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# The Interrelationship Between Exchange Rates, Maritime Exports and Inflation: The Case of Türkiye

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**Abstract**

International trade volumes fluctuate based on various economic factors unique to each country. A nation's capacity to conduct imports and exports hinges on its use of international currencies and the relative value of its currency compared to those of other nations. These exchange rates are evaluated in nominal and real terms to determine the inter country currency values. Nominal exchange rates include inflation effects, whereas real exchange rates are adjusted to exclude such influences. The calculation of the real effective exchange rate (REER) involves averaging the unit prices of valuable goods from other countries. Increases or decreases in exchange rates affect a country's import and export quantities. Moreover, fluctuations in domestic price levels also impact trade dynamics. While many studies have investigated the existence and direction of interactions among these variables, this study distinctively focuses on maritime transport exports within the export sector.

This study contributes to research on the transportation sector by analysing maritime transport exports, a key transport mode, in the context of Turkey. It explores the interplay between maritime transport exports and economic variables such as the real effective exchange rate and inflation. Data were gathered monthly from 2005 to 2022, and after conducting unit root tests, Vector Autoregression (VAR) analysis and the Toda-Yamamoto causality test were applied to evaluate causality. The findings indicate a bidirectional causal link between the real effective exchange rate (REER) and maritime transportation exports and a unidirectional causal effect from the consumer price index to maritime transportation exports, as well as from the real effective exchange rate to the consumer price index.

**Keywords** Maritime · Maritime Transport Exports · Real Effective Exchange Rate · Inflation · Foreign Trade

**JEL Classification** Q56 · Q19 · Q11

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# The Interrelationship Between Exchange Rates, Maritime Exports and Inflation: The Case of Türkiye

A country's import and export volumes are closely tied to exchange rates. A depreciation of a country's currency, manifested as an increase in exchange rates, tends to boost exports, while the opposite scenario, a decline in exchange rates, enhances the value of the national currency, thereby promoting imports. Additionally, fluctuations in price levels can also influence import and export dynamics. This study focuses on the effect of REER (real effective exchange rate) and the consumer price on maritime transport exports, a significant component of Turkey's export sector, and examines the interrelationships among these variables. Maritime transport constitutes the predominant mode of international trade logistics due to its cost efficiency and capacity advantages.

Previous studies have frequently explored the effects of exchange rates on exports or the impact of inflation on exports and exchange rates. In Turkey, the recent surge in exchange rates has intensified research in this area. However, studies that specifically address the REER (real effective exchange rate) and inflation in the context of maritime transport exports are scarce. Therefore, this study aims to serve as a guiding resource for researchers investigating this domain.

The exchange rate refers to the value of one country's currency in relation to that of a different country. In other words, the expression of foreign currencies entering a country in terms of its national currency is referred to as the rate of exchange. The determination of a foreign currency's true value, as it gains or loses value in the market over time, is calculated using the effective exchange rate. This calculation involves taking a weighted average of the national currency based on the rate of exchange of currencies from institutions with the highest monetary transactions in the country. While the stated exchange rate reflects the prevailing market rate, adjusting it for inflation yields the real exchange rate (Seyidoğlu, 2003). For countries, maintaining stable exchange rates is a desirable economic condition, particularly as they are critical for measuring purchasing power. Stable exchange rates contribute to balanced economies, fostering financial stability and positively impacting economic growth and price increases.

