

Determinants of Indonesia's Economic Growth in 1990–2023: An Error Correction Model (ECM) Approach

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ABSTRACT: This study aims to analyze the determinants of Indonesia's economic growth during the period 1990–2023 using the Error Correction Model (ECM) approach. The independent variables consist of *Foreign Direct Investment* (FDI), exports, imports, household consumption, *Domestic Investment* (PMDN), and government expenditure. The data are time-series in nature and were obtained from official national and international sources. The ECM method was employed as it is able to capture both short-run and long-run relationships as well as the adjustment mechanism toward equilibrium.

The results indicate that simultaneously all independent variables significantly affect Indonesia's economic growth. However, partially, FDI does not have a significant impact in either the short or long run. In contrast, exports, imports, consumption, PMDN, and government expenditure show positive and significant effects on economic growth in both the short and long run. This finding suggests that Indonesia's economy remains strongly driven by domestic factors and productive international trade, while the role of FDI is still limited due to its concentration in sectors with low multiplier effects.

These results provide important implications for Indonesia's economic development policy. The government needs to encourage diversification of high value-added exports, optimize the role of productive imports, strengthen household purchasing power, and foster a more conducive environment for both domestic and foreign investment. Furthermore, government expenditure should be directed toward productive sectors such as infrastructure, education, and health in order to support sustainable economic growth.

KEYWORDS: Economic Growth, ECM, FDI, Domestic Investment, Consumption, Exports, Imports, Government Expenditure

I. INTRODUCTION

Economic growth is a key indicator of development success, as it reflects rising production of goods and services that increase national income (Mankiw, 2006; Zulfahmi, 2010). Aggregate demand—consisting of consumption, investment, government spending, exports, and imports—remains the main driver of growth in developing countries, including Indonesia.

During 1990–2023, Indonesia's economy showed resilience despite major shocks such as the 1997–1998 Asian financial crisis, the 2008 global financial crisis, and the Covid-19 pandemic in 2020. While exports and FDI were volatile, strong household consumption and government spending consistently supported positive growth, confirming Indonesia's reliance on domestic demand.

Key macroeconomic variables analyzed in this study include Foreign Direct Investment (FDI), exports, imports, consumption, Domestic Investment (PMDN), and government expenditure. FDI contributes capital, technology transfer, and jobs, though inflows are unstable. Exports remain commodity-based and vulnerable to global prices, while imports, particularly of capital goods, support industrialization but weigh on the trade balance. Household consumption, which contributes more than 50% of GDP, is the primary growth engine, while PMDN reflects domestic investor confidence, albeit uneven across regions. Government expenditure provides infrastructure and fiscal stimulus but faces bureaucratic inefficiencies.

Using the Error Correction Model (ECM), this research examines both short- and long-term relationships between these variables and growth. The findings highlight the dominance of domestic factors—consumption and domestic investment in the short run, and FDI, consumption, and government expenditure in the long run—while exports and imports remain less significant.

II. LITERATURE REVIEW

1. Foreign Direct Investment (FDI)

Theory. The role of FDI in economic growth is framed by several theories. Hymer's monopolistic advantage theory emphasizes firm-specific advantages that motivate multinational activity (Hymer, 1966). Vernon's product life-cycle model considers FDI a stage in international diffusion of production (Vernon, 1996). Dunning's OLI paradigm (Ownership–Location–Internalization) synthesizes firm advantages, host location attributes, and internalization motives as determinants of FDI flows and their economic impact (Dunning, 1993). Theoretically, FDI can raise capital accumulation, transfer technology, and enhance productivity in host economies.

Empirical evidence. Cross-country studies generally find a positive FDI–growth link but emphasize conditionality: FDI yields growth mainly when host countries possess adequate absorptive capacity (skilled labor, infrastructure, institutions) or complementary domestic investment (e.g., Dossou, 2019; Duarte et al., 2017). Results vary by region, sector composition, and time horizon.

Implication for Indonesia. Empirical works on Indonesia suggest FDI contributes to growth but with volatility and uneven spatial distribution; effectiveness depends on institutional quality and complementary domestic policies (e.g., Ifa & Ardiansyah, 2019; Radha Ikhwan & Ariusni, 2019). Thus, policy emphasis should be on improving absorptive capacity and aligning FDI with domestic development goals.

