

Analysis of Factors Influencing Exports in 5 ASEAN Countries Using a Moderation Approach

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Abstract: This study investigates the factors influencing export performance in five ASEAN countries Indonesia, Malaysia, the Philippines, Singapore, and Thailand during the 2014-2023 period. The topic is highly relevant given the vital role of exports in sustaining monetary stability and promoting long-term economic growth. The novelty of this research lies in its integrated approach, which simultaneously examines key export-related macroeconomic variables, namely foreign direct investment and inflation, while incorporating foreign exchange reserves as a moderating variable an approach that remains limited in existing ASEAN-focused studies. This analysis uses secondary data obtained from the World Bank and processed using panel data regression methods, including the Common Effect Model, Fixed Effect Model, and Random Effect Model, strengthened by a Moderated Regression Analysis (MRA) approach. The results show that foreign direct investment and inflation significantly influence foreign exchange reserves. Furthermore, foreign exchange reserves have been shown to play a strategic role in strengthening the economic resilience of ASEAN countries and can be used as a reference in formulating monetary and international trade policies.

Keywords: ASEAN; Exports; Foreign Direct Investment; Foreign Exchange Reserves; Inflation

1. Introduction

Macroeconomic stability is one of the main requirements for achieving sustainable economic growth. A crucial instrument in maintaining this stability is foreign exchange reserves, which serve as an indicator of international confidence, a support for monetary policy, and an instrument for financing external liabilities. For developing countries, foreign exchange reserves are not only a buffer against external shocks but also essential capital for financing long-term development. Therefore, fluctuations in foreign exchange reserves are a crucial issue that requires attention in international economic studies.

The role of foreign exchange reserves in ASEAN is increasingly strategic along with increasing global trade integration and cross-border capital flows. Some of the ASEAN countries (Indonesia, Malaysia, the Philippines, Singapore, and Thailand) have shown varying foreign exchange reserve trends over the past 10 years. Figure 1 shows that Singapore dominates with the highest foreign exchange reserves, while Malaysia and the Philippines experienced fluctuations reflecting differences in their respective economic fundamentals.

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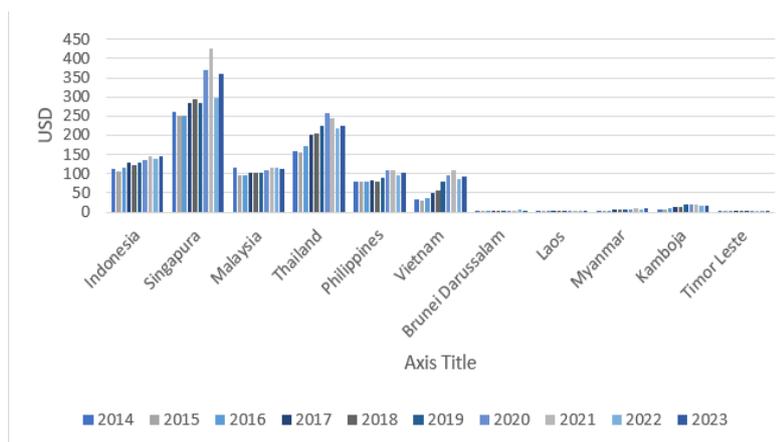


Figure 1 ASEAN Foreign Exchange Reserves.

Source: World Bank, 2025.

This condition highlights the importance of conducting a comprehensive examination of the key factors that determine foreign exchange reserves in ASEAN economies, as well as evaluating the extent to which these reserves shape and support export performance. Existing studies have commonly examined variables such as exports, foreign direct investment, inflation, exchange rates, and external debt. However, their findings remain inconclusive. For example, Bakri's (2023) research shows that exports and foreign direct investment have a positive and significant impact on foreign exchange reserves, while inflation has no significant impact. Conversely, Panggabean et al., (2024) findings reveal that inflation actually has a negative and significant impact on foreign exchange reserves. These discrepancies in results highlight a gap in research, particularly regarding the lack of agreement on the determinants of foreign exchange reserves in ASEAN countries. Furthermore, empirical studies specifically considering foreign exchange reserves as a moderating variable in the relationship between macroeconomic indicators and exports are still relatively limited.