Exchange rate stability is closely linked to changes in exchange rates, making them a cornerstone of national economies. Consequently, countries have adopted various exchange rate regimes over time to assess their impacts within the global economy. Fixed, floating, and hybrid exchange rate regimes provide frameworks for determining and managing the value of a country's currency in relation to foreign currencies. The fixed exchange rate system, in particular, aims to stabilise international prices by pegging a country's currency to those of advanced economies. However, this approach requires substantial foreign currency reserves. In contrast, under a floating exchange rate regime, the rate of exchange is determined freely and by market conditions and forces, without intervention from central banks or government entities. This flexibility can lead to significant exchange rate volatility, while a hybrid regime, with occasional interventions, exhibits the characteristics of both fixed and floating systems. In such cases, central banks may intervene to ensure stability (Mwiya et al., 2024). Exchange rate volatility particularly affects countries that derive a significant portion of their economic income from exports. The real effective exchange rate enables more accurate calculations of currency values, significantly contributing to the growth of foreign trade by increasing external trade revenues. As a result, fluctuations in the real effective exchange rate have become a prominent research topic recently. Although these fluctuations follow a trajectory influenced by certain macroeconomic factors in the medium term, there is no consensus among researchers regarding the factors driving them. Consequently, research in this area has proliferated, with studies suggesting that real effective

exchange rates are influenced by multiple factors, including price increases and various macroeconomic monetary factors (Boubakri et al., 2019).

However, exchange rate fluctuations can pose challenges for economies. Coupled with inflation, rising prices can lower living standards and make it difficult to meet basic needs. In middle- and low-income countries that borrow in foreign currencies, exchange rate volatility can significantly increase borrowing costs and create repayment difficulties. Furthermore, reduced investments can lead to economic contractions (Mwiya et al., 2024). Mishkin argues that nominal exchange rates have limited effects on consumer prices across various sectors, with much of these effects dissipating over time. However, fluctuations in exchange rates can influence inflation and economic activities, potentially shaping monetary policy decisions within an economy.

## Literature Overview

Maritime transport plays a key role in the sustainability of economic activities as the primary carrier of international trade. In this context, exchange rates among the economic determinants of maritime transport have a significant impact, particularly on export shipments. An increase in the exchange rate leads to a depreciation of the local currency, which promotes exports while simultaneously reducing imports. On the other hand, inflation and the resulting increase in domestic price levels exert an upward pressure on the costs associated with maritime transport. Although there is a substantial body of literature examining the relationship between exchange rates, inflation, and foreign trade, especially exports and imports, studies that comprehensively explore the specific effects of these variables on maritime exports are relatively limited. This indicates a growing need for empirical analyses based on economic indicators within the maritime transport sector.

The literature contains a substantial body of research on exchange rates, inflation, and exports. Studies examining the relationship between exchange rates, inflation, and exports include the following:

Sheefeni and Ocran (2014) investigated Namibia and found that changes in exchange rates influence domestic price levels, with this effect being more pronounced in the long term. Helali et al. (2014) conducted a study on Tunisia, arguing that exchange rates have a strong impact on imports and inflation. Yanamandra (2015) examined the impact of the rate of exchange pass-through on prices in India. The study identifies both short and long-term effects, noting that exchange rate pass-through affects inflation in the short term, with a stronger impact in the long term. Elahi et al. (2016) reported that exchange rate fluctuations significantly affect inflation, production, and a country's foreign trade. They also noted a positive relationship between a country's real exchange rate and GDP (gross domestic product). Inflation and liquidity shocks increase the real exchange rate, although this effect is not observed in developing countries, where the opposite trend is reported. Chaudhary et al. (2016) concluded that exchange rates have a long-term effect on exports in South and Southeast Asian countries, based on their analysis covering 1979–2010. Monfared and Akın (2017) studied Iran using data from 1976 to 2012 and found, that increases in exchange rates lead to higher inflation. Chandrarin et al. (2022) explored the response of exchange rates to certain product prices and inflation in Indonesia. Their study highlights the strong relationship between exchange rates and inflation. Sasaki et al. (2022) investigated the NEER (nominal effective exchange rate) and producer price indices in Japan. They argued that the exchange rate pass-through increased following global economic crises. Additionally, they found that the weakest effect of changes in import prices, domestic producer prices, and consumer prices occurs between import prices and domestic prices. Antonio and Luis (2022) examined the impact of exchange rates on oil prices, particularly in Eurozone countries. Their results indicate a positive relationship between oil prices and exchange rates, with fluctuations in oil prices affecting inflation, though this effect is mitigated when exchange rates appreciate. Çiftçi and Kaya (2023) examined the relationship between exchange rate