2. EXPORTS

Theory. Exports matter for growth under the export-led growth hypothesis: outward orientation expands market size, fosters specialization (comparative advantage), and encourages technology adoption and scale economies (Ricardo; Jung & Marshall, 1985). Trade theories also stress that the composition of exports (primary vs. manufactured, low vs. high value-added) conditions the growth payoff.

Empirical evidence. Empirical results are mixed: many countries realize growth gains from export expansion, particularly when exports are diversified and value-added intensive. However, commodity-dependent export structures often transmit global price volatility to domestic growth (Jung & Marshall, 1985; Zahra & Hassouneh, 2019).

Implication for Indonesia. Indonesia's export basket is still concentrated in primary commodities (coal, palm oil), which increases vulnerability to external shocks. Indonesian studies recommend export diversification and downstream processing to increase the contribution of exports to sustainable growth (e.g., Dewi & Sarfiah, 2022).

3. IMPORTS

Theory. Imports have a dual role: while high consumption imports may depress domestic industries, imports of capital goods and intermediate inputs can accelerate industrialization and technological upgrading (endogenous growth literature). The net growth effect depends on import composition and the economy's ability to utilize imported inputs productively.

Empirical evidence. Studies indicate that imports of machinery and intermediate goods positively affect productivity and growth; by contrast, excessive import reliance for consumption goods can worsen trade balances without stimulating long-term capacity (Fannoun & Hassouneh, 2019).

Implication for Indonesia. For Indonesia, imports support production (capital goods) but also reflect structural gaps in domestic supply chains. Policy should prioritize selective import substitution, strengthen local value chains, and facilitate productive imports that complement domestic investment.

4. HOUSEHOLD CONSUMPTION

Theory. In Keynesian frameworks, consumption is the largest component of aggregate demand and a primary driver of short-run output fluctuations. Alternative consumption theories (Permanent Income, Relative Income) explain consumption behavior as a function of expected lifetime income or social benchmarking. Consumption also mediates fiscal multipliers and stabilizes demand in downturns.

Empirical evidence. In many developing economies, household consumption accounts for a large GDP share and stabilizes growth during external shocks. However, growth overly reliant on consumption without productivity improvements risks limiting long-term sustainable growth (Yakhamid, 2022).

Implication for Indonesia. Given that household consumption contributes over 50% of Indonesia's GDP, policies that protect purchasing power (inflation control, social safety nets) and that raise productivity (education, skills, labor markets) will make consumption-driven growth more sustainable.

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5. DOMESTIC INVESTMENT (PMDN)

Theory. Domestic investment (capital accumulation) is central in neoclassical (Solow) and endogenous growth models—raising capital per worker and enabling technological adoption. Domestic investment complements FDI and fosters structural transformation.

Empirical evidence. Empirical studies generally find a positive association between domestic investment and growth, conditional on investment quality and institutional context (Jumaedi et al., 2023). The growth impact is stronger where investment targets productive sectors and where the business climate supports efficient capital deployment.

Implication for Indonesia. PMDN remains concentrated geographically and sectorally (e.g., Java-centric). Policies to broaden investment—improving local governance, infrastructure, and incentives—can enhance PMDN's contribution to balanced and inclusive growth.

6. GOVERNMENT EXPENDITURE

Theory. Fiscal theories (Wagner; Peacock–Wiseman) and Keynesian perspectives view government spending as both a stabilizer and a long-run productivity driver when allocated to infrastructure, health, and education. The growth effect depends on spending composition (capital vs. recurrent) and efficiency of implementation.

Empirical evidence. Global evidence shows that productive public spending yields positive long-run growth effects, whereas inefficient current spending can be contractionary if it crowds out private investment (Kumar Sinha, 2023). Crisis episodes often reveal the stabilizing role of countercyclical fiscal policy.

Implication for Indonesia. Indonesia's public spending has cushioned crises (e.g., COVID-19), but budget absorption and bureaucratic constraints limit effectiveness. Reorienting expenditures toward high-return public investment and strengthening public financial management can improve fiscal multipliers.

III. METHODOLOGY

Quantitative research is a scientific approach that emphasizes the use of numerical data to test theories and hypotheses related to social or natural phenomena. It involves the development and application of mathematical models, statistical tools, and systematic procedures to measure and analyze variables objectively. The main purpose of this approach is to verify theoretical assumptions and to provide empirical evidence that can be generalized. In this study, the quantitative method is applied using an associative research design, which is intended to examine the relationship or causal influence between two or more variables. Associative research allows researchers to identify how independent variables affect dependent variables, thereby enabling the formulation of conclusions that explain, predict, and potentially control the phenomena under investigation (Wiratna, 2018:19).

