

## The Impact of GDP Growth, Foreign Direct Investment, and the Real Exchange Rate on Imports of Goods and Services in ASEAN-3 Countries

Muhammad Nabiil<sup>1</sup>, Muhammad Ariiq Daffa Nasution<sup>1</sup>, Randi Sultana<sup>1</sup>, Mirzatul Kadri<sup>1\*</sup>, Nazamuddin Nazamuddin<sup>1</sup>

<sup>1</sup>Faculty of Economics and Business, Universitas Syiah Kuala, Indonesia

\*Corresponding: [mirzatulkadri@usk.ac.id](mailto:mirzatulkadri@usk.ac.id)

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### Abstract

This study examines the long-run and short-run effects of real GDP growth, foreign direct investment, and the real exchange rate on imports of goods and services in three ASEAN economies Indonesia, Malaysia, and Thailand using annual panel data from 1990 to 2024. The analysis employs the Panel ARDL Pooled Mean Group (PMG) estimator to capture dynamic adjustments across countries with different short-run structures. Unit root tests confirm that the variables are integrated of mixed orders,  $I(0)$  and  $I(1)$ , supporting the use of the ARDL framework. Cointegration tests indicate a stable long-run relationship among the variables, suggesting that import behavior is driven by fundamental macroeconomic factors. The long-run results show that only the real exchange rate significantly influences imports, with appreciation reducing import demand, while GDP growth and FDI exhibit no significant long-run effects. In the short run, GDP growth significantly increases imports, whereas the exchange rate and the error-correction term are insignificant. Overall, the findings highlight the dominant role of exchange rate competitiveness in the long-run import dynamics of ASEAN-3 countries, while economic growth primarily affects short-run fluctuations. These results provide important policy implications for exchange rate management and trade stabilization strategies.

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## Introduction

International trade plays a central role in shaping the economic structure of countries in Southeast Asia (World Bank, 2023). The region has experienced rapid economic integration driven by expanding cross-border flows of goods, services, capital, and technology. ASEAN economies rely heavily on external trade to support industrial development and domestic consumption. Among these economies, Indonesia, Malaysia, and Thailand represent the largest and most dynamic trade players. Their economic performance is closely linked to global markets through export competitiveness and import demand. Imports, in particular, supply essential capital goods and intermediate inputs that sustain production networks. These conditions make it important to understand the main factors influencing import behavior in ASEAN-3.

Imports of goods and services contribute significantly to economic growth in developing economies (Salvatore, 2020). For Indonesia, Malaysia, and Thailand, imports provide machinery, technology, and raw materials that support domestic industrial capacity. The role of imports becomes even more critical in economies with active

manufacturing and export-oriented sectors. When global value chains expand, the demand for imported components increases. These countries also depend on imported goods to maintain efficiency and competitiveness. Fluctuations in imports therefore reflect both domestic economic conditions and external dynamics. Understanding these fluctuations is essential for designing effective trade and macroeconomic policies (Krugman & Obstfeld, 2018).

Exchange rate movements play a decisive role in influencing import demand (Mankiw, 2021). A stronger domestic currency makes foreign goods cheaper relative to domestic goods. This often stimulates import growth, especially for capital goods and consumer goods. Conversely, depreciation raises the cost of imports and may suppress import demand in the short run. ASEAN-3 economies are vulnerable to exchange rate volatility due to their high dependence on global financial and trade flows. Real exchange rate movements provide a more accurate measure of purchasing power because they incorporate inflation differentials. This makes the real exchange rate an essential factor for analyzing import behavior in open economies (IMF, 2023).

The real exchange rate is a commonly used indicator to assess international price competitiveness (Dornbusch & Fischer, 2020). It measures the relative price of domestic goods compared to foreign goods adjusted for inflation. When the real exchange rate appreciates, imported goods become relatively cheaper. This situation tends to increase the volume of imports among countries with strong industrial and consumption demand. In contrast, real depreciation generally discourages imports due to higher foreign prices. ASEAN-3 countries have experienced notable fluctuations in real exchange rates over the past decades. These fluctuations highlight the importance of examining the exchange rate as a determinant of import behavior.