uncertainty and inflation across 149 countries from 1980 to 2017. Their findings demonstrate that exchange rate uncertainty exerts a significant and positive influence on inflation. Pham et al. (2023) explored the impact of exchange rate pass-through on inflation in selected global economies between 2000 and 2019, highlighting that both short- and long- term effects differ across countries, especially those with inflation-targeting frameworks. Flaccadoro (2024) analysed the effects of exchange rate pass-through on consumer prices in Canada, concluding that exchange rate fluctuations positively influence inflation in response to economic shocks. Sumba et al. (2024) constructed a model incorporating purchasing power parity and the Taylor rule. Their results demonstrate a positive effect in the 'Fragile Five' countries of Brazil, Turkey, Indonesia, India and, South Africa, where rising exchange rates lead to higher prices of imported goods. Conversely, in countries within the Southern African Development Community, lower exchange rates were associated with increased investments, reduced import demand, and enhanced macroeconomic stability. Urgessa (2024) analysed the impact of exchange rate fluctuations on export revenues in Ethiopia using quarterly data from 2007 to 2021, employing symmetric and asymmetric effect analyses. The study found that exchange rates affect exports in the short term but have no significant impact on the long term. Luangaram and Wongpunya (2024) conducted an analysis for Thailand, examining the impact of trade openness and exchange rates on inflation. Their results demonstrate that policies related to trade openness and exchange rates influence inflation. Sethi et al. (2024) concluded that inflation adjustments affect foreign exchange markets. Their study, covering 24 Asian countries from 1998 to 2018, found that inflation- targeting policies positively impact exchange rates, increasing market confidence without requiring central bank intervention.

## Studies specific to Turkey include the following:

Leigh and Rossi (2002) highlighted an important relationship between exchange rate adjustments and inflation in Turkey. Gül and Ekinci (2006) examined the interrelationship among the real exchange rate, imports, and exports. Their econometric tests revealed a long-term relationship, but the Granger causality tests indicated that exchange rates do not affect imports and exports. However, they argued that imports and exports influence exchange rates. Hepaktan et al. (2011) found that imports and exports affect the REER in their study of imports, exports, and exchange rates. Ayvaz et al.(2013) analysed inflation and real effective exchange rate data from 1983 to 2012 in Turkey, identifying a bidirectional causal relationship between these variables. Karaş and Karaş (2017) detected a bidirectional interrelationship between the REER (the real effective exchange rate) and imports, with a unidirectional effect of exports on imports. Petek and Çevik (2017) analysed the connections between Inflation, exchange rates, imports, and exports in Turkey from 1990 to 2015. Their findings indicate both long-term and unidirectional relationships among the variables. Okur (2017) employed an econometric analysis to investigate the dynamic interlinkages among exchange rates, inflation, and monetary policy rates in Turkey over the period 2008–2016, identifying causal relationships among these endogenous variables. Özer and Kutlu (2019) reported that the real exchange rate affects the international trade balance and inflation in Turkey, but changes in inflation and the trade balance do not influence the exchange rate. No significant relationship was found between inflation and the trade balance. Şahin and Durmuş (2019) conducted an empirical overview of the effect REER (real effective exchange) rates on Turkey's imports and exports from 2003 to 2018. The results reveal that while the REER significantly affects imports, exports, in turn, influence the REER, with a unidirectional causality observed between the two. Duman and Sağdıç (2019) used the Granger causality analysis to determine that the effective exchange rate unidirectionally affects inflation. Thorbecke and Şengönül (2023) studied the impact of exchange rates on Turkey's imports and exports from 2012 to 2022. Their results show that imports and exports increase during periods of currency appreciation but remain unchanged during depreciation. Aytekin et al. (2023) explored the long-term interconnections among consumer prices, producer prices, and the REER (real effective