The analytical method employed in this study is the Error Correction Model (ECM), which is widely used in time-series econometric analysis. ECM is chosen because it enables the researcher to capture both the short-run dynamics and the long-run equilibrium relationships among variables. In principle, ECM combines the concepts of cointegration and error correction, where the cointegration test identifies whether a long-term equilibrium relationship exists among variables, and the error correction mechanism measures the speed of adjustment when short-term disequilibrium occurs. The strength of ECM lies in its ability to not only estimate the immediate impact of independent variables on the dependent variable but also explain how deviations from equilibrium in one period are corrected in subsequent periods. Thus, ECM is considered suitable for analyzing the determinants of Indonesia's economic growth, as it accounts for both temporary shocks and long-run structural relationships among macroeconomic variables. The Error Correction Model (ECM) applied in this study is formulated as follows:

$$Y_t = \beta_0 + \beta_1 DX1_t + \beta_2 DX2_t + \beta_3 DX3_t + \beta_4 DX4_t + \beta_5 DX5_t + \beta_6 DX6_t + ECT_{t-1}$$

Where:

Y_t = Economic Growth (USD)

β_0 = Constant

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ = Coefficients of each independent variable

$X1$ = Foreign Direct Investment (FDI) (USD)

$X2$ = Exports (USD)

$X3$ = Imports (USD)

$X4$ = Household Consumption (USD)

$X5$ = Domestic Investment / PMDN (USD)

$X6$ = Government Expenditure (USD)

t = Time period

ECT_{t-1} = Error Correction Term (lagged residual from the cointegration equation)

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λ = Adjustment coefficient (expected to be negative and significant)

ϵ_t = Error term

A. Classical Assumption Test

1) Normality Test

This study uses the Jargue-Bera Test or J-B Test method, namely if the probability is > 0.05 , the variables are normally distributed.

Multikolonieritas Test

In this study, identify multicollinearity from the Variance Inflation Factor (VIF) value. If the VIF value ≤ 10 , it is stated that there is no multicollinearity. Conversely, if the VIF value ≥ 10 , then it is stated that multicollinearity occurs.

Heterokedastisitas Test

Detection of heteroscedasticity can be done by looking at the presence or absence of certain patterns on the scatter plot graph. With the condition that the probability value is > 0.05

Autokorelasi Test

To determine whether or not the regression equation has autocorrelation, the Run test approach will be used. If the Run value is > 0.05 then autocorrelation symptoms can be ignored.

B. Statistical Test

F Test (Simultaneous)

The conditions that the f test has are as follows:

1. If the significance value < 0.05 or H_0 is rejected and H_a is accepted, it means that the independent variables together (simultaneously) have a significant effect on the dependent variable.
2. If the significance value > 0.05 or H_0 is accepted and H_a is rejected, it means that the independent variables together (simultaneously) have no significant effect on the dependent variable.

T Test (Partial)

The conditions that the partial test has are as follows:

1. If the probability (significance) < 0.05 or $t \text{ count} > t \text{ table}$, then H_0 is rejected and H_a is accepted.
2. If the probability (significance) > 0.05 or $t \text{ count} < t \text{ table}$, then H_0 is accepted and H_a is rejected.

Coefficient of Determination (R^2)

The coefficient of determination (R^2) ranges from 0 to 1. If the R^2 value is closer to 1, it indicates that the results for the regression model are good or the independent variables as a whole can explain the dependent variable. Meanwhile, if the R^2 value is closer to 0, it means that the independent variables as a whole cannot explain the dependent variable.

IV. RESULTS AND DISCUSSION

This study examines the influence of six key sectors on Indonesia's economic growth, namely Foreign Direct Investment (FDI), exports, imports, household consumption, Domestic Investment (PMDN), and government expenditure. These sectors were selected because they are considered to have significant contributions to economic growth and reflect Indonesia's macroeconomic activities over more than three decades. Household consumption, for instance, has consistently been the largest contributor to GDP, while FDI and exports play an important role in enhancing productivity and global competitiveness. On the other hand, imports are viewed as a potential constraint when they exceed domestic production capacity.

