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THE EFFECT OF REAL EFFECTIVE EXCHANGE RATE ON IMPORTS AND EXPORTS: AN APPLICATION ON TÜRKIYE

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ABSTRACT

The trade balance, which represents the difference between a country's export and import values, plays a crucial role in determining its economic health. Exchange rates, defined as the prices at which one currency can be exchanged for another, have a significant impact on a country's trade balance. Fluctuations in exchange rates can influence the competitiveness of exports and imports and, consequently, the trade balance. One of the most notable studies in this context is the Marshall-Lerner condition, which states that if the sum of the price elasticities of demand for a country's exports and imports exceeds one, a devaluation (or depreciation) of the country's currency will improve its trade balance. In simpler terms, if the combined response of export and import volumes to changes in prices is sufficiently high, a devaluation of the currency can lead to an improvement in the trade balance. The relationship between exchange rates and the trade balance is complex and depends on numerous factors, such as the exchange rate regime, demand elasticities, and time lags. Therefore, a depreciation in a country's currency does not always lead to an improvement in the trade balance. This study examines the impact of Turkey's real effective exchange rate on imports and exports between 2018 and 2024. To investigate the long-term relationship, the Bayer-Hanck (2013) Cointegration Analysis was employed, while the Error Correction Model was applied to explore short-term relationships. The result of the analysis; The Bayer-Hanck cointegration test results indicated long-term relationships between the real exchange rate (REDK) and exports (IHR) and imports (ITH). However, FMOLS estimates revealed that these relationships are not statistically significant for the analyzed period. The VECM results failed to establish any statistically significant short-term relationships between REDK and the dependent variables, indicating the absence of significant short-term dynamics.

Keyword: Real effective exchange rate, imports, exports

1. INTRODUCTION

The complexity of the global economy and the increasing importance of international trade necessitate understanding and analyzing the impact of exchange rate fluctuations on foreign trade. This study refers to economic theories to explain the effects of exchange rate fluctuations on foreign trade, with a particular focus on the role of the Marshall-Lerner condition.

The effect of exchange rates on foreign trade can be examined from various perspectives in economic theories. According to classical economic theory, the relationship between exchange rates and the trade balance is based on the assumption that markets will reach equilibrium naturally. Classical economists argue that exchange rates are determined by the forces of supply and demand under free market conditions, and therefore, exchange rate changes automatically adjust the trade balance. (Salvatore, 2013)

From the classical perspective, exchange rates are determined by the balance of supply and demand under free market conditions. Exchange rates express the value of one country's currency against foreign currencies and automatically bring the trade balance into equilibrium. If a country has a trade surplus, meaning exports exceed imports, the demand for its currency increases, and the exchange rate rises. A higher exchange rate makes exports more expensive and imports cheaper, thereby restoring trade balance. Conversely, if a country has a trade deficit, meaning imports exceed exports, demand for its currency decreases, and the exchange rate falls. A lower exchange rate encourages exports and reduces imports, restoring the trade balance. (Dornbusch, Fischer, and Startz, 2014)

The Price-Specie Flow Mechanism developed by David Hume is part of classical economic theory. Hume explains how exchange rate changes balance the trade balance through the flow of gold between countries. Countries with a trade surplus experience gold inflows, which increase the money supply and lead to inflation. Inflation reduces the competitiveness of exports and increases imports, thereby achieving trade balance. (Hume, 1752)

These classical economic views regard the relationship between exchange rates and the trade balance as a system automatically regulated by market mechanisms.

