

The dynamics of Exchange Rates and Internastional Trade as Determinants of Indonesia's Economic Growth An Organizational Perspective on Role Conflict

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Abstract

This study aims to analyze the dynamics of international trade and exchange rates and their effects on Indonesia's Gross Domestic Product (GDP). The variables examined include exports, imports, exchange rates, and GDP using secondary data covering the period 2014–2024. A quantitative approach is employed using the *Vector Error Correction Model* (VECM), supported by stationarity testing, optimal lag selection, the Johansen cointegration test, Granger causality test, *Impulse Response Function* (IRF), and *Forecast Error Variance Decomposition* (FEVD). The cointegration test indicates the existence of a long-run relationship among exports, imports, exchange rates, and GDP. The Granger causality test shows that exports affect imports and GDP, while imports affect GDP. In addition, a unidirectional causal relationship is found from GDP to the exchange rate. The VECM results indicate that imports and exchange rates significantly affect exports in the long run, while the adjustment mechanism toward equilibrium primarily occurs in the export and import equations. The IRF results show that shocks to exports and imports generate relatively strong responses in GDP, whereas the response to exchange rate shocks tends to be smaller and fluctuating. The FEVD results indicate that, in period 10, variations in GDP are mainly explained by imports at 38.58% and exports at 33.27%, while the exchange rate contributes 9.10%. These findings suggest that international trade plays a relatively dominant role in explaining the dynamics of Indonesia's GDP. Therefore, strengthening export competitiveness, managing productive imports, and maintaining exchange rate stability are essential to support sustainable economic growth in Indonesia

Keywords: Exports, Imports, Exchange Rate, GDP, VECM, International Trade.

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Introduction

Economic growth is an important indicator for measuring the success of economic development in a country. Economic growth achieved from year to year can be assessed as an indication of a country's performance and success in managing its economic activities in the short term, as well as its efforts to develop the economy in the long term (Sukirno, 2011, as cited in Yanuar, 2024). Economic growth also serves as a benchmark for assessing the extent to which a country's economic activities generate additional income for society over a given period (Todaro, 2011, as cited in Yanuar, 2024). At the macroeconomic level, the economic growth achieved by a country is measured based on changes in its real national income or regional income, which reflects economic activities and the process of utilizing various factors of production to generate output. This output is measured using the Gross Domestic Product (GDP) indicator. Therefore, economic growth can generally be proxied by GDP.

The amount and volume of a country's Gross Domestic Product can be used to measure economic growth (Bimantoro, 2016). According to Fitriani (2019), total income and total expenditure on goods and services over a certain period are known as Gross Domestic Product (GDP). GDP at constant prices is used as the basis for calculating economic growth (Hanifah, 2022). Annual GDP growth at constant prices represents economic growth. According to Ismanto (2019), exports and imports have a significant impact on economic growth. Kristianingsih (2019) argues that export expansion can contribute to economic growth by increasing a country's capacity to earn foreign currency, which in turn supports faster economic growth. A trade deficit occurs when import growth exceeds export growth, which may lead to a slowdown in domestic economic activity. A slowdown in domestic economic performance may reduce entrepreneurs' interest in investment (Nur & Naldi, 2016).

Economic growth indicates the extent to which economic activities generate additional income for society over a certain period. Therefore, economic activity is essentially a process of utilizing factors of production to generate output, which in turn provides returns to the factors of production owned by society.

National economic performance can be observed through developments in Gross Domestic Product (GDP). GDP at current prices (ADHB) reflects the structure of the economy, whereas GDP at constant prices (ADHK) 2010=100 reflects the rate of economic growth as a representation of development performance. In other words, from the production side, GDP at current prices (ADHB) shows the contribution of each business sector to Indonesia's economy. Meanwhile, GDP at constant prices (ADHK) 2010=100 reflects the performance of each business sector in each period, measured using prices from 2010 (BPS, 2025).

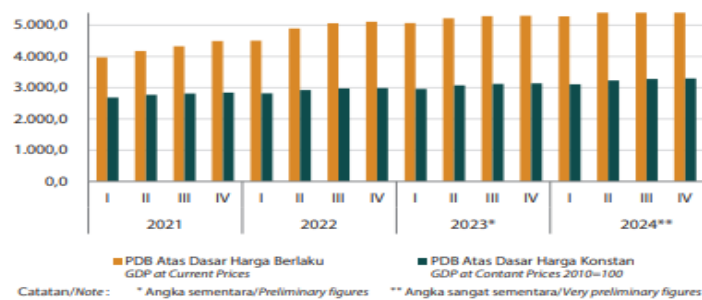


Figure 1. GDP at Current Prices and Constant 2010 Prices (Trillion Rupiah), Quarterly, 2021–2024

Based on GDP at current prices and GDP at constant prices, Indonesia's economy generally shows continued strengthening. In 2021, which is generally regarded as the final year of the COVID-19 pandemic, Indonesia's economic growth reached 3.70 percent. However, when considering the post-COVID-19 period from the first quarter of 2022 to the fourth quarter of 2024, Indonesia's average economic growth was 5.11 percent. On an annual basis, the Indonesian economy continued to recover following the COVID-19 pandemic. This was reflected in economic growth of 5.31 percent in 2022, followed by growth of 5.03 percent in 2024.

