



Asymmetric Effects of Trade Openness and Chinese FDI on Indonesia's Economic Growth, 2010–2023

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Abstract: *This study investigates the asymmetric impacts of trade openness and Chinese foreign direct investment (FDI) on Indonesia's economic growth during the period 2010–2023. The research is motivated by the increasing intensity of Indonesia–China economic relations, where trade and investment have become major channels of integration into the global economy. Annual time-series data on GDP, trade, and FDI were obtained from the World Bank, UN Comtrade, and Statistics Indonesia (Central Bureau of Statistics). Using a multiple linear regression model, the study examines the extent to which bilateral trade openness and FDI inflows from China contribute to Indonesia's GDP growth. The empirical results reveal that bilateral trade openness with China exerts a strong and statistically significant positive effect on GDP, indicating that greater trade integration enhances market access, export diversification, and production efficiency. In contrast, Chinese FDI demonstrates a positive but statistically insignificant effect, suggesting limited linkages with domestic industries and weak absorptive capacity of the host economy. These findings highlight the asymmetric role of trade and investment, where trade emerges as the primary driver of Indonesia's growth, while the benefits of FDI remain constrained by structural and institutional challenges. The study contributes to the literature by providing empirical evidence from a major emerging economy and underscores the need for policies that strengthen domestic absorptive capacity, enhance local industry participation, and maximize spillover effects of foreign investment.*

Keywords: *Trade openness, Foreign direct investment, Gross Domestic Product, Economic growth.*

Introduction

Since the implementation of the ASEAN China Free Trade Area (ACFTA), Indonesia-China trade relations have transformed from a relatively small trade relationship to one of the main pillars of the Indonesian economy. In ACFTA, ASEAN countries have agreed to reduce or even eliminate barriers to international trade between countries in the ASEAN region, both tariff barriers and non-tariff barriers. Trade openness, defined as the degree to which a country engages in international trade through liberalized policies and reduced barriers, has been widely recognized as a key driver of this growth (Lim & Satrianto, 2024; Seng, 2017).

Bilateral trade openness between Indonesia and China in the 2010-2023 period resulted in significant changes to the dynamics of the national economy. Since 2016, the intensity of economic relations between the two countries has increased through strategic cooperation agreements, which is reflected in a surge in exports and imports. On the one hand, the Chinese market has become the main destination for Indonesia's exports, especially primary commodities such as coal, CPO, and mining ore, which directly increases foreign exchange and boosts domestic production capacity. But on the other hand, the high imports compared to exports creates a structural dependence on manufactured goods and

technology from China, which has the potential to widen the trade deficit while suppressing the competitiveness of the national industry.

This phenomenon raises a number of structural issues that are crucial to examine. First, Indonesia's export structure, which is still dominated by primary commodities, puts the economy at risk of global price volatility and dependence on external demand. Second, the inflow of cheap manufactured products from China has put competitive pressure on domestic industries and MSMEs, which risks reducing the value-added of the manufacturing sector and accelerating the symptoms of deindustrialization. Third, although China's Foreign Direct Investment (FDI) supplies large capital, its investments tend to be concentrated in the extractive and infrastructure sectors, with limited local linkages and technology transfer, so that the multiplier effect on GDP and people's welfare is relatively small.

International trade openness is an important instrument in promoting economic growth in the ASEAN region, generally measured by the ratio of export-import to GDP. Through agreements such as AFTA, trade barriers have been reduced, facilitating the movement of goods, services, and capital in the region (Purnomo, 2019). However, the strategies pursued by each country differ according to their domestic conditions and

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comparative advantages. Singapore has a very open trade policy with almost no tariff barriers (Chia & Plummer, 2022). Indonesia takes more cautious steps through strategic trade policies that protect important industries, while gradually opening markets in accordance with international commitments (Handoko et al., 2022; Meanwhile, Thailand emphasizes technological innovation through the Thailand 4.0 policy (Jongwanich et al., 2022), Vietnam has carried out export-oriented industrialization by attracting FDI to the manufacturing sector since the Doi Moi reform (Tran et al., 2024). Cambodia has been even more liberal by lowering tariffs and removing non-tariff barriers to attract foreign investment, although its effectiveness is still limited by infrastructure and institutional capacity constraints (Chen & Sok, 2023). Theoretically, trade openness provides tangible benefits, such as expanding market access, increasing productivity, strengthening economic competitiveness, and encouraging foreign capital flows that accelerate capital accumulation and development (Ifa et al., 2023). Thus, trade openness in ASEAN has proven to be a growth engine, both through international trade and increased foreign investment.