The type of research employed is associative quantitative research using time-series data from 1990 to 2023, obtained from international institutions such as the World Bank. The researcher applies the Error Correction Model (ECM) to analyze both short-run and long-run relationships between these variables and Indonesia's economic growth. The ECM was chosen because it is capable of explaining adjustment dynamics when short-term disequilibria occur toward long-run equilibrium, as well as testing the existence of cointegration among variables. Through this approach, the study seeks to identify which sectors have a direct short-term impact and which provide sustainable contributions to national economic growth.

Based on the table above, it can be seen that the results of the unit root test at the 2nd difference level show that the probability value of each variable is smaller than the 5% alpha level. Thus, at the 2nd difference level, the data are found to be stationary for all variables. Therefore, it can be concluded that all the data in this study are non-stationary at the level, but stationary at the 2nd difference.

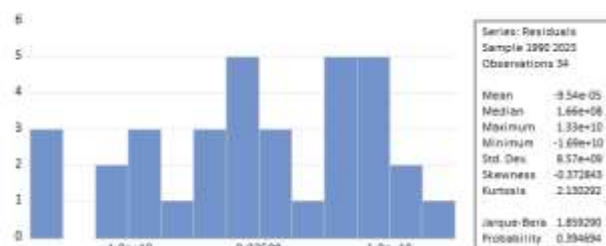
Based on the table above, it can be seen that the results of the cointegration test show a Phillips-Perron probability value of 0.0003, which is smaller than the 5% alpha level. Thus, the data indicate the presence of cointegration among the variables. Therefore, it can be stated that there is a long-run relationship among the variables.

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A. Classical Assumption Test

1. Normality Test

A normality test was conducted to determine whether the residuals of the regression model are normally distributed. This study employed the **Jarque-Bera test** to examine the residuals. If the probability value of the Jarque-Bera statistic exceeds the significance level of $\alpha = 5\%$, the residuals can be considered normally distributed.



Based on the results of the normality test above, it can be seen that the probability value of 0.394694 is greater than $\alpha = 5\%$. Therefore, it can be concluded that the data in this study are normally distributed and that no normality deviation occurs in the ECM model.

2. Multicollinearity Test

The multicollinearity test was conducted to detect whether there is a strong correlation among the independent variables in the regression model. Multicollinearity is assessed using the Centered Variance Inflation Factor (VIF), where a value of less than 10.00 indicates the absence of multicollinearity.

Variance Inflation Factors			
Date: 09/30/25 Time: 19:23			
Sample: 1990-2023			
Included observations: 34			
	Coefficient	Uncentered	Centered
	Variance	VIF	VIF
C	4.45E+19	16.86303	NA
X1	0.207359	14.71640	6.336949
X2	0.060835	495.4482	8.505335
X3	0.040246	307.0877	4.839446
X4	0.004854	385.3378	5.004406
X5	2.07E-05	1.610967	1.428645
X6	0.184305	276.3431	4.586104

Based on the test results, all independent variables—FDI, exports, imports, household consumption, domestic investment (PMDN), and government expenditure—showed VIF values below the threshold of 10. This indicates that the regression model is free from multicollinearity, and the independent variables can be reliably used in the ECM estimation.

3. Autocorrelation Test

The autocorrelation test was conducted to examine whether there is correlation among the residuals of the regression model. This study employed the **Breusch-Godfrey Serial Correlation LM Test**. If the probability value is less than 5%, autocorrelation is present; if it is greater than 5%, no autocorrelation exists.

Breusch-Godfrey Serial Correlation LM Test			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.276818	Prob. F(2,25)	0.7605
Obs*R-squared	0.736632	Prob. Chi-Square(2)	0.6919

The table shows that the Prob. Chi-Square value is 0.6919, which is greater than 0.05, indicating that the ECM model is free from autocorrelation issues.

4. Heteroskedasticity Test

The heteroskedasticity test was conducted to determine whether the variance of the residuals is constant or not. In this study, the Breusch-Pagan-Godfrey test was employed. If the probability value of the Obs*R-squared statistic is greater than 5%, it indicates that heteroskedasticity is not present in the model.

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null hypothesis: Homoskedasticity			
F-statistic	1.964653	Prob. F(6,27)	0.1063
Obs*R-squared	10.33284	Prob. Chi-Square(6)	0.1113
Scaled explained SS	3.682559	Prob. Chi-Square(6)	0.7195

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Based on Table, the probability value of Obs*R-squared is 10.33284, which exceeds the 5% significance level ($\alpha = 0.05$). This indicates that the model does not suffer from heteroscedasticity.