Real Gross Domestic Product (real GDP) reflects the level of economic activity and purchasing power within an economy (World Bank, 2023). When real GDP increases, production, income, and investment typically expand. Higher economic activity stimulates demand for imported machinery, equipment, and intermediate goods. This relationship is well documented in empirical trade literature, especially for emerging economies undergoing industrialization. Indonesia, Malaysia, and Thailand have all experienced substantial structural transformations driven by economic growth. These transformations have increased their reliance on imported inputs. Real GDP therefore serves as a fundamental determinant of long-run import patterns (Samuelson & Nordhaus, 2020).

Foreign Direct Investment (FDI) plays a major role in shaping trade flows in developing countries (UNCTAD, 2023). FDI inflows often bring new technologies, industrial capacity, and multinational production networks. These developments increase the demand for imported machinery, raw materials, and intermediate goods. In ASEAN-3, FDI has been a crucial engine for strengthening export-oriented manufacturing sectors. Multinational companies typically rely on imported inputs to maintain standardized production quality. As a result, fluctuations in FDI inflows can significantly influence the demand for imports. This makes FDI a strategically important variable when examining import behavior in the region (Nunnenkamp, 2004).

Empirical studies have demonstrated strong interactions between exchange rates, economic growth, FDI, and import demand (Bahmani-Oskooee & Niroomand,

2021). Many studies find that exchange rate appreciation increases import volumes in emerging economies. Other research shows that real GDP growth is consistently associated with rising demand for imported goods. FDI inflows are also found to stimulate imports by supporting industries that rely on foreign inputs. These results, however, vary across countries and periods due to differences in structural characteristics. For ASEAN-3, the combined effects of these variables remain understudied in a single integrated framework. This creates a gap that warrants further investigation.

The ASEAN region has undergone significant economic changes over the past five decades (ADB, 2022). These changes include liberalization of trade policies, expansion of global value chains, and rising foreign investment inflows. Indonesia, Malaysia, and Thailand have emerged as key players in Southeast Asian manufacturing. Their import patterns have become increasingly influenced by external shocks, domestic market shifts, and financial integration. Despite their similarities, each country exhibits unique macroeconomic dynamics. These differences make comparative analysis both relevant and necessary. Studying ASEAN-3 jointly provides deeper insight into regional import behavior.

Understanding the macroeconomic determinants of imports is important for strengthening economic resilience (OECD, 2023). Policymakers need accurate information on how exchange rates, GDP, and FDI influence import demand. Long-term empirical evidence helps anticipate trade flows and design appropriate monetary, fiscal, and investment policies. In ASEAN-3, managing import dynamics is crucial for supporting industrial development and external stability. The long time span from 1970 to 2024 provides valuable insights into structural changes across decades. Examining such an extended period allows the identification of both short-run and long-run relationships. This enhances the robustness and policy relevance of the analysis.

Based on these considerations, this study investigates the impact of the real exchange rate, real GDP, and FDI on imports of goods and services in ASEAN-3. The research aims to provide empirical evidence on how these macroeconomic variables shape import demand over the long term. The study offers a comparative perspective by analyzing three major Southeast Asian economies simultaneously. The findings are expected to contribute to the literature on international trade in the ASEAN region. They also offer practical implications for policymakers in designing strategies to manage import dependence. By integrating multiple macroeconomic factors into a unified framework, the study provides a clearer understanding of import behavior. This supports better decision-making for sustaining regional economic stability.

## **Method**

This study utilizes annual panel data for three ASEAN economies Indonesia, Malaysia, and Thailand covering the period from 1990 to 2024. All variables are obtained from the World Development Indicators (WDI) published by the World Bank (2025), ensuring consistency, reliability, and methodological comparability across countries and over time. The dependent variable is the import of goods and services (IMP), measured in constant U.S. dollars to reflect real import demand and minimize the effects of inflation. The independent variables consist of real Gross Domestic Product (GDP), representing each country's level of economic activity; Foreign Direct Investment (FDI),

which captures the inflow of foreign capital that often increases demand for imported machinery, technology, and intermediate goods; and the real effective exchange rate (PA), which assesses external price competitiveness using a trade-weighted exchange rate index adjusted for inflation.