In this case, it is important to analyze Indonesia-China bilateral trade openness in the 2010-2023 period. Because, although multilateral trade through AFTA has provided a significant boost, the dynamics of Indonesia-China bilateral trade shows an increasing trend, but on the other hand, there is also the potential for structural dependence on Indonesia's economic growth. Based on the data, the trend of imports is always higher than the trend of Indonesia's exports to China, even when viewed from trade openness. The trend of exports, imports, and bilateral trade openness of Indonesia-China can be seen in Figure 1.

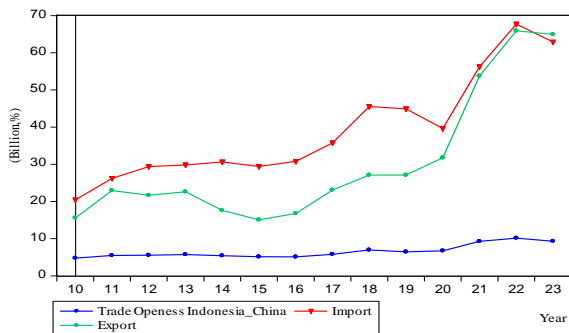


Figure 1. Trend ekspor & impor Indonesia China Tahun 2010-2023
Source: World Bank, processed by authors)

Based on figure 1, we can see that there is an increase in the volume of exports and imports to/from China. The increase in exports (commodities) marks China's strong demand, but the increase in manufacturing imports is also consistent, illustrating the existence of substitution (imported products suppress local production) as well as opportunities for commodity export expansion. In addition to openness in terms of international trade, Indonesia also opens opportunities for foreign countries to invest in Indonesia. This is aimed at improving the Indonesian economy. FDI plays a significant role in driving the economic growth of recipient countries, especially developing countries, various studies have confirmed its positive impact on economic performance (Fazaalloh, 2024; Rao et al., 2023; Marjanać & Grujić, 2022; Khan et al., 2022; Gligorić et al., 2017; Gökçeli et al., 2022; Septriai, 2024a; Septriani, 2024b). Based on the data, over the past two

decades, Indonesia's FDI fluctuations appear to be high, with some spikes in 2013, 2015, and 2023, which illustrate the existence of large projects. Likewise, the openness of Indonesia-China international trade has also increased significantly (see figure 2).

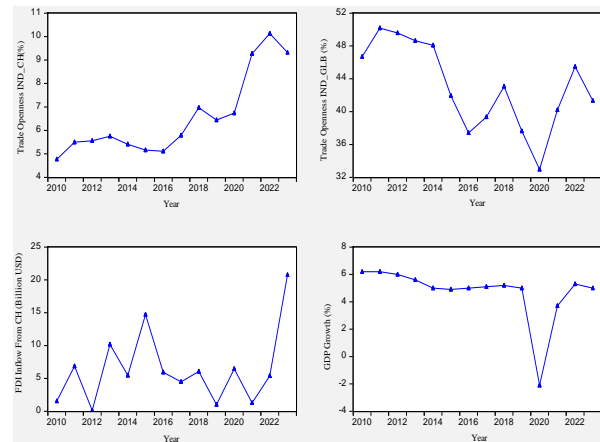


Figure 1. Trend Trade Openneas Indonesia_China, Trade Openness Global, Foreign Direct Investment Inflow from China, GDP Growth Indonesia China Tahun 2010-2023
Source: World Bank, processed by authors)

During 2010-2023, Indonesia's trade openness with China increased from year to year, but Indonesia's trade openness with the global market tended to decrease. This indicates that currently the majority of Indonesia's international trade openness is dominated by Indonesia's bilateral trade openness with China. The interesting phenomenon is that in the 2010-2023 period, if we look at the trend of China's trade openness which has an increasing trend, the trend of global trade openness is decreasing, FDI inflow from China which also has an increasing trend, but GDP tends to decrease. Then the question is whether this bilateral relationship between Indonesia and China provides benefits to the Indonesian economy, or will it only benefit one side? Then when viewed based on FDI from China, recently FDI originating from China has also experienced a very significant increase, although in 2016, 2017, 2019, 2021 FDI inflow from China has decreased. China's FDI inflow trend shows a certain pattern, where if this year FDI is increased, then the next period FDI is lowered, and so on..