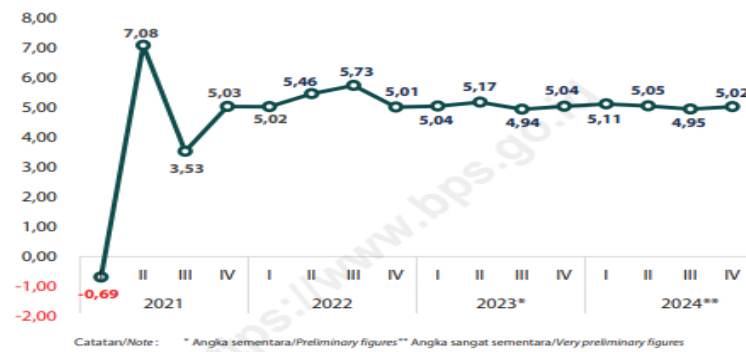


Figure 2. Quarterly GDP Growth Rate (Year-on-Year), 2021–2024

International trade strengthens economic linkages among countries through export and import activities, which also influence the domestic economy (Nasution & Yusuf, 2018). Through export and import activities, countries can expand markets, increase production, earn foreign exchange, and strengthen economic competitiveness. In Indonesia, exports are one of the main sources of national income and an important indicator for assessing economic performance amid the dynamics of global trade (BPS, 2025).

One of the macroeconomic factors that plays a role in determining export performance is the exchange rate. Changes in the exchange rate of the Indonesian rupiah against the United States dollar can affect the price competitiveness of domestic products in international markets. Munarti et al. (2021) found that the exchange rate is one of the factors associated with developments in Indonesian exports. In addition, trade openness is an important aspect of economic integration with global markets. Sowrov (2024) found a positive and significant relationship between trade openness and economic growth in G20 countries, demonstrating the importance of trade policies that support international market integration.

Exchange rate fluctuations are an important aspect of an open economy because changes in exchange rates can reflect market responses to developments in macroeconomic conditions. Exchange rate movements are not only associated with domestic economic conditions but may also be influenced by economic developments in trading partner countries. Danaa, Adenan, and Zainuri (2019) showed that both domestic and external macroeconomic news can influence exchange rate movements in Indonesia. This condition indicates that exchange rate stability is closely associated with the strength of economic fundamentals and developments in the global economic environment.

In the context of the international economy, the choice of an exchange rate regime is an important component of macroeconomic policy because each country has different economic characteristics and conditions. Rahmat (2022) explains that exchange rate regimes may take the form of fixed exchange rates, freely floating exchange rates, or intermediate

regimes. Therefore, exchange rate management needs to be adjusted to domestic economic conditions and global economic developments in order to maintain macroeconomic stability.

Literature Review

International trade exists to fulfill human needs and has important economic implications. Finished products can be distributed to consumers through traders. Traders purchase goods for resale without changing their type or size in order to obtain trading profits. Trade activities have now expanded considerably and have reached the international level. International trade involves both exporting and importing activities.

Exports are one of the main instruments of international trade and play a strategic role in the national economy. Export activities not only serve as a means of expanding markets for domestic products but also contribute to foreign exchange earnings, employment opportunities, government revenues through export duties and taxes, as well as the balance of goods and monetary flows within the domestic economy (Sasono, 2013).

Net exports refer to a condition in which the value of exports is greater than the value of imports. Positive net exports reflect strong demand for domestic goods and services. This condition can increase productivity, which may subsequently contribute to higher domestic economic growth. Conversely, negative net exports reflect a decline in demand for goods and services, which may reduce productivity and hamper economic growth. Exports enable a country to earn foreign currency, whereas imports require payment using foreign currency. Imports are also an important component of international trade. Import activities are conducted to fulfill domestic needs, particularly when certain goods cannot be produced domestically in sufficient quantities to meet the needs of society.

The relatively high value of Indonesia's imports from year to year is closely related to the characteristics of the Indonesian economy, in which various components, including consumer goods, raw materials, and capital goods, are still imported to support economic activities and growth. Imports have an impact on the economy of a country and its population. Therefore, import activities may need to be regulated to protect domestic producers. In addition to protecting domestic producers, import restrictions can have broader implications for the national economy (Eva, 2024).

