

The Dynamics of Thailand's International Trade: An Analysis of Exchange Rate, Inflation, Government Effectiveness, Trade Openness, and Labor Force

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ABSTRACT: This study aims to analyze the factors influencing Thailand's international trade using the Error Correction Model (ECM) approach during the period 1994–2023. The independent variables used in this research include the exchange rate (ER), inflation (INF), government effectiveness (GE), trade openness (TO), and labor force (LF), while the dependent variable is international trade (IT). The ECM method was employed to identify both short-term and long-term relationships among the variables. The results show that in the long term, the exchange rate and labor force have a positive and significant effect on international trade, while inflation and trade openness have a negative and significant effect. Meanwhile, government effectiveness has a negative but not significant effect. In the short term, the exchange rate, inflation, government effectiveness, and trade openness significantly influence international trade, whereas the labor force has a positive but not significant effect. The ECT(-1) value of -0.604158 indicates that 60.4% of the disequilibrium in the short run is corrected each period toward long-run equilibrium.

KEYWORDS: International Trade, Exchange Rate, Inflation, Government Effectiveness, Trade Openness, Labor Force, Error Correction Model (ECM), Thailand

I. INTRODUCTION

International trade is an economic activity that involves the exchange of goods and services between countries through exports and imports. Its main objective is to improve the standard of living of a nation's population. This activity provides various benefits, such as stimulating economic growth, creating employment opportunities, accelerating industrialization, and attracting investment from transnational corporations (Suryanto & Kurniati, 2022). Countries with open economic systems tend to be more vulnerable to changes in global economic conditions. The greater a country's involvement in international trade, the higher its economic sensitivity to external shocks (Pertiwi et al., 2020). The benefits of economic openness can be reflected in a country's balance of payments, which indicates the extent to which the country has succeeded in gaining advantages from international trade and cooperation (Astuti & Ayuningtyas, 2018). Gross Domestic Product (GDP) reflects various economic activities that produce goods and services and is influenced by multiple domestic factors. In the production process, raw materials and final products often involve foreign elements. This encourages cooperation between countries through international trade (Kusuma Hendra et al., 2020).

International trade has become a key pillar of global economic growth. Along with the rise of globalization and trade liberalization, developing countries such as Thailand have increasingly played a strategic role in the global supply chain (Nguyen & Choi, 2025).

The Dynamics of Thailand's International Trade: An Analysis of Exchange Rate, Inflation, Government Effectiveness, Trade Openness, and Labor Force

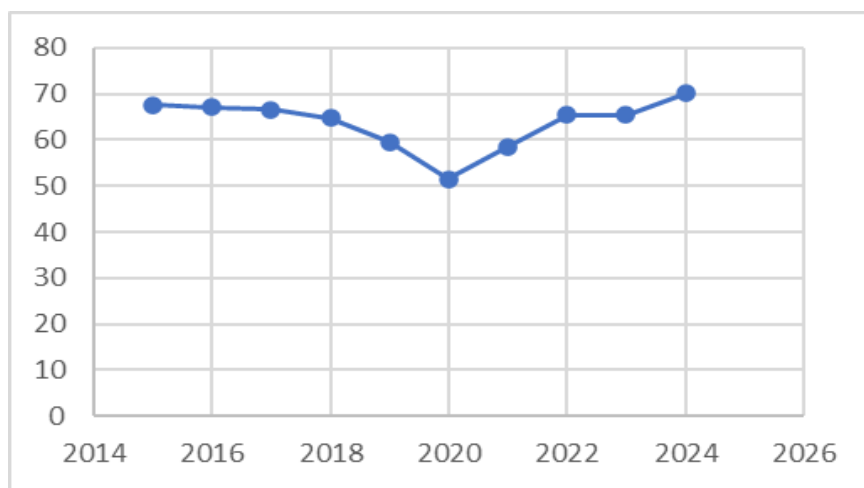


Figure 1: Exports of Goods and Services (% of GDP)

Source: www.worldbank.org

Export contributions remained relatively stable in the range of 64%–67% between 2015 and 2018, but experienced a sharp decline to 51.49% in 2020 due to disruptions in global supply chains and the COVID-19 pandemic. Since 2021, the export sector has shown a strong recovery, rising to 65.37% in 2022 and projected to reach 70.06% by 2024. Overall, the data highlight the crucial role and resurgence of exports as a major driver of Thailand's economic growth.