C. Statistical Test

Hypothesis Testing

1. Partial Test (t-Test)

Long-Run Estimation

Y= 1.521911 + 0.290755 + 0.871779 + 0.647623 +1.604790 + 0.044995 + 1.407166+ error.....4.1

1. FDI (X1): Probability value = 0.5285 > 0.05 → Not significant. Although the coefficient shows a positive sign, FDI does not have a significant effect on economic growth.
2. Exports (X2): Probability value = 0.0015 < 0.05 → Significant and positive. Exports positively influence long-run economic growth.
3. Imports (X3): Probability value = 0.0033 < 0.05 → Significant and positive. Imports positively affect long-run economic growth.
4. Consumption (X4): Probability value = 0.0000 < 0.05 → Significant and positive. Household consumption strongly contributes to long-run economic growth.
5. Domestic Investment / PMDN (X5): Probability value = 0.0000 < 0.05 → Significant and positive. Domestic investment supports long-run economic growth.
6. Government Expenditure (X6): Probability value = 0.0029 < 0.05 → Significant and positive. Government spending enhances long-run economic growth.

Short-Run Estimation

Short-Run ECM Results:

(D)Y= 3.07E+11 + 10.99099 + 31.50962 + 22.53823 + 14.52704 + 0.099277 + 1.572836 - 0.173330 (ECT-1).....4.2

1. FDI (X1): Probability = 0.2059 > 0.05 → Not significant, but the coefficient is positive, indicating that increases in FDI tend to support economic growth even though the effect is not statistically significant.
2. Exports (X2): Probability = 0.0014 < 0.05 → Significant and positive. Exports have a positive short-run effect on economic growth.
3. Imports (X3): Probability = 0.0020 < 0.05 → Significant and positive. Imports positively influence short-run economic growth.
4. Consumption (X4): Probability = 0.0011 < 0.05 → Significant and positive. Household consumption contributes positively to short-run economic growth.
5. Domestic Investment / PMDN (X5): Probability = 0.0499 < 0.05 → Significant and positive. Domestic investment supports short-run economic growth.
6. Government Expenditure (X6): Probability = 0.0266 < 0.05 → Significant and positive. Government spending has a positive short-run impact on economic growth.

2. Simultaneous Test (F-Test)

Long-Run Estimation

F-statistic	4729.611
Prob(F-statistic)	0.000000

Based on the results of the simultaneous test of the independent variables on the dependent variable in the long-run equation, it can be seen that the probability value (F-statistic) is 0.000000 or < 0.05. This indicates that the independent variables (X) have a significant influence on the dependent variable (Y). In other words, FDI, Exports, Imports, Consumption, Domestic Investment (PMDN), and Government Expenditure can affect economic growth in Indonesia during the period 1990–2023.

Short-Run Estimation

F-statistic	3.950537
Prob(F-statistic)	0.000067

Based on the results of the simultaneous test of the independent variables on the dependent variable in the short-run equation, it can be seen that the probability value (F-statistic) is 0.000067 or < 0.05. This indicates that the independent variables

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(X) have a significant influence on the dependent variable (Y). In other words, FDI, Exports, Imports, Consumption, Domestic Investment (PMDN), and Government Expenditure can affect economic growth in Indonesia during the period 1990–2023.

3. Coefficient of Determination (R^2)

Long-Run Estimation

R-squared	0.999049
Adjusted R-squared	0.998838

The R-Square value in the ECM test for the long-run equation is 0.999049 or 99%. This means that in the long run, the independent variables (X) explain 99% of the variation in the dependent variable (Y), while the remaining 1% is influenced by other variables outside the model.

Short-Run Estimation

R-squared	0.628957
Adjusted R-squared	0.656178

The R-Square value in the ECM test for the short-run equation is 0.628957 or 62.89%. This means that in the short run, the independent variables (X) explain 62.89% of the variation in the dependent variable (Y), while the remaining 37.13% is influenced by other variables outside the model.

D. DISCUSSION

- Foreign Direct Investment (FDI)

The results indicate that FDI does not significantly affect Indonesia's economic growth, either in the short or long run. This suggests that FDI inflows are still concentrated in extractive and capital-intensive sectors, with limited employment and multiplier effects. Similar findings were reported by Herzer (2010) and Alfaro et al. (2004), who stressed that FDI benefits are conditional on financial market development and institutional quality. In Indonesia, Tambunan (2007) and Wibowo (2019) found that FDI becomes significant only when directed to export-oriented manufacturing. This aligns with Dependency Theory (Frank, 1967) and Eclectic Theory (Dunning), which emphasize that FDI is beneficial only if supported by strong domestic capacity.