Foreign Direct Investment (FDI) plays an important role in developing economies, not only as a driver of economic growth through the transfer of capital, technology, and managerial skills, but also as a factor that poses a dilemma between growth and environmental sustainability. Global research shows that increased FDI is often associated with environmental degradation, especially in developing countries with relatively weak environmental regulations, which supports the pollution haven hypothesis (Cole & Elliott, 2005; Lestari et al., 2025; Corneo et.al 2025). It is evident that recently, in Indonesia, natural disasters and environmental problems often occur as a result of mining/quarrying activities by foreign companies. Studies in Asia also note that while FDI increases economic growth, such investment flows tend to increase environmental degradation and in turn indirectly hamper growth..

With the phenomenon described above, it is known that this condition shows the large role of China's bilateral relations to the Indonesian economy. Although the percentage seems moderate, when summed up with elasticity and multiplier, this contribution is

very material to GDP fluctuations. Since the implementation of ACFTA, Indonesia's cooperation with China has tended to increase dramatically. Therefore, it is necessary to know the extent of the influence of bilateral cooperation on the Indonesian economy..

Method

This study uses a quantitative approach by utilizing secondary data in the form of annual time series during the period 2010-2023. The selection of this period is based on the consideration that since 2010 Indonesia-China bilateral economic relations have strengthened, marked by an increase in trade and investment flows after the implementation of the ASEAN-China Free Trade Agreement (ACFTA).

The data used in this study were obtained from several credible sources. Indonesia's Gross Domestic Product (GDP) data is taken from the World Bank World Development Indicators (WDI) in billion USD at constant 2015 prices. Indonesia-China bilateral trade openness data is calculated as the ratio between the value of Indonesia-China exports plus imports to Indonesia's GDP, with export and import data obtained from UN Comtrade and the Central Statistics Agency (BPS). The data on Foreign Direct Investment (FDI) from China in Indonesia was obtained from the Investment Coordinating Board (BKPM) and the ASEAN Statistics Database.

In this study, the dependent variable analyzed is Indonesia's GDP, which represents the total output of the economy. The independent variables consist of Indonesia-China bilateral trade openness (TO_Bilateral) and FDI from China to Indonesia (FDICN_IND). Operationally, TO_Bilateral is defined by the formula:

$$TO_Bilateral_t = \frac{(XINDCH_t + MINDCH_t)}{GDP_t} \times 100\%$$

With XINDCH_t indicating the value of Indonesia's exports to China in year t, and MINDCH_t indicating the value of Indonesia's imports from China in the same year. The FDICH_IND variable is the total foreign direct investment (FDI) originating from China and realized in Indonesia, measured in units of billion USD. Furthermore, to analyze the relationship between variables, a multiple linear regression model with Ordinary Least Squares (OLS) estimation method is used. The estimated econometric model is formulated as follows:

$$GDP = \alpha + \beta_1 TO_Bilateral_t + \beta_2 FDICN_IND_t + \varepsilon_t$$

where α is a constant, β₁ and β₂ are regression coefficients, and ε_t is the error term. In accordance with international trade theory and previous empirical literature, the coefficients β₁ and β₂ are expected to be positive, meaning that the higher the bilateral trade openness and the greater the FDI from China, the higher the Indonesian GDP.

Prior to estimation, the model is tested with a series of classical assumption tests to ensure the validity of the results. Normality test is conducted to see whether the residuals of the model are normally distributed by looking at the Jarque-Bera probability value. Then multicollinearity was tested using Pearson correlation among independent variables. High correlations (r > 0.8) indicate potential multicollinearity that may affect coefficient estimates (Gujarati & Wooldridge, 2016). Subsequently, the regression model was estimated using Ordinary Least Squares (OLS), and model validity

was assessed through the Breusch-Godfrey Serial Correlation LM Test for autocorrelation and White and Breusch-Pagan tests for heteroskedasticity. Furthermore, t-tests, F-tests, and coefficient of determination tests were conducted.

Results and Discussions

The normality test confirms that the dataset used in this study is normally distributed, as indicated by a Jarque-Bera probability of 0.622380, exceeding the 5% significance threshold (α = 0.05). These results, presented in Figure 3, validate the suitability of the data for regression analysis.