Thailand is the second-largest economy in ASEAN after Indonesia, according to data released by the World Bank (2021) (in billion US dollars). The services sector accounted for 56% of GDP in 2021, while industry contributed 35% and agriculture 9%. Between 2013 and 2022, Thailand's economy grew at an average annual real rate of 1.9%, mainly driven by rising private consumption and investment. However, the disruptions caused by the COVID-19 pandemic significantly affected the country's exports of goods and services, particularly in the tourism sector, which contributed nearly one-fifth of Thailand's GDP. Thailand also serves as ASEAN's automotive manufacturing hub and remains an important producer and exporter of key agricultural products, including rice (HKTDC Research, 2024).

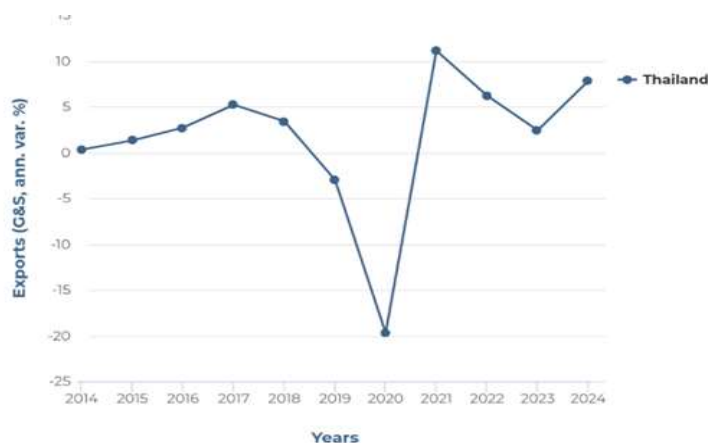


Figure 2 : Thailand Exports

Source : www.focus-economics.com

Thailand's export trend demonstrates fluctuations that are highly influenced by global economic dynamics. Exports experienced steady and gradual growth from 2014 to 2018, reflecting a relatively stable international trade environment. However, the sector faced a significant contraction of –19.7% in 2020, a sharp decline caused by the impact of the COVID-19 pandemic and massive disruptions in global supply chains. Following the pandemic, a strong recovery occurred, with growth surging to 11.1% in 2021 and 6.2% in 2022. Although it slowed to 2.4% in 2023 due to global uncertainty, exports rebounded to 7.8% in 2024, indicating stabilization and global economic recovery. Overall, these data suggest that Thailand's economy is adaptive and resilient in recovering from major external shocks.

The Dynamics of Thailand's International Trade: An Analysis of Exchange Rate, Inflation, Government Effectiveness, Trade Openness, and Labor Force