In reducing heteroskedasticity and ensure more stable variance, all variables are transformed into their natural logarithmic forms, allowing estimated coefficients to be interpreted as elasticities. The selection of variables follows established empirical studies examining the macroeconomic determinants of import demand and the influence of FDI on trade flows in emerging Asian economies (Senhadji & Montenegro, 1999; Bahmani-Oskooee & Niroomand, 2021). The use of a multi-country dataset over a 35-year period provides a comprehensive empirical foundation for analyzing long-term import dynamics and cross-country structural patterns within ASEAN-3.

The empirical model follows a dynamic panel framework based on the Autoregressive Distributed Lag (ARDL) structure, which allows short-run dynamics and long-run relationships to coexist across the sample countries. The general model is expressed as:

$$\Delta \ln Y_{it} = \alpha_i + \sum_{j=1}^{p-1} \beta_{1ij} \Delta \ln Y_{i,t-j} + \sum_{j=0}^{q-1} \beta_{2ij} \Delta \ln X_{i,t-j} + \phi_i (\ln Y_{i,t-1} - \phi_i \ln X_{i,t-1}) \varepsilon_{it}$$

Where  $Y_{it}$  represents rice production per capita,  $X_{it}$  is a vector of explanatory variables,  $\phi_i$  denotes the error-correction term capturing the speed of adjustment toward equilibrium, and  $\varepsilon_{it}$  is the stochastic error term. A significant and negative  $\phi_i$  implies the existence of a stable long-run relationship.

This model is particularly appropriate because the variables are expected to be integrated of order  $I(0)$  or  $I(1)$  but not  $I(2)$ . The ARDL framework efficiently estimates parameters in small samples and addresses dynamic heterogeneity across countries, making it widely used in sustainability and agricultural production research (Nkoro & Uko, 2016; Ali et al., 2022).

To estimate the long-run coefficients and short-run dynamics, the Pooled Mean Group (PMG) estimator by Pesaran, Shin, and Smith (1999) is applied. The PMG approach constrains long-run coefficients to be homogeneous across countries but allows short-run parameters, error variances, and adjustment speeds to differ.

## Result and Discussion

Before explaining the results of the ARDL Panel estimation, a series of analytical steps were first conducted, including stationarity testing, cointegration testing, and the estimation of both short-run and long-run relationships. These steps ensure that the model satisfies the basic econometric assumptions and that the estimation results can be interpreted accurately and reliably.

The stationarity test is used to determine whether the data are stationary or not. The Augmented Dickey-Fuller (ADF) test ensures that each variable has the appropriate order of integration, either at level  $I(0)$  or at first difference  $I(1)$ . This step is crucial because the ARDL model can only be applied when the variables are not all integrated at the same order, but instead represent a combination of  $I(0)$  and  $I(1)$ .

Table 1. The ADF for the variables in level and first difference

	individual intercept				individual intercept and tren				Result
	At Level		First Difference		At Level		First Difference		
	<i>t</i> - t- statistic	p- value	<i>t</i> - statistic	p- value	<i>t</i> - t- statistic	p- value	<i>t</i> - t- statistic	p- value	
IMP	8.86260	0.1815	82.3308	0.0000	15.0554	0.0198	94.1310	0.0000	$I(1)$
GDPG	39.5431	0.0000	72.3568	0.0000	32.7754	0.0000	790.172	0.0000	$I(0)$
FDI	22.6582	0.0009	94.4119	0.0000	19.1821	0.0039	478.211	0.0000	$I(0)$
PA	3.44584	0.7512	55.9941	0.0000	5.02139	0.5411	44.9202	0.0000	$I(1)$

Source : Eviews 2025 output

The Augmented Dickey-Fuller (ADF) test reported in Table 1 is used to identify whether each variable is stationary at level or becomes stationary after first differencing. The results show that GDPG (economic growth) and FDI are stationary at level, as indicated by p-values below 0.05 under the individual intercept specification, implying that both variables are integrated of order zero or  $I(0)$ . Meanwhile, IMP (imports of goods and services) and PA (real exchange rate) exhibit non-stationarity at level, shown by p-values above 0.05, but become stationary after first differencing with p-values equal to 0.0000, indicating that both variables are integrated of order one or  $I(1)$ . These findings confirm the presence of a mixture of  $I(0)$  and  $I(1)$  series, which is appropriate for the ARDL modelling framework because the method allows variables with different integration orders as long as none of them are integrated of order two or  $I(2)$  (Dickey & Fuller, 1979; Dickey & Fuller, 1981; Pesaran, Shin, & Smith, 2001).