exchange rate). Their findings indicate that these variables influence each other eventually. A growth in producer prices affects inflation in the long run, but the interrelationship between inflation and the real effective exchange rate was insignificant. The Toda-Yamamoto causality test revealed a bidirectional interrelationship between exchange rates and producer prices, with a unidirectional causal effect from producer prices to inflation. Pınar (2024) analysed the interrelationship between the real exchange rate, imports, and exports using quarterly averages from 2003 to 2019. The research found a long-term interrelationship among these variables. Granger causality tests demonstrate an interrelationship between exchange rates and exports, as well as between imports and exports, with causality from imports to exchange rates. Türk (2024) examined the interrelationship between the real effective exchange rate, imports, and exports using asymmetric tests. The results showed a positive effect of the REER (real effective exchange rate) on exports, with effects observed during specific periods. Aydaş and Canbaloğlu (2024) investigated the consequences of the REER (real effective exchange rate) on exports through inflation and increase in economic output. They found that an increase in exchange rates negatively affected exports, while the effect of inflation on exports was positive with no significant effect.

## Method, Dataset, and Descriptive Statistics

Monthly data on the real effective exchange rate (REER), general price level (CPI), and maritime transport exports (MARITIME) for Turkey covering the period from 2005 to 2022 were used. Stationarity was tested using the Augmented Dickey-Fuller (ADF) and Phillips- Perron unit root tests. Upon identifying non-stationarity, first differencing was applied, and the transformed series were analysed using Vector Autoregression (VAR). The causal relationships and directions were further assessed through the Toda-Yamamoto causality framework. Data for REER and CPI were retrieved from the Central Bank of the Republic of Turkey (CBRT), while maritime transport export data were sourced from the United Nations Conference on Trade and Development (UNCTAD).

**Table 1**

*Variable Abbreviations, Units, and Data Sources*

| Variables | Abbreviation | Unit | Data Transformation | Data Source |
|---|---|---|---|---|
| Real Effective Exchange Rate (CPI-Based) | REER | Index | Logarithmic | CBRT |
| Consumer Price Index | CPI | Index | Logarithmic | CBRT |
| Maritime Transport Exports | MARITIME | Ton | Logarithmic | UNCTAD |

Table 1 presents the abbreviations, units, and sources of the variables used in the study. Due to significant scale differences among the variable values, all variables were first transformed into logarithmic form, and subsequent econometric analyses were conducted using these transformed values.

**Table 2**

*Descriptive Data Analysis*

| Variables | Mean | Median | Std. Deviation | Max. Value | Min. Value | JB Statistic |
|---|---|---|---|---|---|---|
| REER | 97.13292 | 103.97 | 21.1436 | 127.71 | 47.7 | 23.18028*** |
| CPI | 13.65481 | 9.24 | 15.03402 | 85.51 | 3.99 | 1915.386*** |
| MARITIME | 8.121.754 | 7.643.587 | 2.496.279 | 13.911.594 | 3.737.182 | 15.83272*** |

*Note: *, *, *** denote significance levels at 5% and 1%, respectively.*

Table 2 presents the descriptive statistics for the variables used in the analysis, including the mean, median, standard deviation, and minimum and maximum values. Based on these results, logarithmic transformations were applied to all variables. The transformed variables the real effective exchange rate,

consumer price index, and maritime transport exports are denoted as LRERR, LCPI, and LMARITIME, respectively.

**Table 3**

*Correlation Analysis*

| Variables | LMARITIME | LREER | LCPI |
|---|---|---|---|
| LMARITIME | 1 | | |
| LREER | −0.8267*** | 1 | |
| | (0.0000) | | |
| LCPI | 0.6060*** | −0.6426*** | 1 |
| | (0.0000) | (0.0000) | |

*Note: *, * *, * * * asterisks denote statistical significance at the 5% and 1% levels, respectively. Values shown in parentheses indicate p-values."*

Table 3 reports the correlation coefficients among the study variables. A negative correlation of approximately 83% is recorded between LMARITIME and LRERR, whereas a positive correlation of about 61% is found between LMARITIME and LCPI. These values offer a preliminary understanding of the relationships between the dependent and explanatory variables.