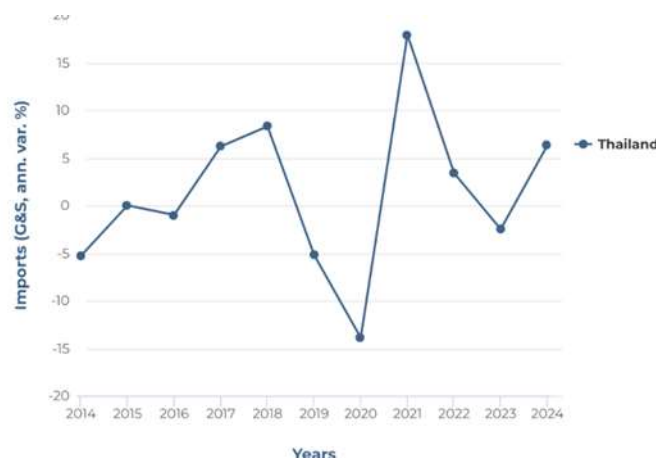


Figure 3 : Thailand Imports

Source : www.focus-economics.com

Thailand's import data reveal a highly fluctuating trend that is strongly responsive to both domestic and global economic conditions. During the early period (2014–2016), imports experienced stagnation and contraction, reaching –13.9% in 2020, reflecting weak domestic demand compounded by the severe impact of the COVID-19 pandemic and global supply chain disruptions. Imports then showed an exceptional rebound of 17.9% in 2021. Although they contracted again in 2023 (–2.5%), imports regained strong growth of 6.3% in 2024. These sharp fluctuations underscore that imports are closely linked to industrial needs, investment levels, and domestic consumption demand.

Based on the fluctuating trends in Thailand's trade performance, the volatility of exports and imports highlights the need to examine five key issues: (1) the instability of the Baht exchange rate, which affects competitiveness; (2) the inflation rate, which increases production costs and reduces competitiveness; (3) the effectiveness of government policies, which may hinder market access; (4) trade openness, as a determinant of export and import volumes; and (5) the labor force, as a key production factor. If these issues are neglected, Thailand risks facing economic slowdown and a decline in domestic competitiveness. Therefore, this study, titled "The Dynamics of Thailand's International Trade: An Analysis of Exchange Rate, Inflation, Government Effectiveness, Trade Openness, and Labor Force" aims to provide new insights and adaptive policy recommendations for the government and business sectors, while enriching the existing literature on international economics.

II. LITERATURE REVIEW

Several previous studies have examined the relationship between exchange rates, inflation, government policy, trade openness, and the labor force with international trade. For example, Pertiwi et al. (2020) found that the local currency exchange rate against the USD had a negative relationship, while the labor force had a positive and significant relationship with international trade. In contrast, the inflation rate and technology showed no significant influence. Meanwhile, the results of the random effects model indicated that only the inflation variable was not significant in affecting international trade. Further estimations using the fixed effects model (models 3 and 4) revealed that inflation and labor force consistently had a positive and significant effect, while in model 4, the government effectiveness variable also showed a positive and significant effect on international trade. Overall, the variables jointly had a significant effect on the natural logarithm of international trade.

Meanwhile, another study by Suryanto & Kurniati (2022) found that the exchange rate had a negative effect on international trade, while inflation positively influenced international trade. The effectiveness of government policies had a positive and significant impact, and trade openness also significantly and positively affected international trade. Simultaneously, the factors of exchange rate, inflation rate, government effectiveness, and trade openness jointly influenced international trade. Furthermore, a study by Galal & Lan (2017) revealed a stable long-term relationship between inflation and foreign trade in Egypt. The study found that inflation causes changes in foreign trade, whereas foreign trade does not significantly influence inflation.

The study conducted by Doni (2018) found a positive and significant influence of the labor force on international trade, as well as a positive and significant effect of inflation on international trade. Together, the labor force and inflation variables significantly affected international trade. Meanwhile, the research by Ćorić & Pugh (2010) discovered that exchange rate variability had a negative impact on international trade.

Based on a review of previous studies, it is evident that the relationship between exchange rate, inflation, government effectiveness, trade openness, and labor force with international trade still shows varied and inconsistent results. Several studies,

The Dynamics of Thailand's International Trade: An Analysis of Exchange Rate, Inflation, Government Effectiveness, Trade Openness, and Labor Force

such as Pertiwi et al. (2020) and Suryanto & Kurniati (2022), emphasized the importance of government effectiveness and trade openness, while other studies, such as Galal & Lan (2017) and Doni (2018), focused more on the effects of inflation and labor force, without highlighting institutional aspects. Moreover, most prior research predominantly employed panel regression, multiple linear regression, or VAR models, and therefore did not simultaneously analyze long-term and short-term relationships as can be done through the Error Correction Model (ECM) approach. Previous studies have also mainly focused on countries such as Egypt and Indonesia, whereas research specifically examining Thailand's international trade by incorporating both macroeconomic and institutional variables remains limited. Hence, this study aims to fill this research gap by employing the ECM model to analyze the effects of exchange rate, inflation, government effectiveness, trade openness, and labor force on Thailand's international trade in both the short and long term.