After establishing the integration properties of the variables, the next step is to examine whether a long-run equilibrium relationship exists among them. The cointegration test is carried out using the ARDL Bounds Testing approach based on the F-statistic. If the F-statistic exceeds the upper critical bound at the 5 percent significance level, it indicates the presence of a long-term cointegrating relationship among IMP, GDPG, FDI, and PA in the model.

The cointegration test results shown in Table 2 indicate that there is a long-run equilibrium relationship among the variables. This test was conducted using both the within-dimension (Panel statistics) and between-dimension (Group statistics) approaches to confirm robustness. For the within-dimension results, the Panel PP-Statistic and Panel ADF-Statistic show significant values with probabilities of 0.0000 and 0.0047, respectively, which are below the 0.05 threshold. Similarly, the between-dimension results show that the Group PP-Statistic and Group ADF-Statistic also have probabilities of 0.0000 and 0.0002. These findings indicate that the null hypothesis of no cointegration

can be rejected, suggesting that GDPG, UNEMP, RER, DC, and FDI share a stable long-run relationship.

This result implies that despite short-term fluctuations, the variables tend to move together over time and return to long-run equilibrium. Therefore, the presence of cointegration supports the use of the ARDL Panel model to analyze both short-run and long-run dynamics among these macroeconomic variables (Pedroni, 1999; Pedroni, 2004; Pesaran, Shin, & Smith, 2001).

Table 2. Cointegration Test

Atternatif hypothesis: common AR coefs. (within-dimension)				
	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-statistic	-0.263390	0.6039	-1.512684	0.9348
panel rho-statistic	-0.567838	0.2851	-0.945443	0.1722
panel PP-statistic	-4.440039	0.0000	-5.523624	0.0000
Panel ADF-statistic	-2.595036	0.0047	-3.115860	0.0009
Atternatif hypothesis: individual AR coefs. (between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	-0.074908	0.4701		
Group PP-Statistic	-6.126483	0.0000		
Group ADF-Statistic	-3.521896	0.0002		

Source : Eviews 2025 output

After confirming the presence of cointegration among the variables, the next stage is the estimation of both long-run and short-run relationships using the ARDL Panel model. This stage estimates the dynamic interactions between the dependent and independent variables. The long-run coefficients indicate the direction and magnitude of the effects in a stable period, while the short-run coefficients describe the dynamic adjustment process through the value of the Error Correction Term (COINTEQ).

Table 3. Long-run Coefficient Estimates of the Panel ARDL Model

Variabel	Coefficient	Std.Error	t-Statistic	Prob.
GDPG	-0.003576	0.281503	-0.225847	0.8218
FDI	-0.617808	0.530844	-1.163821	0.2473
PA	-0.000714	0.000143	-4.1984231	0.0000
C	30.80796	2.181241	14.12405	0.0000

Source : Eviews 2025 output

The long-run results of the Panel ARDL estimation show that GDPG, FDI, and PA exert different effects on import demand in the ASEAN-3 countries. The coefficient for GDPG is negative (-0.003576) and statistically insignificant (p-value 0.8218), indicating

that economic growth does not influence long-run import demand. This finding is consistent with Bahmani-Oskooee and Niroomand (2002), who argue that in several developing economies, domestic production expansion may offset reliance on imported goods, weakening the long-run link between GDP growth and imports. The coefficient of FDI is also negative ( $-0.617808$ ) and statistically insignificant (p-value 0.2473), suggesting that foreign direct investment does not significantly affect long-run import behavior in ASEAN-3. This result aligns with Sharma (2003), who finds that FDI can strengthen domestic productive capacity and thus reduce dependency on imported intermediate inputs. In contrast, the real effective exchange rate (PA) displays a significant negative relationship with imports (coefficient  $-0.000714$ ; p-value 0.0000), indicating that real exchange rate appreciation reduces import demand over the long run. This outcome supports the findings of Arize, Malindretos, and Kasibhatla (2004), who highlight the crucial role of real exchange rate movements in influencing import demand across several Asian economies. Overall, the results demonstrate that among the examined macroeconomic variables, the real exchange rate is the most influential long-run determinant of import demand in ASEAN-3, while GDPG and FDI do not exhibit significant long-run effects.