This study is driven by two main considerations. From an academic standpoint, it seeks to enrich the literature by addressing the limited discussion on the moderating role of foreign exchange reserves in linking macroeconomic variables to export performance. From a policy-oriented perspective, the results of this study are expected to provide useful input for policy makers in maintaining monetary stability and increasing the economic competitiveness of ASEAN countries in the international trade arena.

This study utilizes panel data sourced from the World Bank covering the period 2014-2023 in five ASEAN member countries. The empirical approach used is panel data regression, which includes the Common Effect Model, Fixed Effect Model, and Random Effect Model, and is strengthened by Moderated Regression Analysis (MRA). The analysis results indicate that foreign direct investment and inflation significantly influence foreign exchange reserves. Furthermore, foreign exchange reserves act as a moderating variable, strengthening the relationship between macroeconomic indicators and export performance.

From a theoretical perspective, foreign exchange reserves are closely related to balance of payments theory, international trade theory (Smith, Ricardo, and Heckscher-Ohlin), as well as Keynesian and classical quantity inflation theories. Exports are seen as the primary source of foreign exchange, while FDI provides additional foreign capital that strengthens external stability. Conversely, inflation has the potential to erode export competitiveness and depress the value of foreign exchange reserves. This study combines these theoretical frameworks to explain the dynamics of foreign exchange reserves in ASEAN, while also expanding the literature through recent empirical testing.

Consequently, the formulation of this research problem stems from the fact that foreign exchange reserves are a vital instrument in maintaining monetary credibility and supporting development. Despite the numerous studies that have investigated the factors influencing foreign exchange reserves and the role of exports in this regard, the findings of these studies have shown significant variations in their conclusions and analytical approaches. Moreover, studies that explicitly position foreign exchange reserves as a moderating variable in the relationship between macroeconomic factors and exports are still relatively limited, thus opening up space for further research.

2. Literature Review

Research on the factors influencing foreign exchange reserves has been widely conducted, particularly in ASEAN countries and Indonesia, using various methodological approaches and over different time periods. A number of empirical studies suggest that foreign exchange reserves are largely shaped by developments in international trade and key macroeconomic indicators. Bakri, (2023), as an illustration, a study analyzed the factors influencing foreign exchange reserves in six ASEAN countries during the 2011-2021 period using panel data. The results showed that net exports and foreign direct investment (FDI) had a positive and statistically significant impact on foreign exchange reserves, while inflation and exchange rate fluctuations were not found to have any impact. This finding underscores the important role of the external sector in strengthening a country's foreign exchange reserves.

Furthermore, Panggabean et al., (2024) study examines the relationship between monetary policy, international trade, and foreign exchange reserves in ASEAN-6 countries during the 2012-2022 period using the System Generalized Method of Moments (SYS-GMM) approach. Their results indicated that interest rates and import volumes negatively and significantly affected foreign exchange reserves, with inflation also showing a significant adverse impact. In contrast, the exchange rate and export level variables showed a positive but statistically insignificant relationship. These differences in results indicate that the influence of macroeconomic variables on foreign exchange reserves is highly dependent on the context of each country, including its domestic economic conditions and trade structure.

Another study focused on Indonesia was conducted by Djamal et al., (2023), examined the effects of foreign debt, imports, exports, and foreign investment on Indonesia's foreign exchange reserves from 2005 to 2020 using the Ordinary Least Squares (OLS) approach. The study found that foreign borrowing and exports significantly contributed to increases in foreign exchange reserves, while interest rates did not show a significant effect. This implies that export performance and external capital inflows remain central to the accumulation of foreign exchange reserves in Indonesia.