III. RESEARCH METHODOLOGY

A. Type and Source of Data

The type of data used in this study is quantitative data. This research presents the results of data analysis conducted using EViews software. The study employs International Trade as the dependent variable, while the independent variables include Exchange Rate, Inflation Rate, Government Effectiveness, Trade Openness, and Labor Force. The data used in this study are time-series data covering the period from 1994 to 2023.

B. Data Analysis Method

The data analysis method used in this research is the Error Correction Model (ECM) as an econometric tool, accompanied by a descriptive method aimed at identifying the existence of both long-term and short-term relationships arising from cointegration among the research variables. Prior to the ECM estimation and descriptive analysis, several preliminary steps were performed, including stationarity testing, determining the optimal lag length, and conducting a cointegration test. After estimating the ECM, further analysis was carried out using the Impulse Response Function (IRF) and Variance Decomposition methods. The steps for formulating the ECM model follow the approach proposed by Basuki & Yuliadi (2014).

The testing procedures conducted in this study follow Widarjono (2005) and include the following stages:

Stationarity Test: One of the essential concepts in econometric theory is the assumption of stationarity. Statistically, a time series is said to be stationary if its mean and variance remain constant over time, and the covariance between two periods depends only on the lag distance between them, not on the specific time at which the covariance is calculated. Moreover, data values that are excessively large over the observation period tend to converge toward their mean value (Engle & Granger, 1987). In this study, the stationarity test was performed using the Augmented Dickey-Fuller (ADF) Test.

Cointegration Test: The cointegration approach is closely related to testing the existence of a long-term equilibrium relationship among economic variables. Cointegration represents a long-run equilibrium relationship between non-stationary variables, where the residuals from their linear combination must be stationary. The method used in this study to test for cointegration is the Engle-Granger Cointegration Test.

Error Correction Model (ECM) Estimation: The Error Correction Model (ECM) estimation applied in this study is based on the Domowitz-El Badawi error correction specification (Domowitz & El-Badawi, 1987). The ECM is characterized by the inclusion of the Error Correction Term (ECT). According to this model, the ECM is valid when the ECT coefficient carries a negative sign and is statistically significant. The general specification of the ECM is as follows:

$$\Delta_t = \beta_0 + \beta_1 \Delta X_t + \beta_2 \Delta X_{t-1} + \beta_3 ECT$$

In the model, the value of the Error Correction Term (ECT) coefficient lies between zero and one ($0 < \beta < 1$). The short-term coefficients in the ECM equation are represented by β_1 , while the long-term regression coefficients are obtained using the following formula:

$$\text{Constant} = \beta_0 / \beta_3 \quad X_t = (\beta_2 + \beta_3) / \beta_3$$

The ECM equation model used in this study is formulated as follows:

$$\Delta IT_t = \beta_0 + \beta_1 DER_t + \beta_2 DINF_t + \beta_3 DGE_t + \beta_4 DTO_t + \beta_5 DLF_t + \beta_6 ER_{t-1} + \beta_7 INF_{t-1} + \beta_8 GE_{t-1} + \beta_9 TO_{t-1} + \beta_{10} LF_{t-1} + \mu_t$$

Description:

IT_t : International Trade Periode t

ER_t : Exchange Rate Periode t

The Dynamics of Thailand's International Trade: An Analysis of Exchange Rate, Inflation, Government Effectiveness, Trade Openness, and Labor Force