## Findings

In this section of this study, the ADF and PP unit root tests, followed by Vector Autoregression (VAR) analysis, were initially conducted for the variables. Subsequently, the Toda-Yamamoto causality analysis was performed to estimate the causal relationships and their directions among the variables, and the results were interpreted.

**Table 4**

*Results of the Unit Root Tests*

| | **Augmented Dickey-Fuller Test (Level Values)** | | **Phillips-Perron Test (Level Values)** | |
|---|---|---|---|---|
| Values | Constant(τ-stat.) | Constant &Trend (τ stat.) | Constant (Adj. τ stat.) | Constant &Trend (Adj. τ stat.) |
| LMARITIME | −2.1153 (0.2390) | −5.5506*** (0.0000) | −2.4846 (0.1206) | −7.1194*** (0.0000) |
| LREER | −0.7025 (0.9920) | −1.9340 (0.6331) | −0.8137 (0.9941) | −2.1231 (0.5296) |
| LCPI | −0.9585 (0.7678) | −2.0787 (0.5543) | −0.2597 (0.9272) | −1.1545 (0.9162) |
| | **Augmented Dickey-Fuller Test (First Differences)** | | **Phillips-Perron Test (First Differences)** | |
| Variables | Constant (τ stat.) | Constant &Trend (τ stat.) | Constant &Trend (τ stat.) | Constant &Trend (Adj. τ stat.) |
| ΔLMARITIME | −20.4354*** (0.0000) | −20.4020*** (0.0000) | −33.3803***(0.0000) | −36.9750*** (0.0001) |
| ΔLREER | −9.3311*** (0.0000) | −9.5631*** (0.0000) | −11.3468*** (0.0000) | −13.4199*** (0.0000) |
| ΔLCPI | −10.9091*** (0.0000) | −7.8690*** (0.0000) | −10.8064*** (0.0000) | −10.7677*** (0.0000) |

*Note: *, *, *** asterisks indicate statistical significance at the 5% and 1% levels, respectively. Parenthetical values represent p-values. (i) Lag lengths were selected as "1" based on the AIC criterion. (ii) "Δ" denotes the first difference operator. (iii) The t-statistic for the trend coefficient of the LMARITIME variable was calculated as "5.11" and found to be statistically significant.*

In contrast, LMARITIME exhibits a linear trend; therefore, unit root testing was performed using a trend component. The test statistics reject the null hypothesis of a unit root for LMARITIME. Given the non-stationarity of LRERR and LCPI at the level, their first differences were analysed, and the ADF and PP test results rejected the null hypothesis for both series. Consequently, LRERR and LCPI are integrated of order one, I(1), while LMARITIME remains stationary at the level.

The results from both the ADF and PP unit root tests indicate that the variables possess integration orders of '1' and '0'. Accordingly, the maximum integration order (dmax) required for the Toda-Yamamoto (TY) causality analysis is determined as '1'. Additionally, the lag length (k) is another key parameter for the TY causality analysis. To establish the appropriate lag length, a VAR model must first be estimated to meet the, diagnostic and stability requirements. Table 5 summarises the diagnostic tests and stability conditions of the VAR model based on the lag length selected using the AIC criterion.