Furthermore, Pebriyanti & Khoirudin, (2024) examined the factors influencing foreign exchange reserves in ASEAN-5 countries using the Fixed Effects Model (FEM). The analysis showed that foreign investment, exchange rates, and economic growth partially negatively impacted foreign exchange reserves, while exports had a positive and significant impact. This finding reaffirms the importance of exports in strengthening foreign exchange reserves, although the influence of other macroeconomic variables varies across countries.

A more specific study on Indonesia was conducted by Kumala & Rakhmanita, (2023), which analyzed the period 2018-2022 to examine the impact of exports and imports on foreign exchange reserves. Partial test results indicate that exports significantly impact foreign exchange reserves, while imports have no significant impact. However, when examined simultaneously, exports and imports jointly exerted a significant influence, emphasizing the importance of trade balance dynamics in supporting national foreign exchange reserves.

Overall, previous research indicates that foreign exchange reserves are affected by various factors, particularly exports, imports, foreign investment, inflation, interest rates, and international trade policies. However, research findings differ both in terms of the direction and significance of the variables influence. Furthermore, most studies still treat foreign exchange reserves as the dependent variable, and relatively few studies examine their more strategic role in influencing the relationship between macroeconomic variables and export performance. Therefore, this study urgently seeks to fill this gap by placing foreign exchange reserves within a more comprehensive analytical framework.

3. Methodology

This study uses a quantitative approach with a causal research design to analyze the influence of foreign direct investment and inflation on export performance. Furthermore, this study also examines the role of foreign exchange reserves as a moderating variable in the relationship between macroeconomic variables and exports.

The sample was determined through purposive sampling by selecting five countries that provide complete and consistent data for the period 2014-2023. These countries are Indonesia, Malaysia, the Philippines, Singapore, and Thailand. With a 10 year observation period and five countries, the total sample size is 50 observations (balanced panel data). The unit of analysis is each country's annual macroeconomic data.

This study utilizes secondary data sourced from the World Bank covering the period from 2014 to 2023. The variables studied include foreign exchange reserves, foreign direct investment, inflation, and exports.

The panel data regression model employed in this research can be expressed as follows:

$$EXP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 INF_{it} + \varepsilon_{it}$$

$$EXP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 INF_{it} + \beta_3 FERZ_{it} + \varepsilon_{it}$$

$$EXP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 INF_{it} + \beta_3 FERZ_{it} + \beta_4 FDI * Z_{it} + \beta_5 INF * Z_{it} + \varepsilon_{it}$$

Description:

- EXP = Exports
- FDI = Foreign Direct Investment
- INF = Inflation
- FERZ = Foreign Exchange Reserves
- ε = error term
- i = Number of Observations
- t = Time Period
- β_0 = intercept
- $\beta_{1,2,3,..}$ = slope
- FDIZ = Interaction between FDI and FERZ
- INFZ = Interaction between INF and FERZ

4. Results and Discussion

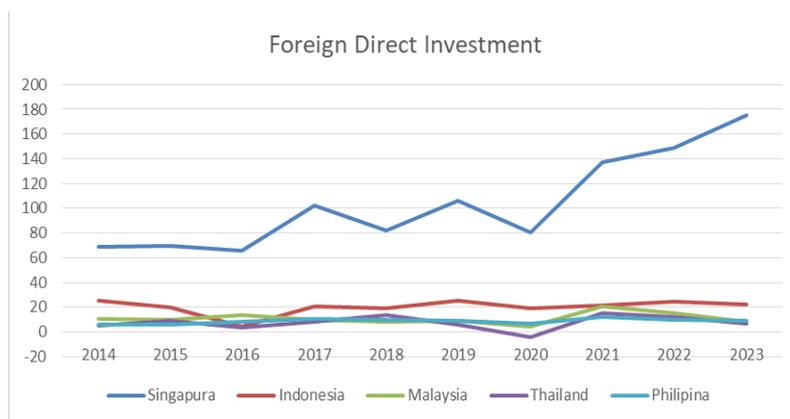


Figure 2 Foreign Direct Investment Trends in Southeast Asia.