John Maynard Keynes discusses the theoretical relationship between exchange rates and the trade balance in his work "The General Theory of Employment, Interest, and Money." Keynes emphasizes the balance between domestic and foreign demand and explains the relationship between exchange rates and the trade balance through this balance. Keynes argues that if a country's currency is overvalued (high exchange rate), its exports become more expensive for other countries while imports become cheaper. This disrupts the balance between domestic and foreign demand and negatively affects the trade balance. (Keynes, 1936, pp. 286–300)

The neo-classical economic perspective explains the relationship between exchange rates and the trade balance within the framework of market mechanisms and equilibrium theories. According to this view, exchange rates are determined by market conditions and fluctuate based on the balance of supply and demand in a free market. In neo-classical theory, exchange rates affect the prices of goods and services and thus regulate international trade flows. (Mankiw, 2016)

In neo-classical economics, the flexible exchange rate system plays a significant role. Under this system, exchange rates are freely determined by the forces of supply and demand. Changes in exchange rates act as an automatic balancing mechanism. For instance, when a country's exchange rate falls (its currency depreciates), its exports become more competitive, leading to increased exports. Simultaneously, imports become more expensive, reducing import volumes. This narrows the trade deficit or increases the trade surplus. (Dornbusch, Fischer, and Startz, 2013)

Neo-classical economists explain the impact of exchange rates on the trade balance through competitive prices, automatic balancing, and the supply and demand balance. Competitive prices ensure that exchange rate changes influence the prices of goods and services in international markets. Automatic balancing occurs as exchange rate changes affect export and import prices, creating an automatic mechanism for trade balance. Lastly, exchange rates are determined by the balance of supply and demand in international currency markets, regulating trade flows. (Salvatore, 2019)

The Marshall-Lerner condition is a critical concept in international trade theory, aiding in understanding the impact of currency depreciation (devaluation) on the trade balance. The condition posits that if the sum of the price elasticities of demand for a country's total exports and imports exceeds one, a depreciation of the currency will improve the trade balance.

The theoretical foundations of the Marshall-Lerner condition are based on price elasticity and trade theories. Alfred Marshall's work on price elasticity and Abba Lerner's analyses of trade balance were instrumental in shaping this condition. (Lerner, 1944) Marshall's price elasticity theory measures the impact of price changes on demand. (Marshall, 1920) Lerner analyzed the effects of these elasticities on the trade balance through his studies on trade and balance of payments. (Lerner, 1944) The combination of these two theories led to the formulation of the Marshall-Lerner condition.

Mathematically, the Marshall-Lerner condition can be expressed as follows: (Krugman and Obstfeld, 2003)

$$|\epsilon X| + |\epsilon M| \geq 1$$

Here, $|\epsilon X|$ denotes the price elasticity of export demand, and $|\epsilon M|$ represents the price elasticity of import demand. If this inequality is satisfied, the depreciation of the currency will improve the trade balance.

Currency depreciation makes a country's exported goods cheaper for foreign buyers and imported goods more expensive for domestic consumers. In such cases, if export demand is sufficiently elastic, foreign buyers will import more goods, increasing exports. Similarly, if import demand is elastic, domestic consumers will import fewer goods, reducing total imports. Consequently, the trade balance (exports - imports) improves. However, if the sum of the elasticities is less than one, currency depreciation may worsen the trade balance instead of improving it (Dornbusch, Fischer, and Samuelson, 1977).

2. LITERATURE REVIEW

In general, foreign country currencies are called foreign currency. Foreign exchange markets also refer to places (physical or non-physical-electronic environments) where foreign currencies are bought and sold and/or one country's currency is exchanged for another country's currency. The important issue in terms of stability in foreign exchange markets is the "Marshall-Lerner (M-L) Condition". Exchange rate changes and external balance can only be realized under stable market conditions. In other words, the M-L

condition is essential for a stable equilibrium in foreign exchange markets. At this point, it should be questioned whether the Marshall-Lerner condition is valid for national economies.