INF_t	: Inflation Periode t
GE_t	: Government Effectiveness Periode t
TO_t	: Trade Openness Periode t
LF_t	: Labor Force Periode t
DER	: $ER_t - ER_{t-1}$
DINF	: $INF_t - INF_{t-1}$
DGE	: $GE_t - GE_{t-1}$
DTO	: $TO_t - TO_{t-1}$
DLF	: $LF_t - LF_{t-1}$
$\beta_1 - \beta_9$	: The coefficient values of each independent variable
μ_t	: Residual
ECT	: Error Correction Term

Classical Assumption Tests: This test is conducted to determine whether there are any violations of the classical assumptions in the regression equation. The tests include the normality test, linearity test, multicollinearity test, heteroskedasticity test, and autocorrelation test (Basuki, 2016).

IV. RESULTS AND DISCUSSION

A. Stationarity Test Results

Based on the test results, the level of stationarity significance for each observed variable can be identified. The inflation and labor force variables are stationary at the level form, while the other variables become stationary at the first difference level. Since there are differences in the order of integration among the variables, this study employs the highest degree of stationarity, namely the first difference, for all variables analyzed.

Table 1: Results of the Augmented Dickey-Fuller (ADF) Stationarity Test

Variable	Unit Root Test			
	LEVEL		1st Difference	
	ADF	Prob	ADF	Prob
IT	-2.354	0.163	-6.083	0.00
ER	-2.147	0.228	-4.223	0.027
INF	-3.730	0.0088	-8.352	0.00
GE	-2.214	0.2057	-5.053	0.0003
TO	-2.662	0.0927	-4.696	0.0009
LF	-3.595	0.0122	-4.629	0.0010

Source: Processed Data using EViews 12

B. Cointegration Test

The After confirming that the data are non-stationary, the next step is to identify whether the variables are cointegrated. Therefore, a cointegration test is required. This test provides an initial indication of whether the model exhibits a long-term relationship (cointegration relation) among the variables. The cointegration test results are obtained by generating residuals through the Ordinary Least Squares (OLS) regression of the independent variables on the dependent variable. These residuals must be stationary at the level form in order to confirm the existence of cointegration.

Table 2: Results of the Long-Run Cointegration Equation Test

Variable	Coefficient	Probability
ER	0.694538	0.0439
INF	-1.294538	0.0790
GE	-12.78280	0.4448
TO	-45.26121	0.0149

The Dynamics of Thailand's International Trade: An Analysis of Exchange Rate, Inflation, Government Effectiveness, Trade Openness, and Labor Force

LF	169.4632	0.0001
C	-2742.320	0.0000
Prob(F-statistic)	0.000001	

Source: Processed Data using EViews 12

Based on Table 2, the t-statistic analysis shows that the exchange rate variable has a t-value of 0.694538 with a significance level of 0.0439. Using a 5% significance level, the probability value is smaller than 0.05 ($0.0439 < 0.05$), indicating that the exchange rate has a positive and significant partial effect on international trade. For the inflation rate variable, the t-value is -1.298931 with a significance level of 0.0790. Using a 10% significance level, the probability value is smaller than 0.1 ($0.0790 < 0.1$), suggesting that inflation has a negative and significant partial effect on international trade. The government effectiveness variable shows a t-value of -12.78280 with a significance level of 0.4448. Since the significance value is greater than 0.1 ($0.4448 > 0.1$), it indicates that government effectiveness has a negative but not significant partial effect on international trade. The trade openness variable has a t-value of -45.26121 with a significance level of 0.0149. At a 5% significance level, this value is smaller than 0.05 ($0.0149 < 0.05$), implying that trade openness has a negative and significant partial effect on international trade. Lastly, the labor force variable shows a t-value of 169.4632 with a significance level of 0.0001. Since this value is smaller than 0.05 ($0.0001 < 0.05$), it can be concluded that the labor force has a positive and significant partial effect on international trade.