Source: Data Processing Results, 2025.

Figure 2 illustrates the trend of Foreign Direct Investment across five Southeast Asian countries over 2014-2023 period. According to Haryadi (2013) in Picauly Stephanus (2023) FDI is foreign investment in the form of tangible investments such as factory construction, equipment purchases, or production land. Singapore recorded a significant increase from 68.698 billion in 2014 to 175.241 billion in 2023. This growth is in line with Laopodis's (2021) view in Chrisdianto (2023) research that investment is a current sacrifice for future benefits. The Singaporean government is actively attracting investors, especially in the financial services and insurance sectors, which contributed 54% of FDI in 2023 (Le & Le, 2020).

Indonesia shows a relatively stable FDI trend, namely 25.12 billion in 2014 and 22.08 billion in 2023, with a slight decline due to global uncertainty, high interest rates, and the global economic slowdown. Increasing investment and foreign trade is part of the Golden Indonesia Vision 2045 for sustainable economic development (Ngabiyanto et al., 2024). The government's efforts to accelerate the investment climate are outlined in Presidential Regulation No. 91 of 2017. BKPM data Nurkhin et al. (2024) shows the mining and base metal industry sectors as the largest contributors with an investment value of IDR 74 trillion, especially in West Java, Central Sulawesi, DKI Jakarta, North Maluku, and Banten.

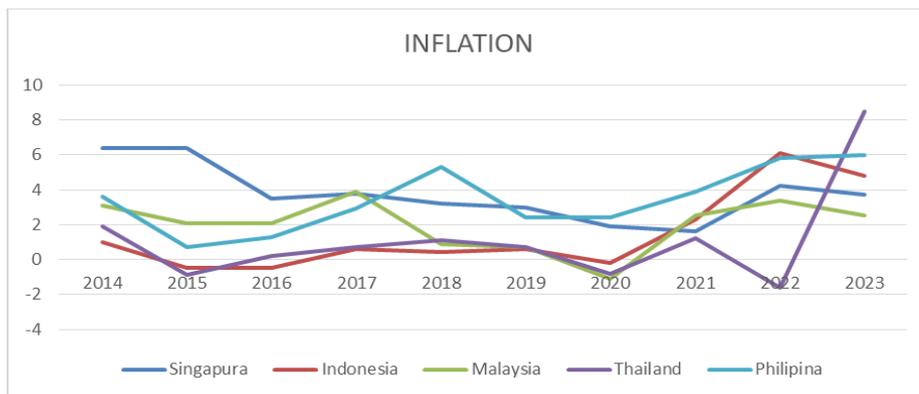


Figure 3 Inflation Trends in Southeast Asia.

Source: Data Processing Results, 2025.

Figure 3 shows the development of inflation rates in five Southeast Asian countries during the period 2014-2023. According to Bank Indonesia (2020), inflation is defined as a general and persistent increase in the prices of goods and services in an economy over a certain period. Singapore exhibits a relatively stable inflation pattern with a moderate trend. The inflation rate reached 6.4% in 2014 due to cost pressures in the property and transportation sectors, decreased to 3.5% in 2016, rose again to 4.2% in 2022, and then leveled off to 3.7% in 2023. This demonstrates Singapore's ability to maintain price stability despite its heavy dependence on energy and food imports. This phenomenon aligns with the concept of imported inflation, which is inflation caused by rising prices of imported goods in an open economy, according to (Boediono, 1995).