The exchange rate refers to the amount of domestic currency required to obtain one unit of foreign currency, that is, the number of rupiah required to purchase one unit of foreign currency. The exchange rate is an important variable in an open economy because it influences other economic variables, such as prices, interest rates, the balance of payments, and the current account.

As explained by the Mundell theory, there is a negative relationship between the exchange rate and economic growth. The higher the exchange rate, the lower the level of net exports, which represents the difference between exports and imports. This decline can reduce the level of production and subsequently affect GDP and economic growth (Tidar, 2022).

The conceptual framework of this study is based on the use of the VAR method as a foundation for understanding and interpreting the relationships among the variables more appropriately. The conceptual framework of the study is presented as follows:

Impor

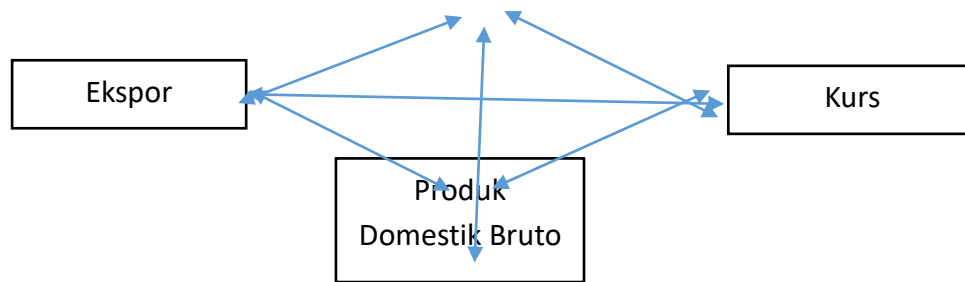


Figure 3 Conceptual Framework (VAR): Analysis of the Impact of International Trade on Indonesia's Gross Domestic Product

The VAR model enables dynamic analysis of the relationships between variables—including short- and long-term effects—as well as the direction of causal relationships (Granger causality).

Research Methodology

This study employs an associative or quantitative research approach. According to Rusiadi (2023), associative/quantitative research aims to determine the degree of relationship and the pattern or nature of influence between two or more variables; such research facilitates the construction of a theory designed to explain, predict, and control a specific phenomenon. To support the quantitative analysis, the Vector Autoregression (VAR) model is utilized; this model is capable of explaining long-term causal relationships among economic variables treated as endogenous variables. The study relies on secondary data obtained from Statistics Indonesia (BPS) and the Ministry of Trade, covering the period from 2014 to 2025 (12 years).

The data analysis model employed is Vector Autoregression (VAR), supported by the following procedures: Stationarity Test, Optimum Lag Selection, Cointegration Test, Granger Causality Test, Vector Error Correction Model (VECM) analysis, Impulse Response Function (IRF), and Forecast Error Variance Decomposition (FEVD).

Results and Discussion

4.1 Stationarity Test

The stationarity test is a crucial initial step in time series data analysis, as it aims to determine whether a variable is stationary or contains a unit root. The decision regarding the ADF test is made by comparing the ADF t-statistic value with the MacKinnon critical value at significance levels of 1%, 5%, and 10%. If the absolute value of the ADF t-statistic is smaller than the absolute value of the critical value, the null hypothesis (H_0)—which posits the presence of a unit root—cannot be rejected. This indicates that the data is non-stationary at the level being tested.

Conversely, if the absolute value of the ADF t-statistic exceeds the absolute value of the MacKinnon critical value, the null hypothesis is rejected, meaning the data is stationary (i.e., it does not contain a unit root). This conclusion is further supported if the probability value (Prob.) is less than 0.05. If the data is not stationary at the level, testing may proceed to the first difference or subsequent differences until a stationary data series is obtained. These test results subsequently serve as the basis for selecting the appropriate estimation method, particularly for VAR/VECM modeling.

Table 1 Hasil Uji Akar Unit ADF

Variabel	Unit Root	ADF test statistic	Prob.	Keterangan
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Ekspor	Level	-0.589517	0.8623	Non-stationary
	1 st difference	-7.696703	0.0000	Stationary
	2 nd difference	-6.752577	0.0000	Stationary
Impor	Level	-1.953610	0.3058	Non-stationary
	1 st difference	-6.912039	0.0000	Stationary
	2 nd difference	-10.34032	0.0000	Stationary
Kurs	Level	-1.399828	0.5745	Non-stationary
	1 st difference	-5.574278	0.0000	Stationary
	2 nd difference	-6.555070	0.0000	Stationary
Pdb	Level	0.671203	0.9901	Non-stationary
	1 st difference	-3.268356	0.0227	Stationary
	2 nd difference	-28.32554	0.0001	Stationary

Source: Processed data, EViews V.13, 2022

Based on the Augmented Dickey-Fuller (ADF) stationarity test results, it was found that all research variables—exports, imports, exchange rates, and Gross Regional Domestic Product (GRDP)—were non-stationary at the level, as their probability values exceeded the 5% significance level ($\alpha = 0.05$). The probability values were 0.8623 for exports, 0.3058 for imports, -0.5745 for exchange rates, and 0.9901 for GRDP. This indicates the presence of a unit root, meaning the mean and variance change over time—a condition that could lead to spurious regression if the data were used directly in the analysis. However, after first-differencing, the variables became stationary, as evidenced by probability values below 0.05 for the differenced series.