**Table 5**

*Diagnostic Tests of the VAR Model*

| **Lag Length** | **4** | |
|---|---|---|
| **Diagnostic Tests** | Statistic | Statistic |
| Autocorrelation Test | 13.9666 | 0.1235 |
| Heteroskedasticity | 172.9091 | 0.0505 |

*Note: *, *, *** asterisks demonstrate statistical significance at the 5% and 1% levels, respectively.*

Table 5 displays the results of the autocorrelation and heteroskedasticity tests for the VAR system estimated with a lag length of 4. The test statistics indicate that the VAR system is free from autocorrelation and heteroskedasticity issues. Additionally, Figure 1 demonstrates that the VAR system satisfies the stability conditions, as all AR roots are distributed within the boundaries of the unit circle.

**Figure 1**

*AR root graph*

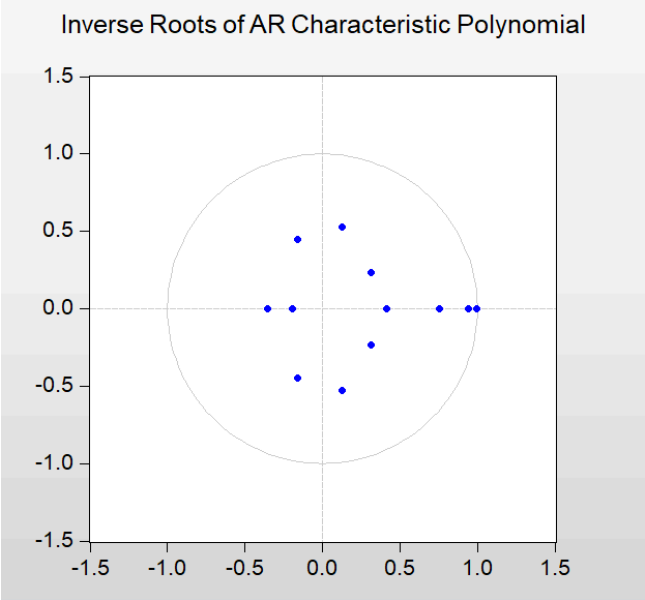



**Table 6**

*Toda-Yamamoto Causality Test Findings*

| **Dependent Variable: LMARITIME** | | | |
|---|---|---|---|
| Independent Variable | $\chi^2$ Chi-Square Statistic | P-value | Result |
| LREER | 13.3163** | 0.0354 | The null hypothesis has been rejected, indicating a one-way causal relationship from LREER to LMARITIME. |
| LCPI | 9.6077** | 0.0476 | A unidirectional causality from LCPI to LMARITIME is observed, as the null hypothesis is rejected. |

| **Dependent Variable: LREER** | | | |
|---|---|---|---|
| Independent Variable | $\chi^2$ Chi- Square Statistic | P-value | Result |
| LMARITIME | 13.9493*** | 0.0075 | Evidence points to a unidirectional causal link from LMARITIME to LREER, as the null hypothesis is not supported. |
| LCPI | 5.2824 | 0.2595 | Conversely, since the null hypothesis could not be rejected in the case of LCPI and LREER, no causal relationship was identified between these variables. |
| **Dependent Variable: LCPI** | | | |
| Independent Variable | $\chi^2$ Chi- Square Statistic | P-value | Result |
| LMARITIME | 7.7040 | 0.1030 | The results do not provide sufficient evidence to reject the null hypothesis, implying no causal relationship between LMARITIME and LCPI. |
| LREER | 26.4886*** | 0.0000 | In contrast, the null hypothesis is rejected for the relationship between LREER and LCPI, indicating a one-way causality from the former to the latter. |

*Note: Single (), double (), and triple () asterisks indicate statistical significance at the 5% and 1% levels, respectively. Parenthetical values represent p-values. (i) The maximum integration order (dmax) was set to "1," the lag length (k) to "4," and the "dmax+k" parameter for the Toda-Yamamoto causality test was selected as "5."*

Table 6 presents the outcomes of the Toda-Yamamoto causality test. The null hypothesis, which asserts that the dependent variable is not influenced by the excluded variable, was tested. The findings are as follows:

