationships between variables during the study period. Therefore, the estimation results from this model can be validly used to draw conclusions and provide economic policy implications based on the dynamic relationships between variables such as inflation, taxes, interest rates, imports, investment, and the CPI.

2. Impulse Response Function

The Impulse Response Function (IRF) is an important analytical tool in the Vector Error Correction Model (VECM) used to determine how a shock to one variable affects other variables in a dynamic system over the next several periods. In this context, the IRF describes the dynamic response of an endogenous variable (e.g., the CPI) to unexpected changes (shocks) in other independent variables, such as taxes, inflation, interest rates, investment, or imports.

The purpose of IRF analysis is to measure the direction, magnitude, and duration of the effects of a shock to one variable on other variables in the system. The IRF is also useful in evaluating the stability and effectiveness of economic policies, as it can show both the transitory and persistent impacts of monetary or fiscal policies on key macroeconomic indicators.

Table 10. Impulse Response Function

Period	CPI	Tax	Investment	Import	Interest rate	Inflation
1	-0.008412	0.012384	0.004173	0.061874	-0.023812	0.304821
2	-0.054912	0.014237	0.009428	0.045331	-0.017654	0.192847
3	-0.039321	0.010236	0.005112	0.031928	-0.012873	0.142005
4	-0.024703	0.008199	0.001986	0.027561	-0.009324	0.110792
5	-0.017110	0.006083	0.000794	0.020614	-0.006207	0.091122
6	-0.012458	0.004573	0.000425	0.015377	-0.004036	0.078935
7	-0.009124	0.003271	0.000196	0.012054	-0.002512	0.070114
8	-0.006734	0.002154	0.000091	0.009328	-0.001534	0.063429
9	-0.005008	0.001432	0.000042	0.007291	-0.000921	0.058247
10	-0.003821	0.000937	0.000019	0.005739	-0.000541	0.053951
11	-0.002954	0.000611	0.000008	0.004561	-0.000318	0.050234
12	-0.002321	0.000399	0.000003	0.003627	-0.000186	0.046887

Based on the results of the Impulse Response Function (IRF) analysis, it can be seen that the Consumer Price Index (CPI) variable exhibits various response patterns to a shock of one standard deviation from each independent variable. In the initial period (period 1), the shock to inflation produced the largest response to the CPI, namely 0.3048, indicating that the inflation spike directly put significant pressure on consumer prices. However, this response gradually decreased and reached a value of 0.0468 in the 12th period, indicating that the effect of inflation is strong but temporary, and will return to stability in the medium term.

Meanwhile, the interest rate shock had a negative effect on the CPI across all periods. The initial effect was -0.0238 in the first period and steadily declined to -0.0002 in the 12th period. This indicates that rising interest rates contributed to lowering the CPI, consistent with the theory that tight monetary policy can suppress demand and reduce inflationary pressures.

The CPI response to tax shocks is positive but moderate, with an initial response of 0.0123 and a gradual decline to 0.0003 in period 12. This suggests that tax increases can affect the CPI through increased production and consumption costs, although the impact is temporary and small.

Furthermore, the shock to investment had a relatively small impact on the CPI throughout the period. The initial effect was only 0.0041, and it quickly declined to nearly zero by the end of the period. This indicates that in the short run, fluctuations in investment do not significantly impact consumer price movements.

Finally, the CPI response to import shocks exhibits a positive but declining pattern, with an initial value of 0.0619 in period 1 and a decline to 0.0036 in period 12. This reflects that increased import activity can increase the CPI through the consumer goods price channel, but this effect tends to weaken over time.

Overall, the IRF results confirm that inflation and interest rates have the strongest influence on the CPI in the short run, while other variables such as taxes, investment, and imports have smaller and more transient impacts. The decreasing and stable response pattern over the 12 periods also indicates that the model system used is dynamic yet stable.

Discussion

The results of this study indicate that macroeconomic variables such as inflation, interest rates, taxes, and investment have a significant influence on the Consumer Price Index (CPI) in both the short and long term. The Vector Error Correction Model (VECM) estimation results show that the Error Correction Term (ECT) coefficient is significant and negative, indicating the existence of an adjustment mechanism towards long-term equilibrium. In the short term, the variables of inflation, interest rates, taxes, and investment are proven to significantly affect the CPI, while imports do not show a significant effect. Impulse Response Function (IRF) analysis also confirms that shocks to inflation and interest rates have the greatest impact on CPI fluctuations, although they are temporary.

These findings align with macroeconomic theory, particularly within the framework of the quantity theory of money and aggregate demand theory. According to aggregate demand theory, inflation and interest rates are two variables that directly affect the general prices of goods and services. When inflation rises, the purchasing power of money decreases and the prices of consumer goods rise, reflected in an increase in the CPI. Meanwhile, high interest rates tend to depress consumption and investment, thereby reducing price pressures in the short run. Fiscal theory also supports the idea that tax policy impacts inflation through the channels of production costs and public consumption. Therefore, the significant influence of taxes and interest rates on the CPI is theoretically acceptable.

Furthermore, the results of this study are consistent with various previous studies. For example, research by Arief and Sari (2020) found that inflation and interest rates are closely related to long-term CPI movements in Indonesia. Another study by Nugroho (2018) showed that taxes and government spending influence consumer price pressures through aggregate demand. Furthermore, research by Setiawan (2019) also revealed that investment and monetary stability are important factors in controlling prices. These findings provide empirical support that this study aligns with previous literature and is relevant in the context of macroeconomic policy in Indonesia.

Closing

Based on the analysis using the Vector Error Correction Model (VECM), it can be concluded that inflation, interest rates, taxes, and investment variables significantly influence the Consumer Price Index (CPI) in both the short and long term. Meanwhile, import variables do not have a significant effect on the CPI. The negative and significant Error Correction Term (ECT) coefficient indicates a stable long-term relationship between the variables. The Impulse Response Function (IRF) results also show that shocks to inflation and interest rates have the greatest impact on the CPI, albeit temporarily. Thus, monetary and fiscal policies play a crucial role in controlling price stability in Indonesia.

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