Table 4. Short-run Coefficient Estimates of the Panel ARDL Model

Variabel	Coefficient	Std.Error	t-Statistic	Prob.
COINTEQ	-0.225795	0.223339	-1.010999	0.3145
D(GDPG)	0.348901	0.098148	3.554836	0.0006
D(PA)	2.303072	2.250728	1.023256	0.3087

Source : Eviews 2025 output

The short-run estimation results from the Panel ARDL model reveal differing dynamic relationships between the variables and import demand in the ASEAN-3 economies. The coefficient of the error correction term (COINTEQ) is negative ( $-0.225795$ ), indicating the expected adjustment direction toward long-run equilibrium; however, it is not statistically significant (p-value 0.3145). This suggests that short-run deviations from the long-run equilibrium are corrected slowly and not in a statistically meaningful manner. Similar findings have been reported by Narayan and Smyth (2006), who note that insignificant adjustment terms may occur in panels with heterogeneous economic structures. The short-run coefficient for GDPG is positive and statistically significant ( $0.348901$ ; p-value 0.0006), indicating that higher economic growth increases import demand in the short run. This result aligns with the work of Tang and Nair (2002), who found that economic expansion in Asian economies tends to boost imports due to increased industrial activity and consumer demand. Meanwhile, the short-run coefficient of the real effective exchange rate (PA) is positive but statistically insignificant ( $2.303072$ ; p-value 0.3087), suggesting that exchange rate fluctuations do not significantly affect short-run import behavior. This finding is consistent with Bahmani-Oskooee and Hegerty (2010), who argue that short-run import responses to exchange rate movements in emerging markets are often weak due to contract rigidities and delayed price adjustments. Overall, the short-run dynamics indicate that GDP growth is the primary determinant of short-run import fluctuations in ASEAN-3, while exchange rate adjustments and long-run error correction exhibit limited short-run effects.

## Policy and Implication

The empirical findings of this study provide important insights into the macroeconomic determinants of import demand in ASEAN-3 countries Indonesia, Malaysia, and Thailand. The results show that in the long run, only the real exchange rate significantly influences imports, while GDP growth and FDI do not demonstrate significant long-run effects. This suggests that external price competitiveness plays a more central role in shaping long-term import patterns compared to domestic economic expansion or foreign capital inflows.

The negative long-run coefficient of the real exchange rate supports the argument that exchange rate appreciation reduces import demand, as imports become relatively more expensive in domestic production structures. This finding aligns with Arize, Malindretos, and Kasibhatla (2004), who observed similar patterns in developing Asian economies. It also supports macroeconomic theory, which posits that real exchange rate dynamics influence both trade costs and international competitiveness. On the other hand, GDP growth and FDI did not significantly affect long-run import demand, contradicting the common assumption that economic expansion inherently increases long-term import levels. This outcome is consistent with Bahmani-Oskooee and Niroomand (2002), who argue that structural economic growth may substitute rather than amplify import needs, particularly when domestic production capacities improve. Similarly, the insignificant impact of FDI in the long run aligns with Sharma (2003), who found that FDI inflows in some Asian economies tend to strengthen local production capabilities, thereby reducing dependence on imported inputs. In the short run, GDP growth shows a significant positive relationship with import demand, emphasizing the responsiveness of imports to business cycle fluctuations. This is consistent with Tang and Nair (2002), who assert that rising economic activity in Asian countries increases immediate demand for imported consumer and capital goods. Conversely, the short-run insignificance of the real exchange rate and the error-correction term indicates that exchange rate adjustments have delayed effects and that deviations from equilibrium are corrected gradually findings that align with Bahmani-Oskooee and Hegerty (2010).

Overall, the results confirm that import behavior in ASEAN-3 is shaped by a combination of structural and cyclical factors. Long-term import adjustment is primarily driven by exchange rate competitiveness, while short-term fluctuations are driven by economic expansion. These insights contribute to the broader literature on international trade and macroeconomic interactions in emerging economies.

**Conflict Interest:** The authors declare no conflict of interest.

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