Given these results, the Vector Error Correction Model (VECM) is an appropriate choice, as it is designed to analyze both short- and long-term relationships between variables that are non-stationary at the level but exhibit cointegration.

4.2 Selection of Optimal Lag

The VAR approach is highly sensitive to the data lags employed; therefore, determining the optimal lag is essential. The optimal lag length can be determined using criteria such as the Schwarz Criterion (SC), Hannan-Quinn Information Criterion (HQ), and Akaike Information Criterion (AIC).

Table 2 Optimum Lag Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1422.586	NA	7.71e+23	66.35282	66.51665*	66.41323
1	-1415.223	13.01327	1.16e+24	66.75455	67.57371	67.05663
2	-1398.582	26.31607	1.15e+24	66.72473	68.19922	67.26848
3	-1356.749	58.37072	3.63e+23	65.52323	67.65305	66.30864
4	-1332.390	29.45839*	2.73e+23*	65.13440*	67.91955	66.16148*

* indicates lag order selected by the criterion

Source: Processed data, EViews V.13, 2022

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Based on the test results presented in Table 2, varying outcomes were obtained across the different information criteria. The Likelihood Ratio (LR) criterion indicates that the optimal lag is 4, marked by an LR value of 29.45839. The Final Prediction Error (FPE) criterion also identifies lag 4 as the optimal choice, with a value of 2.73E+23. Furthermore, according to the Akaike Information

Criterion (AIC), the lowest value occurs at lag 4 (65.13440), thereby indicating that lag 4 is the optimal lag length.

In contrast, the Schwarz Information Criterion (SC) yields its lowest value at lag 0 (66.51665), whereas the Hannan-Quinn Information Criterion (HQ) produces its lowest value at lag 4 (66.16148). Thus, of the five criteria employed, four—LR, FPE, AIC, and HQ—indicate that lag 4 is the optimal lag length, while only the SC criterion selects lag 0.

4.3 Cointegration Test

Cointegration testing is conducted to determine whether a long-run equilibrium relationship exists among the variables—specifically, whether there is co-movement and a stable relationship among the variables included in this study. In this research, the Johansen cointegration test method is employed.

Table 3 Cointegration Test Results

Trace statistic	>	Critical value	Prob.
93.64333		47.85613	0.0000
Max-Eigen statistic	>	Critical value	Prob.
45.84763		27.58434	0.0001

Source: Processed data, EViews V.13, 2022

Based on the table above, the Trace Statistic value of 93.64333 exceeds the 5% critical value of 47.85613, with a probability of 0.0000 (< 0.05). These results indicate that the variables—exports, imports, exchange rates, and GDP—share a significant long-term stable or equilibrium relationship.

Regarding the Maximum Eigenvalue approach, the statistic value of 45.84763 exceeds the critical value of 27.58434, with a probability of 0.0001 (> 0.05). Thus, the Maximum Eigenvalue Test further reinforces the decision to reject the null hypothesis. In other words, based on the Max-Eigen criterion, a cointegration relationship exists among the research variables.

4.4 Granger Causality Test

The Granger causality test was conducted to determine the direction of the causal relationships among the economic variables used in this study: exports (EKSPOR), imports (IMPOR), the exchange rate (KURS), and Gross Domestic Product (PDB). A relationship is considered to exhibit causality if the probability value (Prob.) is less than the 5% significance level ($\alpha = 0.05$). The test was performed using a lag of 3, based on 41 quarterly observations covering the period from 2014Q1 to 2024Q4. The results of the Granger causality test for this study are presented in the following table.

Table 4 Granger Causality Test Results

Null Hypothesis:	Obs	F-Statistic	Prob.
IMPOR does not Granger Cause EKSPOR	44	1.80590	0.1498
EKSPOR does not Granger Cause IMPOR		2.85602	0.0378
KURS does not Granger Cause EKSPOR	44	0.95280	0.4454
EKSPOR does not Granger Cause KURS		1.91429	0.1299
PDB does not Granger Cause EKSPOR	44	1.83204	0.1447
EKSPOR does not Granger Cause PDB		3.23766	0.0232
KURS does not Granger Cause IMPOR	44	0.79696	0.5353
IMPOR does not Granger Cause KURS		2.45978	0.0634
PDB does not Granger Cause IMPOR	44	2.59887	0.0529

IMPOR does not Granger Cause PDB		4.04976	0.0084
PDB does not Granger Cause KURS	44	6.62648	0.0004
KURS does not Granger Cause PDB		0.17275	0.9509

Source: Processed data, EViews V.13,

Overall, the Granger Causality test results indicate that the relationships between variables in the research system tend to be unidirectional rather than reciprocal. Four relationships were found to be significant at the 5 percent level: exports $\rightarrow$ imports, exports $\rightarrow$ GDP, imports $\rightarrow$ GDP, and GDP $\rightarrow$ exchange rate.