- Exports

Exports significantly and positively impact economic growth both in the short and long term. This supports the export-led growth hypothesis (Balassa, 1978) and comparative advantage theory (Ricardo, 1817), showing that export expansion increases production capacity and foreign exchange. Studies by Shan & Sun (1998), Siregar & Ward (2002), and Hapsari (2012) confirm that exports—especially non-oil manufacturing—are key drivers of Indonesia's growth.

- Imports

Imports also have a positive and significant effect, reflecting that Indonesia's imports are largely productive inputs such as raw materials and capital goods. Awokuse (2008) and Tambunan (2011) found similar evidence that imports can catalyze growth by providing essential production inputs. This supports the Productive Import Hypothesis (Coe & Helpman, 1995) and Endogenous Growth Theory (Romer, 1986), where technology and knowledge embedded in imports foster productivity.

- Household Consumption

Consumption significantly supports growth, consistent with the fact that it accounts for over 50% of Indonesia's GDP. Loayza et al. (2000) and Kuncoro (2013) highlight consumption's role in maintaining stability during crises. The findings are aligned with Keynesian Consumption Function (Keynes, 1936), Permanent Income Hypothesis (Friedman, 1957), and Life Cycle Hypothesis (Modigliani, 1966), which emphasize consumption as a key driver of aggregate demand and long-term stability.

- Domestic Investment (PMDN)

PMDN has a significant positive effect, showing that domestic investment strengthens production capacity and reduces dependency on foreign capital. This supports the Harrod-Domar Model, which identifies investment as the main driver of growth. Empirical studies by Boediono (2002), Sari (2014), and Putri & Sari (2019) found that PMDN is more stable and resilient than FDI, especially in the manufacturing and service sectors.

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- **Government Expenditure**
Government spending significantly promotes growth, consistent with Keynesian theory and Wagner's Law. Barro's Endogenous Growth Model (1990) stresses that productive government spending—on infrastructure, education, and health—enhances productivity and long-term growth. In Indonesia, Sukirno (2016), Kusumawardhani (2017), and Rahman & Handoko (2020) provide evidence that fiscal expenditure contributes positively to human capital development and regional inclusiveness.

V. CONCLUSIONS

Based on the results of the study on the determinants of Indonesia's economic growth during the period 1990–2023 using the Error Correction Model (ECM), the following conclusions can be drawn:

1. Foreign Direct Investment (FDI) has no significant effect on economic growth in either the short or long run. This indicates that FDI inflows to Indonesia, which are mostly directed toward extractive and capital-intensive sectors, have not fully generated multiplier effects for the economy.
2. Exports have a positive and significant effect on economic growth in both the short and long run, supporting the export-led growth hypothesis that exports are one of the main drivers of Indonesia's growth.
3. Imports show a positive and significant effect in both the short and long run, suggesting that Indonesia's imports, dominated by capital goods and raw materials, are largely productive and thus support the expansion of domestic production capacity.
4. Household consumption has a positive and significant effect in both the short and long run. As the largest and most stable contributor to GDP, consumption serves as a backbone of growth and enhances Indonesia's economic resilience during crises.
5. Domestic Investment (PMDN) positively and significantly affects economic growth, highlighting the critical role of domestic capital formation in strengthening production capacity and providing a solid foundation for long-term growth.
6. Government expenditure is found to have a positive and significant effect in both the short and long run. Public spending, particularly on infrastructure, education, and health, contributes significantly to sustaining Indonesia's national economic growth.

ACKNOWLEDGMENT

With gratitude, the author would like to express his deepest gratitude to all parties who have played a role in the preparation from this journal. First, a sincere thank you to Mr. Wahyunadi Rois and Mr. Prayitno Basuki for their endless guidance, advice, and support throughout the research and writing process. The author also thanked the family, especially the two parents who always provided moral support, enthusiasm, and understanding to the author. And also thank you to the author's friends who always provide support to the author so that they can complete this research. Without your love and encouragement, the writer would not be able to accomplish this task correctly. In addition, the author also thanked previous researchers whose work became an important basis and reference in this research. Your contributions in this field have provided invaluable inspiration and insight for writers. Finally, I hope that this journal can provide great benefits and a positive contribution to the development of science and be useful for the readers.

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