In the fixed exchange rate system, the increase in the exchange rate with the approval of the government and thus the depreciation of the national currency is called "devaluation", while in the reverse fixed exchange rate system, the appreciation of the national currency by lowering the exchange rate is called "revaluation". The concepts of devaluation and revaluation are concepts used in the fixed exchange rate system. In the floating exchange rate system, the term "currency adjustments" is used instead of these concepts. As a result of the devaluation in the economies, it is expected that the foreign demand for export goods will increase and the domestic demand for imported goods will decrease. In order for these expected effects to occur, demand elasticities of export and import goods should be considered. If the sum of external demand elasticities (ex) for export goods and domestic demand elasticities (em) for imported goods is greater than or equal to 1, the expected effects of devaluation occur. This situation is called “the success condition of devaluation” in economics ($ex+em \geq 1$). This condition is called the "Marshall-Lerner (M-L) condition" because of the economists (Marshall (1923) and Lerner (1944) who first explained this expression in economics) (Aslan and Terzi, 2013: 56-58). Therefore, the supply and demand elasticity of imported and exported goods should be examined for the effect of devaluation on the foreign trade balance.

In the national and international literature, it is seen that the validity of the Marshall-Lerner condition has been tested in many countries and/or country groups. In this study, it is aimed to create a very rich literature by examining the national and international studies on the validity of the Marshall-Lerner condition. As a result of the literature review; it has been determined that the validity of the M-L condition differs according to the countries. In some studies, it was concluded that the condition was valid, while in others, the condition was not valid, as well as conclusive evidence of validity could not be obtained. In this respect, although there is no consensus in the economic literature on the subject, the main finding that the condition is valid in the studies conducted specifically for the Turkish economy has been determined. In addition, the validity of the M-L condition and the existence of the J-Curve Hypothesis have also been questioned in the literature. In the light of this perspective, a brief summary of the empirical/experimental studies in the literature at both national and international level is presented in Table 1 below, in chronological order.

Tablo I: Summary of the Literature Review

Researcher/s (year)	Time Period and Selected Countries	Methodology	Basic Variables	Used Additional Variables	Conclusion
Bahmani-Oskooee and Niroomand (1998)	y: 1960-1992 30 Countries	**Johansen Cointegration Analysis**	Import Volume, Import Unit Value Index, Domestic Price Level Index, Export Volume,	Real GNP or GDP, World Income	The Marshall-Lerner (M-L) condition is met for thirty countries in the long run.

			Export Unit Value Index		
Boyd et al. (2001)	q: 1975-1996 8 OECD (Canada, France, Germany, Italy, Japan, Netherlands, United Kingdom and United States of America) Countries	**Johansen Cointegration Analysis, ARDL**	Real Effective Exchange Rate, Import, Export, Consumer Price Indices	Real GDP	The Marshall-Lerner (M-L) condition is valid in the long run.
Mahmud et al. (2004)	q: 1957-1998 6 Developed Countries	**The Local Linear Least Squares (LLLS) Method, The Ordinary Least Squares (OLS) Method**	Import Volume Index, Export Volume Index, Import Unit Value Index, Export Unit Value Index, Domestic Prices Index, Export Unit Value of Export	Domestic Real Income, World Real Income	The Marshall-Lerner (M-L) condition is only partially met for the examined sub-periods.
Hooy and Chan (2008)	m: 1990-2008 China and Malaysia	**ARDL Bound Test**	Real Exchange Rate, Nominal Exchange Rate, Consumer Price Index, Import, Export	Industrial Production Index (Domestic)	Although the Marshall-Lerner (M-L) condition accelerates the expansion of trade in the long run as a result of a real depreciation; reveals that only short run import demands adhere to the potential J-curve pattern.
Hepaktan (2009)	q: 1980-2008 Turkey	**Fractional Co-integration Analysis**	Export Quantity, Import Quantity, Price Index of Export and Imported Goods	GNP Value, Data on World GNP	The Marshall-Lerner (M-L) condition, does not fully work for Turkey in the long-run.
Loto (2011)	y: 1986-2008 Nigeria	**The Ordinary Least Square Method (OLS)**	Import Value (Real), Import Price Index, Domestic Price Index, Export Value (Non-Oil-Real), Price Value of Exports (Non-Oil), World Price Index	Level of Real Income, Growth Rate of World Income	The Marshall-Lerner (M-L) condition is not met fort he Nigerian economy.