In Indonesia, inflation exhibits greater variability. During the 2015–2016 period, a mild deflation of -0.5% was observed, attributable to declining global commodity prices and subdued domestic demand. Following a period of stability from 2017 to 2019, during which inflation remained at approximately 0.6%, price pressures experienced an escalation in the aftermath of the pandemic. These price pressures reached a peak of 6.1% in 2022 and subsequently declined to 4.8% in 2023, a development that can be attributed to the implementation of monetary policy tightening measures. This increase in inflation aligns with the cost-push inflation theory, in which price pressures are triggered by exchange rate depreciation, rising commodity prices, global supply disruptions, and increases in regulated prices.

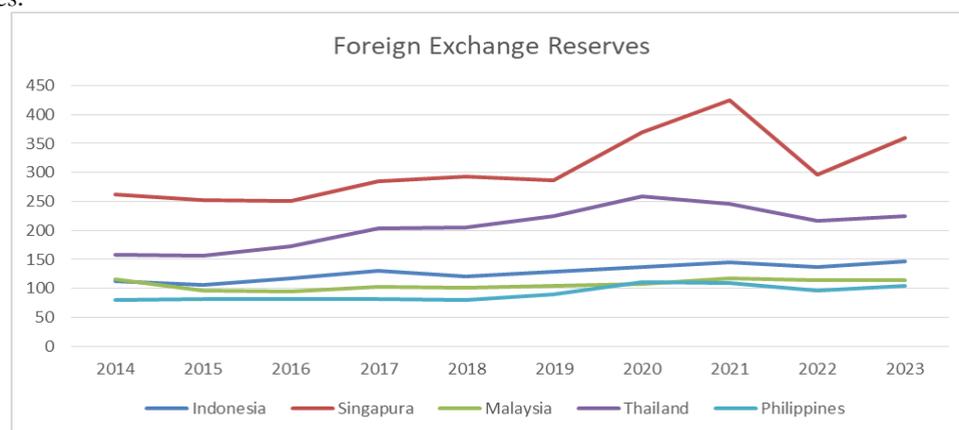


Figure 4 Foreign Exchange Reserves Trends in Southeast Asia.

Source: Data Processing Results, 2025.

Figure 4 illustrates the trend in foreign exchange reserves across five Southeast Asian countries from 2014 to 2023. Foreign exchange reserves are assets in the form of foreign currency managed by central banks and monetary authorities to maintain monetary stability and support the smooth flow of international transactions. During the observation period, Singapura, Thailand, and Malaysia recorded the largest reserve levels among the sampled countries. In particular, Singapura's foreign exchange reserves increased markedly from USD 269 billion in 2014 to USD 463 billion in 2023. The sustained growth and relative stability of reserves in the region reflect improvements in financial system development, including stronger monetary management and the increasing integration of digital banking services.

Indonesia also showed positive growth, with foreign exchange reserves rising from USD 27.7 billion in 2014 to USD 146 billion in 2023. This increase was supported by expanded access to digital banking services that facilitated remittance flows, export-import transactions, and more efficient foreign exchange management.

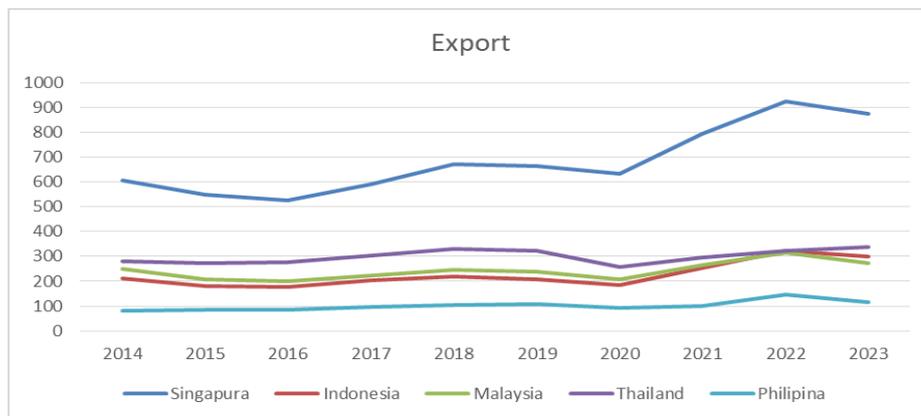


Figure 5 Export Trends in Southeast Asia.