These findings demonstrate that the international trade sector is significantly linked to domestic economic performance. Exports exhibit a predictive relationship not only with imports but also with GDP. Meanwhile, imports also show a predictive relationship with GDP. This indicates that international trade dynamics serve as a channel linked to changes in Indonesia's economic activity.

Conversely, the absence of Granger causality running from the exchange rate to either exports or imports suggests that exchange rate fluctuations during the observation period did not provide sufficient statistical evidence to predict changes in international trade. This may occur because the response of exports and imports to exchange rate changes is not always immediate; rather, it can be influenced by other factors such as international commodity prices, global demand, domestic production structures, trade contracts, and the economic conditions of trading partners.

The significant GDP $\rightarrow$ exchange rate relationship also indicates that domestic economic activity is linked to exchange rate dynamics. However, these results require cautious interpretation, as Granger causality reflects the ability of a variable's past information to predict another variable, rather than proving an absolute structural cause-and-effect relationship.

Thus, the test results illustrate that exports and imports play a crucial role in the dynamics of Indonesia's GDP, while GDP developments show a strong predictive link to the exchange rate.

4.5 Test the Vector Error Correction Model (VECM)

VECM analysis is used to identify short-term and long-term relationships among the variables of exports, imports, exchange rates, and GRDP. Significance is assessed by comparing the t-statistic value with the t-table value of 2.015368 at a 5% significance level. A variable is considered to have a significant effect if the absolute value of the t-statistic exceeds the t-table value.

Table 5 VECM Test Results

Cointegrating Eq:	CointEq1
D(EKSPOR(-1))	1.000000
D(IMPOR(-1))	-9.587039 (1.41508) [-6.77490]
D(KURS(-1))	-35195.71 (14498.1) [-2.42761]
D(PDB(-1))	0.010087 (0.13681) [0.07373]

C	7747.809			
Error Correction:	D(EKSPOR,2)	D(IMPOR,2)	D(KURS,2)	D(PDB,2)
COINTEQ1	0.196941 (0.06303) [3.12467]	0.214970 (0.05974) [3.59862]	4.46E-06 (6.4E-06) [0.69316]	-0.187752 (0.87705) [-0.21407]
D(EKSPOR(-1),2)	-0.954954 (0.25299) [-3.77460]	-0.064770 (0.23978) [-0.27012]	3.31E-06 (2.6E-05) [0.12805]	0.001316 (3.52051) [0.00037]
D(EKSPOR(-2),2)	-1.030167 (0.29023) [-3.54951]	-0.115729 (0.27507) [-0.42072]	-1.64E-06 (3.0E-05) [-0.05525]	-1.184520 (4.03863) [-0.29330]
D(EKSPOR(-3),2)	-0.868887 (0.28860) [-3.01068]	-0.187801 (0.27353) [-0.68658]	-8.50E-08 (2.9E-05) [-0.00288]	-1.549100 (4.01599) [-0.38573]
D(EKSPOR(-4),2)	-0.164947 (0.25176) [-0.65518]	0.109998 (0.23861) [0.46099]	-1.53E-05 (2.6E-05) [-0.59501]	1.156358 (3.50328) [0.33008]
D(IMPOR(-1),2)	1.575230 (0.53214) [2.96020]	0.571709 (0.50435) [1.13356]	1.73E-05 (5.4E-05) [0.31872]	-0.087209 (7.40486) [-0.01178]
D(IMPOR(-2),2)	1.549057 (0.48791) [3.17491]	0.512715 (0.46243) [1.10874]	1.76E-05 (5.0E-05) [0.35406]	3.901713 (6.78939) [0.57468]
D(IMPOR(-3),2)	0.722464 (0.42488) [1.70040]	-0.010123 (0.40269) [-0.02514]	1.03E-05 (4.3E-05) [0.23708]	-0.449025 (5.91233) [-0.07595]
D(IMPOR(-4),2)	0.142559 (0.30351) [0.46970]	-0.177809 (0.28767) [-0.61811]	1.05E-05 (3.1E-05) [0.33951]	-1.154192 (4.22350) [-0.27328]
D(KURS(-1),2)	5824.787 (3288.98) [1.77100]	6569.914 (3117.24) [2.10761]	-0.423769 (0.33567) [-1.26246]	-27904.07 (45767.3) [-0.60969]
D(KURS(-2),2)	4460.854 (3051.52) [1.46185]	5697.298 (2892.18) [1.96990]	-0.495945 (0.31143) [-1.59245]	-29558.66 (42462.9) [-0.69611]
D(KURS(-3),2)	1438.957 (2892.97) [0.49740]	3702.896 (2741.91) [1.35048]	-0.124291 (0.29525) [-0.42096]	-8266.831 (40256.7) [-0.20535]
D(KURS(-4),2)	4809.122 (2170.10) [2.21608]	3657.316 (2056.79) [1.77817]	-0.318633 (0.22148) [-1.43866]	19834.28 (30197.7) [0.65681]
D(PDB(-1),2)	0.015645 (0.01945)	0.027905 (0.01843)	8.88E-07 (2.0E-06)	-1.226778 (0.27063)