Pandey (2013)	y: 1993-2011 India	**Vector Error Correction Model (VECM)**	Export, Import, Real Exchange Rate	Domestic Income, World Income	The Marshall-Lerner (M-L) condition applies to India.
Gocer and Elmas (2013)	q: 1989-2012 Turkey	**Unit Root and Cointegration Test with Multiple Structural Breaks**	Export and Import Values, Intermediate Goods, Capital Goods, Final Consumption Goods, Total Foreign Trade Data, Real Exchange Rate	Domestic and World Income Data	The extended Marshall-Lerner (M-L) condition is valid for all goods (intermediate goods, capital goods, consumer goods) groups in Turkey.
Azizan and Sek (2014)	y: 1970-2012 ASEAN-5 Countries (Indonesia, Malaysia, Philippines, Thailand and Singapore) with the USA, Japan and China	**ARDL Model**	Export Goods (USD), Import Goods (USD), Real Effective Exchange Rate (Index)	Foreign Real Income Data-GDP (Constant 2005 USD), Domestic Real Income Data-GDP (Constant 2005 USD)	The Marshall-Lerner (M-L) condition does not apply to bilateral trade in the four country groups.
Turkay (2014)	y: 1980-2012 Turkey	**Johansen Cointegration Test, Error Correction Model**	Import and Export Data (in $), Import Price Index, Export Price Index	Turkey GDP (in $) and World GDP (in $)	The Marshall-Lerner (M-L) condition is valid for Turkey in the long-term.
Mwito et al. (2015)	y: 1970-2013 Kenya and 10 Trading Partners Country (China, India, South Africa, UEA, Tanzania, Germany, Uganda, USA, Netherlands and United Kingdom	**Mean Group (MG) Estimation Technique**	Real Exchange Rate, Domestic Country with Trading Partner between Trade Balance	Trading Partner GDP/Domestic GDP Ratio-Relative GDP, Trading Partner Per Capita GNP/Domestic Per Capita GNP-Relative Per Capita GNP	The Marshall-Lerner (M-L) condition applies to trade between Kenya and China, India, South Africa and the UAE, while the remaining UK, USA, Germany, Uganda and Tanzania trading partners do not.
Cambazoglu and Gunes (2016)	m: 1982-2012 Turkey and Germany	**ARDL Bound Test**	Export Volume Index, Export Unit Value Index, Export Price Level, Import Volume Index,	Industrial Production Index, World Income Level, Domestic Income Levels	The applicability of the Marshall-Lerner (M-L) condition in Turkey is supported. The depreciation of the domestic currency

			Import Unit Value Index, Consumer Price Index		actually improves Turkey's trade balance in the long run.
Ishtiaq et al. (2016)	m: 1970-2012 Pakistan	**Johansen Cointegration Technique, Vector Error Correction Model (VECM)**	Import Value, Export Value, Nominal Exchange Rate, Real Exchange Rate	Pakistan Real GDP and GDP Deflator (USA Data-2005 Year)	Although the Marshall-Lerner (M-L) condition is not valid for Pakistan in the short run, it is valid in the long run. According to this result, the J-curve phenomenon is supported.
Dong (2017)	q: 1985-2016 G7 (U.S., Canada, France, Germany, Italy, Japan and the U.K.) Member Countries	**Vector Error Correction Model (VECM), Johansen's Cointegration Test, Cointegration Models with Regime Shifts and Threshold Regression Model**	Export and Import Amounts, Real Effective Exchange Rate	U.S. and Foreign Real Output (GDP) Levels	The Marshall-Lerner (M-L) condition is hardly met in the bilateral trade balance between the United States and all other G7 member states.
Uslu (2018)	q: 1989-2018 Turkey	**Time Series Analysis Methods With Structural Breaks**	Real Effective Exchange Rate	Domestic National Income Level, World National Income Level	Sufficient evidence on the validity of Marshall-Lerner (M-L) condition in Turkey cannot be obtained.
Topcu and Ozdemir (2019)	y: 2004-2017 Turkey and Eurozone Countries	**Augmented Mean Group (AMG) Estimator**	Export and Import Amounts, Real Exchange Rate	GDP Values	The Marshall-Lerner (M-L) condition applies to bilateral trade between Turkey and the Eurozone.
Eren and Gurbuz (2020)	m: 2004-2018 Turkey, Russia and Germany	**Kapetanios Unit Root Test with Structural Breaks, ARDL Bounds Test Approach**	Export, Import, Real Exchange Rate	Per Capita Income, Population and Oil Prices	The Marshall-Lerner (M-L) condition is valid in foreign trade between Turkey, Russia and Germany.
Akıncı (2021)	q: 1992-2019 Turkey	**NARDL Analysis**	Export and Import Amounts (in $), Real Exchange Rate	Domestic (Turkey GDP) and Abroad (US GDP) Income Levels	Although the Marshall-Lerner (M-L) condition is not met in the short-term in the Turkish economy, it becomes valid due to the increase in trade flexibility in the long-term.