Source: Data Processing Results, 2025.

Figure 5 shows the evolution of export value in five Southeast Asian countries from. As Sukirno (2008) asserts, exports can be defined as the sale of goods abroad by domestic companies. The transaction is executed in accordance with a mutual agreement between the exporter and importer. This agreement encompasses various provisions, including payment mechanisms, product quality standards, quantities of goods, and terms of sale. Singapore's export patterns demonstrate variability, yet they generally exhibit an upward trend over time, reaching a peak in 2022 with exports amounting to USD 925 billion. This increase is influenced by the global economic recovery following the pandemic, increasing foreign demand, and rising international commodity and raw material prices (Ministry of trade and industry of Singapore, 2023). The predominant sector contributing to Singapore's exports is machinery and electronic equipment, accounting for 35% of total exports (Economy, 2024). This performance serves to substantiate Singapore's status as a prominent global trade hub, an assertion that finds support in the principles espoused by David Ricardo's theory of comparative advantage, according to this theoretical framework, the benefits derived from international trade are applicable to all nations, irrespective of whether they possess an inherent competitive advantage in the global marketplace.

A general review of the data description results indicates that Singapore exhibits a predominant influence in the domains of foreign direct investment, foreign exchange reserves, and exports within the ASEAN region. Indonesia has demonstrated a consistent statistical trajectory, characterized by notable enhancements in foreign exchange reserves. The exchange rates of Malaysia, Thailand, and the Philippines exhibit fluctuations in accordance with domestic and global economic dynamics. Despite the occurrence of deflation and spikes in inflation in certain countries following the pandemic, inflation remains under control.

Panel Regression Model Selection

Table 1. Model Selection Test Results.

Test Name	Hypothesis	Value	Results
Chow Test	H0: If the prob value. > 0.05 (Common Effect)	0.0000	FEM
	H1: If the prob value. < 0.05 (Fixed Effect)		
Hausman Test	H0: If the prob value. > 0.05 (Random Effect)	0.0594	REM
	H1: If the prob value. < 0.05 (Fixed Effect)		
LM Test	H0: If the prob value. > 0.05 (Random Effect)	0.0000	REM
	H1: If the prob value. < 0.05 (Fixed Effect)		

Source: EvIEWS12 Data Processing Results, 2025.

Based on Table 1, it was found that the best model was the Random Effect Model. Therefore, to conduct regression analysis, the Random Effect Model can be used.

Table 2. Panel Data Regression Test Results.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	185.9167	32.69341	5.686673	0.0000
FDI	3.447643	0.276182	12.59186	0.0000
INF	7.583945	2.470052	3.070359	0.0036
FER	0.010915	0.019902	0.548455	0.5860
Adjusted R-Squared				0.756869
F-statistic				51.84586
Prob(F-statistic)				0.000000

Source: Eviews12 Data Processing Results, 2025.

Based on the test results, the estimated results for Random Effect Model parameter were as follows:

$$\begin{aligned}
 \text{EXPit} &= 187.811904865 + 3.48912325979\text{FDI} + 7.57604662558\text{INF} + e \dots\dots\dots(1) \\
 \text{EXPit} &= 185.916741439 + 3.47764263479\text{FDI} + 7.58394464461\text{INF} + 0.010915403331\text{FER} + e \dots\dots\dots(2)
 \end{aligned}$$

Simultaneous significance testing between independent variables was conducted using the F-test. A regression model is declared statistically feasible if the calculated F-value is significant and exceeds the specified critical limit. The empirical results show an F-statistic value of 51.84586 with a probability of 0.0000, which is below the 5% significance level. This finding indicates that foreign direct investment, inflation, and foreign exchange reserves collectively have a significant influence on export performance.