- The null hypothesis of no causal relationship from LRERR to LMARITIME is rejected (p-value < 0.05; 0.0354), indicating that LRERR causes LMARITIME and facilitates its information flow.
- Similarly, the null hypothesis of no causal relationship between LCPI and LMARITIME is rejected (p-value < 0.05; 0.0476), demonstrating that LCPI is also a cause of LMARITIME.
- The null hypothesis for no causal relationship between LMARITIME and LRERR is rejected (p-value < 0.05; 0.0075), indicating that LMARITIME influences LRERR. Thus, a bidirectional causal relationship exists between LMARITIME and LRERR.
- Conversely, the null hypothesis of no causal relationship from LCPI to LRERR cannot be rejected (p-value > 0.05; 0.2595), implying no causal link.
- Similarly, the hypothesis of no causal relationship from LMARITIME to LCPI cannot be rejected (p-value > 0.05; 0.1030).
- However, the null hypothesis of no causal relationship between LRERR and LCPI is rejected (p-value < 0.05; 0.0000), demonstrating that LRERR causes LCPI and transmits information to it.
- According to the causality analysis results, a bidirectional causal relationship exists between LMARITIME and LRERR, whereas unidirectional causality is observed from LCPI to LMARITIME and from LRERR to LCPI.

The findings from the Toda-Yamamoto causality analysis, presented in Table 6, are visualised as shown in Figure 2.

## Discussion and Conclusion

The volume of exports is widely acknowledged as a key contributor to a country's economic performance. The impact of foreign trade on the economy depends on several factors, including the quantity and value of exported goods and, the volatility of exchange rates, which directly influence pricing mechanisms. The literature frequently addresses topics such as the relationships among inflation, exchange rates, and imports-exports, as well as their impacts on economic growth. However, studies focusing on the transportation

sector, particularly those examining the relationships between exchange rates and inflation in the maritime domain, are relatively scarce. Therefore, this study aims to investigate the relationships between maritime transport and economic indicators, offering findings that may benefit researchers.

Maritime transport is the most preferred mode of transportation, particularly for overseas trade, and continues to advance in international logistics. Rising societal needs have increased consumer demand, prompting countries to engage in foreign trade. The transportation of traded goods is predominantly conducted via maritime routes due to factors such as cost advantages. The use of high-capacity vessels in this mode of transport allows for the carriage of larger weights and volumes, enabling the transportation of substantial cargo loads in a single voyage, thereby reducing logistics costs. Unlike road or rail transport, maritime transport typically requires less investment in fixed infrastructure and provides a relatively secure mode of transportation.

The strategic presence of ports offers countries not only economic benefits but also political and geopolitical leverage. Ports function as gateways to international markets and contribute significantly to national development. Additionally, in the cities where ports are located, they foster cultural exchange, enhance social environments, and create employment opportunities. Due to these economic, socio-cultural, political, and geopolitical advantages, maritime transport is highly advantageous for countries with ports and is considered the preferred mode of transportation in foreign trade.

Imports and exports conducted via maritime transport are closely linked to exchange rates, a critical component of foreign trade. Another factor influencing these variables is inflation. Fluctuations in domestic price levels impact both exports and exchange rates. In addition to existing studies, this study specifically examines the relationship between exports in maritime trade and these two economic variables. The findings indicate that exchange rates and inflation influence maritime exports, while a causal relationship is observed only from maritime exports to exchange rates. Market prices and real effective exchange rates (REER) affect maritime exports, with increases or decreases in maritime exports varying based on the amount of foreign currency entering the country through exports.

Building on previous research into REER and inflation, this study deepens the understanding of how these economic factors interact with maritime exports. The results are particularly relevant for Turkey, where maritime transport constitutes a major component of foreign trade. The findings can inform strategic planning and policy development aimed at optimizing maritime export performance. Future research could further enrich this field by exploring long-term interactions or conducting comparative studies across countries with similar economic structures, using multi-country datasets to enhance the generalizability of the conclusions.

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