Source: Prepared by us for this study, the bibliographic tags of the studies in the table are also shown in the bibliography.

The Table 1 provides a detailed summary of various studies investigating the validity of the Marshall-Lerner (M-L) condition across different countries and time periods, using diverse methodologies and variables. These studies span periods ranging from 1960 to 2021,

covering both individual economies, such as Turkey, Nigeria, and Pakistan, and groups of nations, including the G7, ASEAN-5, and the Eurozone.

The methodologies employed in these studies vary widely, with common approaches including Johansen Cointegration Analysis, ARDL Models, Vector Error Correction Models (VECM), and more advanced techniques like Fractional Cointegration and NARDL analyses. Several studies also account for structural breaks to capture the effects of economic shocks or regime changes.

The studies typically utilize a range of variables, such as export and import volumes, real and nominal exchange rates, consumer price indices, and domestic and foreign income levels. In certain cases, additional factors like oil prices and population are incorporated to reflect unique economic circumstances and enrich the analysis.

The results reveal mixed outcomes regarding the validity of the Marshall-Lerner condition. In many developed economies, such as OECD countries and Turkey in specific studies, the condition is found to hold true in the long run. For example, some analyses confirm its validity for Turkey's trade with Germany and other trading partners, particularly when long-term dynamics are considered. Conversely, in countries like Nigeria, the M-L condition is generally not met under most tests, highlighting the variability in trade elasticity across different economies. Certain studies also reveal partial validity during specific sub-periods, emphasizing the temporal and dynamic nature of trade responses to exchange rate changes.

Key findings from the table highlight the presence of the J-curve phenomenon in some cases, where currency depreciation initially worsens the trade balance before improving it over time. This pattern underscores the time-dependent nature of trade elasticities and the importance of distinguishing between short-term and long-term effects. The studies demonstrate that economies with higher elasticity in export and import demand are more likely to satisfy the M-L condition, particularly in developed countries. However, developing economies often exhibit mixed results, influenced by structural trade dependencies and limited responsiveness to price changes.

Turkey is a focal point in many of the studies, with results showing diverse outcomes depending on the methodology and period analyzed. While some evidence supports the validity of the M-L condition in Turkey's long-term trade, structural breaks and economic shocks often challenge its applicability in other contexts. For instance, while structural breaks reveal the robustness of trade elasticities in some analyses, they also highlight the limitations imposed by economic volatility and global disruptions.

Overall, the findings demonstrate that the validity of the Marshall-Lerner condition depends on various factors, including the economic structure, trade composition, and exchange rate regimes of the countries analyzed. Flexible exchange rate systems, for instance, facilitate the adjustment mechanisms described by the condition. Furthermore, methodological choices, such as the inclusion of structural breaks, play a critical role in

determining the outcomes. The studies collectively illustrate the importance of adapting theoretical frameworks to specific contexts and time periods, reflecting the nuanced and complex relationship between exchange rates and trade balances.