Table 3: Results of the Unit Root Test on the Residuals of the Long-Run Equation

Variable	Probability	Description
ECT	0.0120	Cointegration exists

Source: Processed Data using EViews 12

The residuals must be stationary at the level form in order to confirm the presence of cointegration. After conducting the Dickey-Fuller (DF) test to examine the generated residuals, the results show that the residuals are stationary at the level, as indicated by the t-statistic value that is significant at the 5% critical level ($\text{Prob} = 0.0120$). Therefore, it can be concluded that the data are cointegrated, indicating the existence of a long-term equilibrium relationship among the variables in the model.

C. Error Correction Model (ECM) Estimation

Table 4: Results of the Shot-Run Regression Test (ECM)

Variable	Coefficient	Probability
D(ER)	0.838836	0.0493
D(CPI)	-1.399384	0.0140
D(GE)	-44.21441	0.0250
D(TO)	-40.36788	0.0245
D(LF)	7.340521	0.9408
ECT(-1)	-0.604158	0.0072
C	1.047836	0.4281
R ²	0.683152	
Adjusted R ²	0.596739	
Prob(F-statistic)	0.000127	

Source: Processed Data using EViews 12

Based on Table 4, the t-statistic results show that the exchange rate variable has a t-value of 0.838836 with a significance level of 0.0493. Using a 5% significance level, the probability value is smaller than 0.05 ($0.0493 < 0.05$), indicating that the exchange rate has a positive and significant partial effect on international trade. For the inflation rate variable, the t-value is -1.399384 with a significance level of 0.0140. At a 5% significance level, the probability value is smaller than 0.05 ($0.0140 < 0.05$), which means that inflation has a negative and significant partial effect on international trade. The government effectiveness variable shows a t-value of -44.21441 with a significance level of 0.0250. Although the coefficient is negative, since the

The Dynamics of Thailand's International Trade: An Analysis of Exchange Rate, Inflation, Government Effectiveness, Trade Openness, and Labor Force

significance value (0.0250) is less than 0.05, it indicates that government effectiveness has a negative and significant partial effect on international trade. The trade openness variable has a t-value of -40.36788 with a significance level of 0.0245. Since the probability value is smaller than 0.05 ($0.0245 < 0.05$), it can be concluded that trade openness has a negative and significant partial effect on international trade. Lastly, the labor force variable shows a t-value of 7.340521 with a significance level of 0.9408. As the significance value is greater than 0.10 ($0.9408 > 0.10$), it implies that the labor force has a positive but not significant partial effect on international trade.

D. Results of the Classical Assumption Tests

1. Normality Test

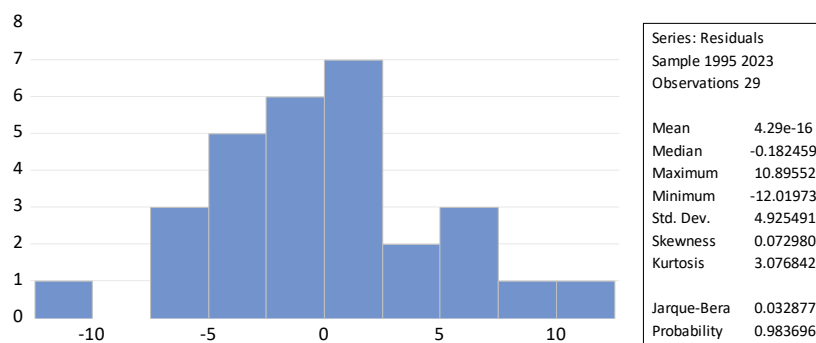


Figure 4: Results of the Normality Test

Source: Processed Data Using EViews 12

This normality test is used to determine whether the residuals are normally distributed. To test the normality of the data distribution, the Jarque–Bera (J-B) test is employed. Based on the results of the normality test, the p-value obtained is 0.9836, which is greater than $\alpha = 10\%$. Therefore, it can be concluded that the data used in the ECM model are normally distributed.