	[0.80444]	[1.51384]	[0.44756]	[-4.53299]
D(PDB(-2),2)	0.011124 (0.01865) [0.59644]	0.024407 (0.01768) [1.38079]	4.93E-07 (1.9E-06) [0.25877]	-1.225646 (0.25952) [-4.72266]
D(PDB(-3),2)	0.022651 (0.01896) [1.19471]	0.032083 (0.01797) [1.78543]	6.50E-07 (1.9E-06) [0.33601]	-1.108035 (0.26383) [-4.19983]
D(PDB(-4),2)	0.033418 (0.01734) [1.92706]	0.041848 (0.01644) [2.54609]	5.61E-07 (1.8E-06) [0.31704]	-0.178417 (0.24132) [-0.73935]
C	-86.07170 (754.967) [-0.11401]	-48.06769 (715.545) [-0.06718]	-0.021425 (0.07705) [-0.27806]	125.3274 (10505.6) [0.01193]
R-squared	0.863100	0.841505	0.468467	0.949628
Adj. R-squared	0.766129	0.729238	0.091965	0.913947
Sum sq. resids	5.61E+08	5.04E+08	5.838445	1.09E+11
S.E. equation	4832.717	4580.371	0.493223	67248.98
F-statistic	8.900610	7.495544	1.244261	26.61489
Log likelihood	-404.1364	-401.8840	-18.15811	-514.7221
Akaike AIC	20.10173	19.99447	1.721815	25.36772
Schwarz SC	20.84645	20.73919	2.466530	26.11243
Mean dependent	-90.41762	-91.89000	-0.007190	-4092.855
S.D. dependent	9993.170	8802.509	0.517597	229247.1

Source: Processed data, EViews V.13, 2022

Long-Run Relationship

The cointegration equation estimation results indicate that the import variable has a coefficient of -9.587039 and a t-statistic of -6.77490. The absolute value of this t-statistic exceeds the t-table value of 2.015368; thus, imports exhibit a statistically significant relationship within the long-run equilibrium equation. Furthermore, the exchange rate variable has a coefficient of -35,195.71 and a t-statistic of -2.42761. Since the absolute t-statistic value of 2.42761 is greater than 2.015368, the exchange rate also demonstrates a statistically significant relationship in the long run. Meanwhile, GDP has a coefficient of 0.010087 and a t-statistic of 0.07373. This value is far lower than the t-table value; consequently, GDP does not show a statistically significant relationship within the long-run equilibrium equation.

Thus, the estimation results indicate that imports and the exchange rate have a significant long-term relationship with exports, whereas GDP does not show a significant relationship in the estimated cointegration equation.

Error Correction Term

The Error Correction Term (ECT) component is used to examine the existence of an adjustment mechanism in response to long-run disequilibria. In the export equation, the ECT coefficient is 0.196941 with a t-statistic of 3.12467. Since $3.12467 > 2.015368$, the ECT is statistically significant. In the import equation, the ECT coefficient is 0.214970 with a t-statistic of 3.59862. This value also exceeds the critical t-value; thus, the ECT is significant in the import equation. Conversely, the ECT in the exchange rate equation has a t-statistic of

0.69316, while in the GDP equation, it is -0.21407. Both absolute values are less than 2.015368, indicating a lack of statistical significance.

Thus, there is statistical evidence that exports and imports respond to disequilibria in the long-run relationship, whereas the exchange rate and GDP do not exhibit a significant adjustment response based on the estimated model.

Short-term Dynamics of Exports

In the export equation, changes in exports at the first, second, and third lags significantly influence changes in exports during the current period. This is evidenced by t-statistic values of -3.77460, -3.54951, and -3.01068, respectively—all of which have absolute values exceeding 2.015368. Additionally, changes in imports at the first and second lags also show a significant influence on exports, with t-statistic values of 2.96020 and 3.17491, respectively. Changes in the exchange rate at the fourth lag are also significant, with a t-statistic value of 2.21608.