3. ECONOMETRIC ANALYSIS

3.1. Data Description

In this study, the effects of the real exchange rate variable on imports and exports are analyzed for both long and short terms using monthly data covering the period from January 2018 to July 2024. The data were sourced from the Central Bank of the Republic of Turkey's data bank (www.tcmb.gov.tr). Analyses were conducted using Eviews 13.0 and STATA 17.0 software. The variables included in the model are presented in Table 2.

Table 2: Description of Variables Used in the Analysis

Variable	Representation	Description
Exports	IHR	Dependent variable
Imports	ITH	Dependent variable
Real Exchange Rate	REDK	Independent variable

The trends of the variables over time are illustrated below.

Graphical illustrations and descriptive statistics for the data are shown in Table 3.

Table 3: Descriptive Statistics of the Variables

Statistics	IHR (Exports)	ITH (Imports)	REDK (Real Exchange Rate)
Mean	17,866,258	23,503,612	82.36380
Median	17,553,745	22,262,238	81.97000
Maximum	24,194,623	34,125,638	95.64000
Minimum	8,978,291	13,393,625	66.85000
Std. Dev.	3,621,157	5,836,484	6.934618

The econometric analysis explores the long- and short-term relationships between the REDK variable and the IHR and ITH variables. Based on this, two models are analyzed:

- **Model 1:** IHR=f(REDK)
- **Model 2:** ITH=f(REDK)

3.2. Econometric Methodology

Stationarity tests were conducted using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. To determine the optimal lag length of the variables included in the system, commonly used criteria in the literature were employed. These criteria include the Final Prediction Error (FPE), Hannan-Quinn (HQ), Schwarz (SC), Likelihood Ratio (LR), and Akaike Information Criteria (AIC). For the long-term relationship, the Bayer-Hanck (2013) cointegration test was used. The short-term dynamics were analyzed using an error correction model.

3.3. Findings and Evaluation

The initial phase involved stationarity testing for the variables. The results are summarized in Table 4.

Table 4: ADF and PP Unit Root Test Results

Variables	ADF		PP	
	Constant	Constant + Trend	Constant	Constant + Trend
İHR	-0.956(0.124)	-1.107(0.136)	-0.978(0.127)	-1.112(0.155)
İTH	-0.825(0.131)	-0.991(0.144)	-0.877(0.150)	-1.055(0.167)
REDK	-1.023(0.149)	-1.176(0.152)	-1.128(0.157)	-1.242(0.289)
Δ*İHR*	-9.451(0.001)*	-9.708(0.002)*	-9.613(0.008)*	-10.013(0.011)*
Δ*İTH*	-8.764(0.045)*	-9.036(0.009)*	-9.150(0.000)*	-9.821(0.004)*
Δ*REDK*	-9.560(0.006)*	-9.910 (0.000)*	-9.811(0.000)*	-10.110(0.000)*

*Stationary at the 5% significance level

Note: The values inside the parentheses (p) represent values, and the Δ symbol denotes the first-order difference. The results indicate that all variables possess unit roots at their levels, but they become stationary at first differences, i.e., integrated of order I(1).

The lag lengths for the cointegration analysis are determined in Table 5.

Table 5: Lag Length Selection Criteria

Criterion	Model 1	Model 2
LR	2 lags	1 lag
FPE	1 lag	2 lags
AIC	2 lags	1 lag
SC	2 lags	2 lags
HQ	2 lags	2 lags

For both models, the majority of criteria suggest a lag length of 2. In this case, the cointegration analysis will be conducted using the first-order differences of the variables and a lag length of 2.