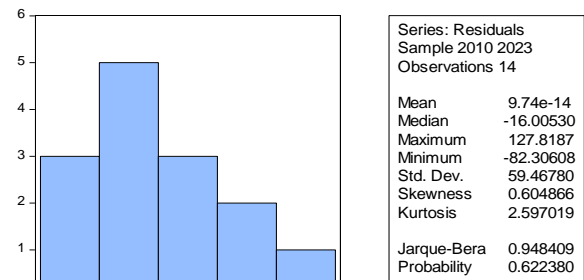


Figure 3. Normality Test Results
Source: Processed research data (2025)

The autocorrelation test shows a Chi-Square probability of 0.62, exceeding the 5% significance level (α = 0.05), indicating the regression model is free from autocorrelation. Results are presented in Table 1.

Table 1. Autocorrelation Test Results

<i>Breusch-Godfrey Serial Correlation LM Test</i>			
F-statistic	0.252728	Prob. F(2,9)	0.7820
Obs*R-squared	0.744455	Prob. Chi-Square(2)	0.6892

Source: Research data (Processed 2025)

The regression model was also subjected to a heteroskedasticity test. The results indicate no evidence of heteroskedasticity, as shown by the Chi-Square probability of Obs*R-squared = 0.3586. The heteroskedasticity test results are presented in Table 2.

Table 2. Heteroskedasticity Test Results

<i>Heteroskedasticity Test: Breusch-Pagan-Godfrey:</i>			
F-statistic	0.521427	Prob. F(2.11)	0.6076
Obs*R-squared	1.212333	Prob. Chi-Square(2)	0.5454

Source: Research data (Processed 2025)

Finally, a multicollinearity test was conducted to examine the relationships among the independent variables. The results are presented in Table 3

Table 3. Multicollinearity Test Results

Variable	Energy_Import	FDI_INFLCH
TO_CHIND	1.000000	0.199830
FDI_INFLCH	0.199830	1.000000

Source : Research data (Processed, 2025)

Furthermore, the regression results of this study can be seen in Table 4, providing insights into the partial and simultaneous effects of energy imports, foreign direct investment (FDI), and GDP growth on carbon intensity in Indonesia during 2000–2022.

Table 4. Multiple Linear Regression Results

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	388.3945	69.76942	5.566829	0.0002
TO_CHIND	93.13613	10.44753	8.914653	0.0000
FDI_INFLCH	3.059529	3.241681	0.943809	0.3655

R² : 0.887991

Adj.R² : 0.867626

F-statistic : 43.60340

Prob (F-Statistic) : 0.000006

Source : Research Data (processed, 2025)

Based on the test results in Table 4, the regression equation is obtained as follows:

$$GDP = 388.3945 + 93.13613TO_CHIND + 3.059529 FDI_INFLCH + \epsilon_i$$

Hypothesis Test

Based on the regression results in Table 4, it is found that the coefficient of determination (R²) is 0.8879. This means that about 88.8% of the variation in Indonesia's GDP can be explained by bilateral trade openness with China and Foreign Direct Investment from China, while the rest is influenced by other external factors outside the model. Then, simultaneously, the F-test results show a value of 43.60 with a probability of 0.000006, which is far below the 5% significance threshold. This indicates that the variables of international trade openness with China and FDI from China simultaneously affect GDP at α (5%). Furthermore, based on the t-test, the bilateral trade openness variable between Indonesia and China has a positive coefficient of 93.136 with a t-statistic value of 8.91 and a probability of 0.0000. These results indicate that the variable of bilateral trade openness between Indonesia and China has a positive and significant effect on Indonesia's GDP at α (5%). In contrast, FDI from China to Indonesia shows a positive coefficient of 3.059, but with a t-statistic value of 0.94 and a probability of 0.3655, which means that the variable of China's FDI to Indonesia has no effect on Indonesia's GDP at α (5%).

Discussion

Based on the regression results, the t-test, the bilateral trade openness variable between Indonesia and China has a positive coefficient of 93.136 with a t-statistic value of 8.91 and a probability of 0.0000. These results indicate that the bilateral trade openness variable between Indonesia and China has a positive and significant effect on Indonesia's GDP at α (5%). That is, when trade openness between Indonesia and China increases by 1 percent, the GDP will increase by 93 billion USD, and vice versa.