These results indicate that, in the short term, export dynamics are influenced by export performance in previous periods, changes in imports, and exchange rate fluctuations at specific lags.

Short-Term Dynamics of Imports

In the import equation, the change in the exchange rate at the first lag yielded a t-statistic of 2.10761; this exceeds the t-table value, indicating statistical significance. Meanwhile, the exchange rate at the second lag yielded a t-statistic of 1.96990, which is not significant as it falls below the critical value of 2.015368.

Additionally, the change in GDP at the fourth lag showed a significant influence on imports, with a t-statistic of 2.54609. The other variables did not demonstrate a significant influence on imports at the chosen level of significance.

Short-Term Dynamics of the Exchange Rate

The estimation results for the exchange rate equation indicate that no t-statistic value exceeds 2.015368 in absolute terms. Consequently, no significant short-term impact of exports, imports, or GDP on exchange rate fluctuations was found within this research model.

These findings suggest that short-term exchange rate dynamics are likely influenced by factors other than the variables included in the model, such as monetary policy, international capital flows, global financial market conditions, inflation, interest rates, and market participant expectations.

Short-term dynamics of GDP

Estimation results for the GDP equation indicate that changes in GDP at the first, second, and third lags significantly affect changes in current-period GDP. This is evidenced by t-statistic values of -4.53299, -4.72266, and -4.19983, respectively; the absolute values of all three exceed the t-table value of 2.015368. Conversely, changes in exports, imports, and the exchange rate do not show a significant short-term impact on GDP based on the applied t-statistic criteria.

These findings suggest that Indonesia's short-term GDP dynamics are driven more by GDP performance in previous periods than by direct changes in exports, imports, or the exchange rate.

Conclusion of VECM Results

Overall, the VECM estimation results reveal distinct characteristics in the relationships between the long run and the short run. In the long run, imports and the exchange rate exhibit a significant relationship with exports, whereas GDP does not show a significant relationship within the cointegration equation.

In the short run, changes in exports are significantly influenced by exports from several previous periods, imports at the first and second lags, and the exchange rate at the fourth lag. Changes in imports are influenced by the exchange rate at the first lag and GDP at the fourth lag. Meanwhile, changes in the exchange rate do not show significant short-run influence from the variables within the system. In the GDP equation, significant influence stems primarily from changes in GDP over the preceding three periods.

These results indicate that the interrelationships among Indonesia's international trade, exchange rate, and GDP are dynamic and do not always manifest directly in every period. Therefore, analyzing the relationships between these variables requires consideration of long-run adjustment mechanisms as well as lag effects within the economy.

F. Impulse Response Function (IRF) Model

Impulse Response Function (IRF) analysis is conducted to determine the dynamic response of each variable to a one-standard-deviation innovation. According to Ariefianto (2012), the IRF is used to trace the impact of a shock to a variable within the system on other variables over a specific period. This analysis serves to identify the direction and dynamics of variable responses to an innovation in both the short and long term. According to Manurung (2005), the IRF measures the direction of movement of a variable resulting from changes in other variables.

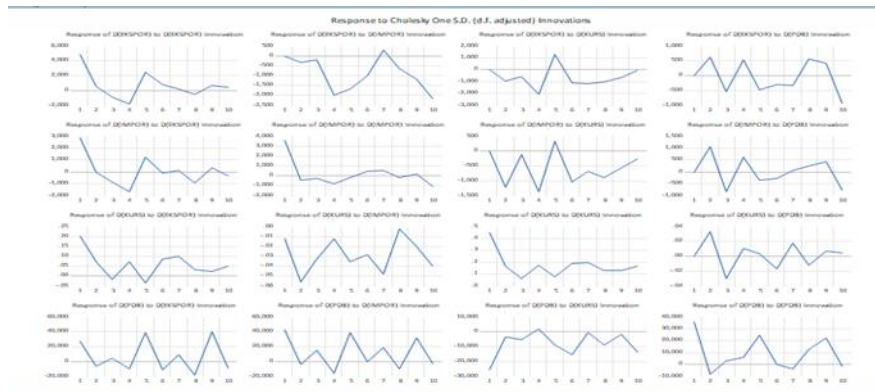


Figure 4 Impulse Response Function (IRF) results

Source: Processed data, EViews V.13, 2022

The Impulse Response Function (IRF) results indicate dynamic responses among the variables over a 10-period horizon. The response of exports to an import shock was -350.52 in the second period, reaching -2,170.74 by the tenth period. Meanwhile, the export response to an exchange rate shock reached -2,032.89 in the fourth period, subsequently fluctuating to -35.67 by the tenth period.

Regarding the import variable, the response to an export shock reached -1,648.08 in the fourth period, while the response to an exchange rate shock was -1,360.57 during the same period. The exchange rate's response to an export shock was recorded at 0.202 in the first period, whereas the response to an import shock was -0.012; both subsequently exhibited fluctuations through the tenth period.