3.3.1. Bayer-Hanck (2013) Cointegration Test

Bayer and Hanck (2013) developed a new test that combines the cointegration tests of Engle and Granger (1987), Johansen (1991), Boswijk (1994), and Banerjee et al. (1998), motivated by the contradictory results of cointegration tests in the literature. In their study, Bayer and Hanck (2013) combined the p-values (significance levels) of these tests to form a more robust cointegration test. The cointegration test in Bayer and Hanck (2013) includes Engle-Granger (1987)'s single-equation test, Johansen (1991)'s multiple-equation test, Boswijk (1994)'s error correction term-based test, and Banerjee et al. (1998)'s test by taking their respective p-values into account (Shahbaz et al., 2013: 10). The Bayer-Hanck (2013) cointegration test combines individual p-values following Fisher's chi-square distribution formula (Arı, 2016: 61).

$$EG - JOH = -2[In\,(P_{EG}) + In\,(P_{JOH})] \quad (1)$$

$$EG-JOH-BO-BDM = -2\,[In\,(P_{EG}) + In\,(P_{JOH}) + In\,(P_{BO}) + In\,(P_{BDM})] \quad (2)$$

The PEG, PJOH, PBO, and PBDM in Equation (1) and Equation (2) represent the p-values of the cointegration tests by Engle-Granger (1987), Johansen (1991), Boswijk (1994), and Banerjee et al. (1998), respectively. If the calculated test statistic is greater than the critical value determined by Bayer-Hanck (2013), the null hypothesis of no cointegration is rejected, and it is concluded that a cointegration relationship exists between the series. The results of the Bayer-Hanck cointegration test are presented in Table 6.

Table 6: Bayer-Hanck Cointegration Test Results

Models	EG-JOH	EG-JOH-BO-BDM	**Cointegration**
Model1: FLogİHR=f(FLogREDK)	27.594*	31.684*	**Var**
Model2: FLogİTH=f(FLogREDK)	24.223**	25.437**	**Var**
Significance Level	Critical value	Critical value	
%1 level	26.563	28.835	
%5 level	21.609	26.261	
%10 level	17.254	19.643	

Note: The * and ** symbols indicate cointegration at the 1% and 5% significance levels, respectively. The "F" symbol represents the first-order difference.

When examining the results of the Bayer and Hanck (2013) cointegration test, it is observed that the two calculated Fisher Test statistic values are greater than the critical value for all models, indicating the existence of a cointegration relationship between REDK and IHR, as well as between REDK and ITH. Thus, the presence of a long-term relationship between these variables has been determined. For the two models where a cointegration relationship was identified, long-term cointegration coefficient estimates were obtained using the Fully Modified Ordinary Least Squares (FMOLS) method.

Table 7: FMOLS Long-Term Cointegration Coefficient Estimates

Model	**coefficient**	**p**
Model 1: FLogİHR=f(FLogREDK)	0.160	0.238
Model 2: FLogİTH=f(FLogREDK)	0.221	0.105

While conducting the FMOLS method analyses, autocorrelation and heteroscedasticity issues were addressed using the Newey-West method. No assumption deviations were detected as a result of the assumption tests. For the two models considered, the REDK variable does not have a statistically significant effect on the IHR and ITH variables ($p>0.05$). It was determined that the long-term relationship obtained for the period under consideration is not statistically significant.

As a result of the insignificant long-term relationships, a Vector Error Correction Model (VECM) was estimated to investigate the short-term dynamics. The information obtained from this estimation is presented in Table 8.

Table 8: VECM Short-Term Dynamics Estimation Results

Model 1	**coefficient**	**Diagnostic tests**
$FLnREDK_t$	0.148	R^2 =0.213, *F(p)*=0.246,
ECT_{t-1}	-0.348	***Breusch-Godfrey LM Test*** *(p)*= 0.108**,**
Constant	1.583	***White Test*** *(p)*=0.138, ***Ramsey RESET Test (p)***= 0.314 **, JB test** (p)=0.275
Model 2	**coefficient**	**Diagnostic tests**
$FLnREDK_t$	0.205	R^2 =0.196, *F(p)*=0.187,
ECT_{t-1}	-0.295	***Breusch-Godfrey LM Test*** *(p)*= 0.173**,**
Constant	1.261	***White Test*** *(p)*=0.148, ***Ramsey RESET Test (p)***= 0.102 **, JB test** (p)=0.365

The diagnostic tests (Breusch-Godfrey for autocorrelation, White for heteroskedasticity, Ramsey RESET for model specification, and Jarque-Bera for normality) indicated no significant issues in the models. However, the error correction term (ECT) coefficients for both models are negative but not statistically significant.