In addition, a partial significance test, also known as a t-test, was employed to assess the impact of each independent variable on exports.

- a. Foreign direct investment exhibited a t-statistic value of 12.59186 with a probability level of 0.0000, which is below the 1% significance level. This outcome confirms a positive and highly significant influence on exports.
- b. Inflation indicated a statistically significant positive influence, as evidenced by a t-statistic value of 3.070359 and a probability of 0.0036.
- c. Foreign Exchange Reserves with a t-statistic value of 0.548455 and a probability of 0.5860, which exceeds the significance level. Therefore, it can be concluded that foreign exchange reserves did not have a significant direct influence on exports during the study period.

Table 3. MRA Random Effect Model Test Results.

Variabel	Koefisien	Std. Error	t-Statistic	Prob.
C	181.3797	19.34228	9.377373	0,0000
FDI	5.322575	0.861136	6.180877	0,0000
INF	-19.16628	6.800577	-2.81833	0.0067
FERZ	-0.010123	0.06878	-0.14718	0.8835
FDIZ	-0.003731	0.002419	-1.54232	0.1288
INFZ	0.124302	0.040184	3.093309	0.0031

Source: Eviews12 Data Processing Results, 2025.

Based on the results of the Moderated Regression Analysis, the interaction variable FDIZ which represents the relationship between FDI and the moderating variable shows a t-statistic value of -1.542 with a probability level of 0.1288, which is above the 5% significance level. This outcome suggests that the moderating variable does not significantly alter the relationship between FDI and Exports, indicating the absence of a moderating effect in this relationship.

In contrast, the interaction term INFZ demonstrates a t-statistic of 3.093 with a probability value of 0.0031, which is below the 5% significance threshold. This finding confirms that the moderating variable significantly influences the relationship between INF and Exports, implying that the presence of the moderating variable strengthens or modifies the effect of INF on Exports in a statistically meaningful manner.

The adjusted R-squared value of 0.843 indicates that the variables FDI, INF, FERZ, and the interaction of FDIZ and INFZ are able to explain 84.3% of the variation in the dependent variable, while the remaining 15.7% is influenced by factors external to the model.

The incorporation of moderating variables into the model has been demonstrated to enhance its explanatory capacity, as evidenced by the augmentation of the adjusted R-squared

value from 76% to 84.3%. This finding suggests that the presence of moderating variables serves to enhance the relationship between the independent and dependent variables.

5. Discussion

The Effect of Foreign Direct Investment on Exports

The findings of the study demonstrate that employing a panel data regression analysis with the Random Effect Model (REM) approach substantiates the existence of a statistically significant influence of Foreign Direct Investment (FDI) on export performance within the context of intervening variables. From a theoretical perspective, this result is consistent with international trade theory and endogenous growth theory, which emphasize that inflows of foreign capital through FDI enhance domestic production capacity by facilitating technology transfer, capital accumulation, and improvements in managerial expertise. As production capacity expands, the volume of goods available for export also increases, leading to a positive and significant contribution of FDI to export performance.

The Effect of Inflation on Exports

Inflation has a significant impact on exports. These findings indicate that changes in the inflation rate can affect the competitiveness of export products in the international market. Controlled inflation tends to increase price stability, allowing domestic products to compete in terms of price and quality in the global market. However, excessively high inflation can reduce competitiveness due to increased production costs. Therefore, the impact of inflation on exports is significant and needs to be managed with appropriate monetary and fiscal policies. This is in line with Competitive Theory, which emphasizes that international competitiveness is determined not only by product quality but also by production cost efficiency. High inflation increases input costs (wages, raw materials, transportation), thereby reducing the company's ability to offer competitive prices. Controlled inflation helps maintain the cost efficiency and competitiveness of export products.