Furthermore, the GDP response to an export shock was 27,260.53 in the first period, rising to 40,598.95 by the ninth period. The GDP response to an import shock was also substantial, measuring 42,901.89 in the first period and 39,610.33 in the fifth period. Conversely, an exchange rate shock elicited a negative response from GDP, starting at -25,694.82 in the first period and reaching -15,172.74 by the sixth period.

Overall, the IRF results demonstrate that export and import shocks elicit relatively strong responses from GDP, whereas exchange rate shocks tend to produce negative responses and exhibit greater fluctuation. These findings indicate that international trade dynamics play a significant role in influencing changes in Indonesia's GDP.

G. Forecast Error Variance Decomposition (FEVD)

Forecast Error Variance Decomposition (FEVD) is conducted to determine the relative importance of various shocks—both to the variable itself and to other variables. According to Manurung (2005), FEVD analysis aims to identify the influence or contribution among the variables involved in the transmission process. The total FEVD value is always 100 percent; a higher FEVD value indicates a greater contribution of one variable's variance to that of another variable within the transmission system.

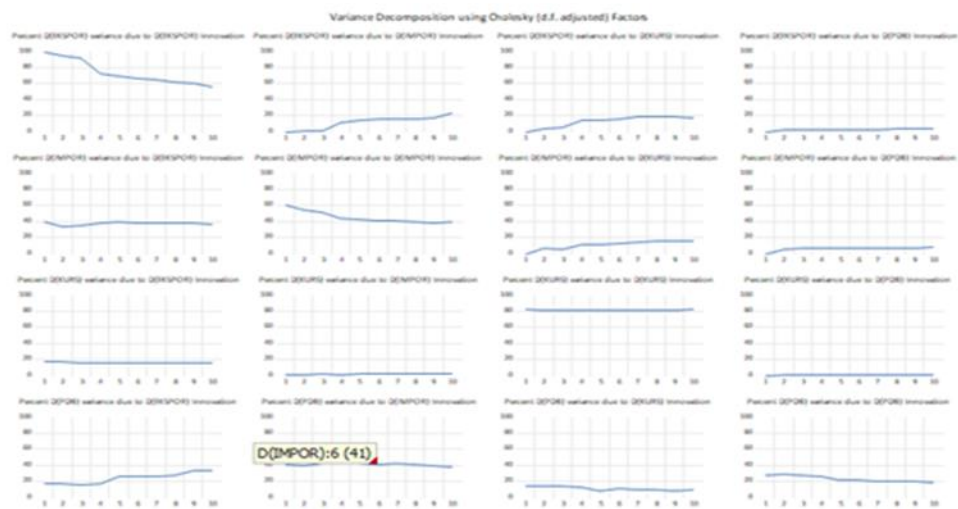


Figure 5 Forecast Error Variance Decomposition (FEVD) Results

Source: Processed data, EViews V.13, 2022

The variance decomposition results indicate that in the 10th period, export variation is primarily explained by shocks to exports themselves (55.54%), imports (22.87%), and the exchange rate (17.29%). Import variation stems mainly from shocks to imports (39.25%) and exports (36.69%). Meanwhile, exchange rate variation is overwhelmingly explained by shocks to the exchange rate itself (82.18%).

Regarding the GDP variable, the 10th period shows that its variation is primarily explained by imports (38.58%) and exports (33.27%), whereas the contributions of the exchange rate and GDP itself are 9.10% and 19.05%, respectively. Thus, the variance decomposition results indicate that exports and imports are the primary sources explaining Indonesia's GDP dynamics, while the influence of the exchange rate on GDP is relatively minor.

Conclusion

Based on the research findings regarding the dynamics of international trade and exchange rates as determinants of Indonesia's GDP, the following conclusions can be drawn:

1. Exports, imports, exchange rates, and GDP share a long-term relationship, as indicated by the cointegration test results.
2. Granger Causality test results show that exports influence imports and GDP, while imports also influence GDP. Additionally, there is a unidirectional causal relationship running from GDP to the exchange rate.

3. VECM results indicate that, in the long run, imports and exchange rates significantly affect exports. The adjustment mechanism toward equilibrium occurs primarily within the export and import equations.
4. IRF results show that export and import shocks elicit a relatively strong response from GDP, whereas the response to exchange rate shocks tends to be smaller and more volatile.
5. Variance Decomposition results reveal that by the 10th period, GDP variation is primarily explained by imports (38.58%) and exports (33.27%), while the exchange rate contributes 9.10%.

Overall, this study demonstrates that international trade—specifically exports and imports—plays a more dominant role than exchange rates in explaining the dynamics of Indonesia's GDP. Therefore, enhancing export competitiveness, managing imports productively, and maintaining exchange rate stability are crucial factors in supporting Indonesia's economic growth.

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