Increased trade intensity with China has expanded market access for Indonesian products, encouraged production efficiency, and opened up opportunities for export diversification. This is in line with international trade theory that emphasizes the role of trade in accelerating economic growth through increased production scale and global integration. The consistency of this study is also supported by empirical evidence showing that countries with high levels of trade openness tend to have better growth performance than countries with relatively closed markets..

Sakyi et al. (2015) confirmed that international trade contributes directly to growth, while the benefits of FDI are highly dependent on the quality of domestic institutions. Ali and Majeed (2022) also found that trade openness significantly increases growth in developing countries, especially in Asia. This result explains why Indonesia-China trade openness proved to be the

main determinant of Indonesia's GDP in the period 2010-2023. Research by Chowdhary and Joshi (2022) shows that trade openness has a positive impact on long-run growth in ASEAN, although the effect varies across countries. The case of Cambodia highlights the important role of trade, where Mah (2015) asserts the post-1990s growth surge was heavily influenced by trade openness, while Seng (2017) adds that the benefits of foreign aid are temporary.

A similar study by Lim and Satrianto (2024) concludes that FDI, government spending, and net exports drive growth, although the contribution of labor remains limited due to low productivity. Sectoral studies reinforce these results, where ASEAN trade agreements have been shown to have a positive impact on the labor market (Kokas et al., 2024), while Chaprithy (2025) finds that trade openness increases the effectiveness of aid in the rice sector..

Theoretically, trade openness expands markets, facilitates specialization according to comparative advantage, and improves the efficiency of resource allocation, thereby promoting aggregate output growth (Frankel & Romer, 1999). In the Indonesia-China context, China's large market demand has absorbed Indonesia's commodity and raw material exports, increased production capacity utilization, and added foreign exchange flows that support domestic demand and development.

Meanwhile, FDI from China to Indonesia shows a positive coefficient of 3.059, but with a t-statistic value of 0.94 and probability of 0.3655, which means that the variable of China's FDI to Indonesia has no effect on Indonesia's GDP at α (5%). This implies that although FDI from China has increased over the study period, its contribution to Indonesia's GDP growth has not been evident. This phenomenon can be explained by the weak linkage of foreign investment with local productive sectors, the dominance of investment in the extractive sector with minimal added value, and the high use of foreign labor compared to domestic workers, which ultimately limits the economic multiplier effect for the Indonesian people.. These investments play a role in strengthening national production capacity, providing new capital flows, and facilitating technology transfer and job creation. However, this study also indicates that there are structural challenges that need to be observed. Where, some investments are still oriented towards the extractive sector, as well as the tendency to use foreign labor from China in several strategic projects.

The insignificant effect of FDI on Indonesia's economic growth can be explained by the fact that foreign investment flows do not necessarily encourage short-term growth or large-scale economic expansion, unless the recipient country has sufficient absorptive capacity, including the quality of human capital, the efficiency of financial markets, and the ability of local suppliers to capture spillover opportunities (Borensztein et al., 1998; Alfaro et al., 2004). The failure of FDI to make a strong aggregate contribution during the observation period is due to several factors, such as sector concentration, limited absorptive capacity, lag effect, as well as the use of foreign labor and investment contract design.

In terms of sector concentration, the majority of Chinese FDI in Indonesia is concentrated in large-scale projects in the extractive, energy and infrastructure sectors. These enclave investments do generate significant output, but have minimal forward or backward linkages with local industries, resulting in

limited multiplier effects on job creation, domestic manufacturing productivity, and household income. Alfaro et al. (2004) asserted that the positive impact of FDI can only be realized if it is supported by a developed domestic financial market so that foreign capital can be channeled to productive sectors effectively. In line with that, Borensztein et al. (1998) show that absorptive capacity limitations-including labor skills, supplier networks, and supporting infrastructure-limit the process of technology transfer and knowledge absorption, resulting in non-optimal innovation spillovers.