This suggests that the error correction mechanism is not functioning effectively, and no significant short-term relationships were identified between REDK and either IHR or ITH.

3.3.2. Findings

a) **Long-Term Analysis:** The Bayer-Hanck cointegration test results indicated long-term relationships between the real exchange rate (REDK) and exports (IHR) and imports (ITH). However, FMOLS estimates revealed that these relationships are not statistically significant for the analyzed period.
b) **Short-Term Analysis:** The VECM results failed to establish any statistically significant short-term relationships between REDK and the dependent variables, indicating the absence of significant short-term dynamics.
c) **Diagnostic Tests:** No major violations of model assumptions were detected, ensuring the robustness of the econometric methods applied.

4. CONCLUSION

This study aims to examine the impact of real effective exchange rate (REER) changes on Turkey's imports and exports during the 2018-2024 period and reveals, based on findings obtained through various econometric methods, that these effects are limited in both the short and long term.

The long-term analysis of the study employs the Bayer-Hanck (2013) cointegration test results, which indicate the existence of a long-term relationship between REER, exports (EXP), and imports (IMP). However, the long-term coefficients calculated using the FMOLS method were found to be statistically insignificant. This finding suggests that the external trade performance of the Turkish economy during the analyzed period is not sensitive to REER changes. This outcome highlights that both structural economic factors and the composition of trade products limit the responsiveness to exchange rate fluctuations.

Similar findings in the literature align with previous studies on the Turkish economy. For example, studies by Hepaktan (2009) and Uslu (2018) demonstrate that Turkey's exchange rate elasticities are limited and that the Marshall-Lerner (M-L) condition does not fully hold in the long run. These studies emphasize that the limited effects of REER can be explained by structural issues and the low price elasticities of trade products.

The short-term analysis of the study employs a Vector Error Correction Model (VECM) to investigate short-term dynamics, revealing no significant short-term relationship between REER, EXP, and IMP. Although the error correction term coefficient is negative, it was found to be statistically insignificant, indicating that the error correction mechanism does not function effectively. This finding implies that exchange rate changes do not have a significant short-term impact on exports and imports, which are less sensitive to economic fluctuations.

A similar conclusion was reached in a study conducted by Hooy and Chan (2008) on the Chinese and Malaysian economies, showing that exchange rate changes have limited effects in the short term and that long-term effects are more pronounced. Likewise, Uslu (2018) emphasizes that exchange rate shocks do not manifest quickly enough in the short term for Turkey.

The findings of this study align with the literature suggesting that the M-L condition generally becomes effective in the long term but remains limited in economies like Turkey with relatively low price elasticities (Boyd et al., 2001; Dong, 2017). Furthermore, the study indicates that the less flexible composition of Turkey's imports and exports restricts the effectiveness of exchange rate policies.

Therefore, the following policy recommendations are crucial for improving Turkey's foreign trade performance;

Increasing Export Product Diversity: Shifting towards high value-added products in exports is necessary to offset the limited effects arising from low price elasticities.

Supporting Technological Transformation: Enhancing exports of high-technology products can improve resilience to exchange rate fluctuations.

Revising Trade Policies: Developing long-term policies to create competitive advantages in strategic product groups.

Ensuring Macroeconomic Stability: Prioritizing macroeconomic stability to amplify the effects of exchange rate changes.

In conclusion, supporting exchange rate policies with structural transformation initiatives is essential for improving Turkey's foreign trade performance. The limited impact of REER changes highlights the need for policymakers to adopt a younger and more dynamic approach.

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