2. Linearity Test

Table 5: Results of the Linearity Test

	Value	Df	Probability
t-statistic	0.072638	21	0.9428
F-statistic	0.005276	(1.21)	0.9428
Likelihood ratio	0.007285	1	0.9320

Source: Processed Data using EViews 12

Based on the linearity test, the calculated F-statistic value is 1.44, indicating that the model used is appropriate, as the probability value of the F-statistic (0.9428) is greater than 0.05.

3. Multicollinearity Test

Table 6: Results of the Multicollinearity Test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.684780	1.582365	NA
D(ER)	0.162466	1.213459	1.196528
D(INF)	0.274467	1.874421	1.870064
D(GE)	338.1077	1.301611	1.301584
D(TO)	279.4301	1.869764	1.802766
D(LF)	9546.353	1.899140	1.232085
ECT(-1)	0.041618	1.297974	1.294949

Source: Processed Data using EViews 12

All centered VIF values are less than 10, indicating that the ECM model does not exhibit multicollinearity.

The Dynamics of Thailand's International Trade: An Analysis of Exchange Rate, Inflation, Government Effectiveness, Trade Openness, and Labor Force

4. Heteroskedasticity Test

Table 7: Results of the Heteroskedasticity Test

F-statistic	0.273681	Prob. F(6,22)	0.9433
Obs*R-squared	2.014222	Prob. Chi-Square(6)	0.9184
Scaled Explained SS	1.203733	Prob. Chi-Square(6)	0.9767

Source: Processed Data using EViews 12

Based on the short-run data analysis results, the Obs*R-squared value obtained is 0.9184, which is greater than $\alpha = 5\%$. Therefore, it can be concluded that there is no heteroskedasticity problem in the ECM model.

5. Autocorrelation Test

Table 8: Results of the Autocorrelation Test

F-statistic	0.618439	Prob. F(2,20)	0.5488
Obs*R-squared	1.689018	Prob. Chi-Square	0.4298

Source: Processed Data using EViews 12

Based on the results of the LM test in the short-run model, the smallest Akaike value at the first lag produces an Obs*R-squared value of 1.46. In this case, the p-value of the Obs*R-squared (0.4298) is greater than $\alpha = 5\%$, indicating that there is no autocorrelation problem in the ECM model.

CONCLUSIONS

The In the long run, the exchange rate (ER) has a positive and significant effect on international trade, with a probability value of $0.0439 < 0.05$. This implies that an increase in the exchange rate promotes the growth of international trade in the long term. In the short run, the exchange rate also has a positive and significant effect ($0.0493 < 0.05$), meaning that short-term changes in the exchange rate contribute to enhancing international trade activities. In the long run, the inflation rate (INF) has a negative and significant effect at the 10% significance level ($0.0790 < 0.1$). This indicates that higher inflation reduces international trade activities in the long term. Similarly, in the short run, inflation also has a negative and significant impact ($0.0140 < 0.05$), showing that inflationary pressures immediately suppress international trade performance. The government effectiveness (GE) variable has a negative but insignificant effect on international trade in the long run ($0.4448 > 0.1$), suggesting that government effectiveness does not have a substantial influence over time. However, in the short run, it has a negative and significant effect ($0.0250 < 0.05$), indicating that government performance has not yet contributed positively to international trade in the short term. The trade openness (TO) variable shows a negative and significant relationship with international trade both in the long run ($0.0149 < 0.05$) and the short run ($0.0245 < 0.05$). This suggests that increased trade openness is accompanied by a decline in trade performance, possibly due to high import dependency or an unbalanced trade structure. Lastly, the labor force (LF) has a positive and significant effect on international trade in the long run ($0.0001 < 0.05$), implying that a larger labor force contributes to trade growth. However, in the short run, the labor force exhibits a positive but insignificant effect ($0.9408 > 0.1$), meaning that changes in labor availability have not yet produced a meaningful impact on international trade activities.

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