This condition is reflected in the dominance of China's FDI in the extractive and infrastructure sectors, which have minimal linkages with MSMEs and domestic industries, so that their contribution to aggregate output is relatively low. This result is in line with the research of Doytch and Uctum (2020) which shows that FDI in the extractive sector tends to make a weaker contribution to growth than investment in the manufacturing sector. In addition, the use of foreign labor and contract structure also weaken the benefits of FDI in Indonesia. Many large-scale Chinese projects use Chinese labor, which in turn reduces the potential for local job creation and limits skills transfer to domestic labor-a phenomenon also identified by Ross and Fleming (2023). Hence, Zhang and Chen (2021) assert that the benefits of FDI will only be optimal if the investment has linkages with local industries and is accompanied by effective technology transfer. In line with this, Nguyen and Tran (2023) found that the effects of FDI in the Asia-Pacific region tend to be delayed and highly dependent on domestic absorptive capacity..

The results of this study show that asymmetry in the contribution of trade and investment to Indonesia's economic growth. Bilateral trade with China provides direct benefits through export expansion and increased production capacity, while FDI from China generates limited impact in the absence of policies that encourage its linkage to the domestic economy. This result is consistent with cross-country evidence showing that international trade is a faster growth driver, while the benefits of FDI are strongly influenced by the quality of institutions and the effectiveness of domestic policies (Sakyi et al., 2015).

The growth theory framework also reinforces this analysis. Neoclassical growth models view openness as a channel for capital accumulation and efficiency improvement, but still predict diminishing returns to capital, so trade liberalization alone is not enough to ensure sustainable growth (Solow, 1956). In contrast, endogenous growth theory emphasizes the importance of knowledge, technology, and human capital, arguing that trade openness and FDI can accelerate growth through technology transfer, skill upgrading, and innovation (Romer, 1986).

From an FDI perspective, the debate is still ongoing. Modernization theory sees FDI as an engine of development as it transmits technology, managerial expertise, and opens access to global networks (Rostow, 2012). However, dependency theory warns that over-reliance on foreign capital has the potential to strengthen dependency, suppress local industries, and perpetuate unequal economic structures (Prebisch, 1950). Thus, FDI has a dual potential: to function as a motor of modernization or a source of dependency, which is largely determined by the structural and institutional conditions of the recipient country.

The results also show that trade openness produces faster and more measurable growth effects than FDI in the period 2010-2023. Cross-country evidence confirms that trade provides more direct income effects, whereas the impact of FDI tends to be

heterogeneous and highly dependent on domestic conditions. Thus, an increase in trade despite being dominated by primary commodity exports directly adds to foreign exchange earnings and enlarges GDP, while the benefits of FDI are only optimal if supported by linkage policies with domestic productive sectors. Theoretically, the results of this study reinforce the view that trade has a direct and faster impact on growth, while the benefits of FDI are heterogeneous and highly dependent on domestic structural conditions. Neoclassical and endogenous growth theoretical frameworks explain that trade liberalization can increase capital accumulation and productivity, while FDI only provides optimal benefits when supported by the quality of institutions, labor capacity, and supporting infrastructure.

Moreover, FDI remains an important mechanism for technology transfer, capital accumulation, and market integration that opens opportunities for economic progress (Hossain, Akter, & Roy, 2022; Albahouth & Tahir, 2024). This perspective is enriched by the modern trade theory framework, where New Trade Theory emphasizes economies of scale, product differentiation, and imperfect competition, so that the benefits of trade come not only from specialization, but also from product diversification and value chain strengthening (Krugman, 1979). Correspondingly, the Export-Led Growth hypothesis states that trade openness promotes growth through increased innovation, productivity, and foreign exchange accumulation (Balassa, 1978). This phenomenon explains the rise of the East and Southeast Asian economies, while emphasizing the vulnerability of countries dependent on limited commodity exports..

Conclusion

Based on the regression results, it is known that openness This study shows that Indonesia-China bilateral trade openness has a positive and significant effect on Indonesia's economic growth, while FDI from China, although positive, does not prove significant. This indicates that trade directly contributes to the expansion of output and foreign exchange, while FDI is still constrained by the concentration on extractive sectors, weak linkages with local industries, and limited domestic absorptive capacity. Theoretically, this finding confirms the primary role of trade in driving short-term economic growth, while the benefits of FDI are more long-term and depend on the quality of institutions and domestic structural readiness.

The implications of the results of this study are first, the government should strengthen trade policies that facilitate export diversification, value addition, and integration into global value chains; second, design FDI policies that emphasize linkages with the domestic sector through technology transfer, adaptive domestic governance, targeted industrial policies and local workforce skills enhancement, and downstream industry development. With this policy, it is expected that trade and FDI can function as complementary drivers of economic growth.

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