The Effect of Foreign Exchange Reserves on Exports

Meanwhile, Foreign Exchange Reserves (FER), both as an independent factor and as an intervening variable, are not found to have a significant impact on exports. This suggests that export growth is driven more by the expansion of foreign direct investment and the stability of inflation rather than by the level of foreign exchange reserves held by a country. The results imply that variations in foreign exchange reserves do not directly translate into changes in export performance. Instead, foreign exchange reserves primarily function as an indicator of external economic resilience, supporting exchange rate stability and fulfilling international payment obligations, rather than serving as a direct driver of export activity. This interpretation aligns with Conventional Foreign Exchange Reserve Theory, which views reserve accumulation as a mechanism to maintain macroeconomic stability and provide a buffer against external shocks, rather than as an instrument to stimulate exports.

The MRA Test Results

Furthermore, the moderation analysis reveals that foreign exchange reserves do not significantly moderate the relationship between Foreign Direct Investment and exports. However, foreign exchange reserves are found to significantly moderate the relationship between inflation and exports. The increase in the Adjusted R-squared value from 76% to 84.3% following the inclusion of the moderating variables indicates an improvement in the explanatory power of the model. This suggests that foreign exchange reserves enhance the overall strength of the model, although their moderating influence varies across different independent variables.

This relates to the concept of classical theory and H-O. A country's export growth is not only influenced by comparative advantage, but also determined by competitive advantage. The essence of the competitive advantage paradigm shows that a country's superior position in global competition is not only based on comparative advantage, but also influenced by government support and intervention, which is essentially closely related to competitive advantage. Competitive advantage can be possessed not only by a country, but also by individuals and organizations operating within it (Tambunan, 2001).

6. Conclusions

The findings of the study demonstrate that foreign direct investment (FDI) and inflation have a positive and statistically significant impact on export performance. These results indicate that increased foreign capital inflows and controlled inflation dynamics can contribute to improving export performance. In contrast, foreign exchange reserves do not exhibit a significant direct influence on exports, suggesting that their role is not primarily as a direct driver of export growth.

The findings of a moderated regression analysis (MRA) suggest that foreign exchange reserves are incapable of functioning as a moderating variable in the relationship between foreign direct investment and exports. However, empirical evidence reveals that foreign exchange reserves moderate the relationship between inflation and exports. This finding implies that adequate reserve accumulation can strengthen the impact of inflation stability on export performance by supporting macroeconomic confidence and reducing external vulnerability.

Moreover, the empirical results confirm that foreign direct investment and inflation exert a positive and statistically significant effect on exports. However, the Intervening Regression Analysis (IRA) reveals that foreign exchange reserves do not act as a mediating variable in the relationship between FDI or inflation and exports. The impact of these macroeconomic variables on export performance occurs through direct channels, without involving foreign exchange reserves as a transmission mechanism.

The implications of this study suggest that export performance can be enhanced through policies that promote foreign direct investment and maintain inflation stability, while foreign exchange reserves play a more strategic role in reinforcing macroeconomic stability rather than acting as a transmission channel. Policymakers should therefore focus on maintaining adequate reserve levels to support price stability and external resilience, which indirectly strengthens export performance.

Despite these findings, this study is subject to several limitations. The analysis is confined to a limited set of variables, namely Foreign Direct Investment, inflation, foreign exchange reserves, and exports. Future studies are encouraged to include additional macroeconomic factors such as exchange rates, interest rates, trade balance indicators, or fiscal policy variables to obtain a more comprehensive explanation of export determinants. Furthermore, the implementation of alternative methodological approaches, including Dynamic Panel Data (GMM) techniques and VAR/VECM models, holds the potential to facilitate a more profound comprehension of the short-term dynamics and long-term relationships between variables.

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Data Availability Statement: The secondary data used in this study were obtained from the World Bank <https://www.worldbank.org>, a globally recognized institution that provides comprehensive and reliable macroeconomic and development indicators. The World Bank offers regularly updated data on economic performance, financial indicators, and development statistics across countries, which are widely used in academic research and policy analysis.

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