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THE VOLUME OF FOREIGN TRADE AND RELATIONS OF CURRENCY ARDL BOUND TESTING ANALYSIS (TURKEY EXAMPLE)

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Abstract

The study aims to produce scientific results for policymakers. Theoretical studies are consistent with the results obtained in this study. The USD / TL parity used in the analysis was used as the dependent variable, and import and export data were used as independent variables. Central Bank of the Republic of Turkey from the Electronic Data Dissemination System (EDDS) has received data set covering the period 2013M01-2020M07 and consists of 91 observation posts. The autoregressive Delayed Distribution Model (ARDL) was preferred in the analyzes because the data were stable to different degrees.

As a result of the statistical analysis, a cointegration relationship was found between variables according to the estimated model, but the long-term relationship was not found significant according to the "P" value. When the values calculated according to the Bayesian approach are interpreted, it can be said that there is a long-term negative relationship between the dependent variable exchange rate and the import of the independent variables. It can be said that there is a positive relationship between exchange rate and exports.

As a result, according to the findings of the research, a consistent relationship with long-term cointegration and theory was found. However, due to the difference in the results, it cannot be mentioned in the studies in the literature.

Keywords: ARDL Bounds Test, Conventional Exchange Rate Theory, Foreign Trade and Exchange Rate Relationship.

1. INTRODUCTION

In this article, the direction and ratio of the relationship between the dependent variable dollar / TL rate and the independent variables import and export quantity are analyzed. The theoretical framework of the relationship has been described as "traditional exchange rate theory". The traditional exchange rate theory assumes a relationship between the balance of payments and the exchange rate. Import and export amounts are followed in the main balance of payments accounts.

This study presents a comprehensive literature (1973-2018) examining the relationship between foreign trade volume and exchange rate variables. When the literature is examined, it is noteworthy that the results obtained differ.

According to Aktaş (2010), the results are contradictory since there is no relationship between exchange rate and foreign trade volume. According to Vergil and Erdoğan (2009: 36), different development levels and analysis methods of the countries studied affect the results. Either (1973); Dellas and Zilferfarb, (1993); According to McKenzie (1999), the results may differ as the internal dynamics of the analyzed country (such as investment risk, investor attitudes, consumer preferences, and substitute product status) affect the exchange rate more than imports and exports. Clark et al. (2004: 20-21) links the different results obtained in the studies to the political and economic structure of the country studied, to the data set, variability and preferred analysis methods.

This employee aims to produce scientific data for policymakers. Selected analysis method (ARDL) and Bayesian approach used in interpreting the results contribute to the literature. The sample consists of 91 observations for the period 2013M01-2020M07. In the study, the USD / TL rate is the dependent variable, and the import and export data is the independent variable. The time series used in the study, Turkey's Central Bank from the Electronic Data Dissemination System (EDDS) is taken as secondary data. It is thought that using different methods with the same data set will affect the results.

In this study, the Traditional Exchange Rate Theory was first discussed. Later, a large literature on the exchange rate and foreign trade volume variables was explained. In the last section, the stationarities of variables are examined by unit root test. Specification analysis was performed for the model estimated by ARDL. The proposed statistic was considered reliable as all tests were compatible with the assumptions. As a result, cointegration between variables was found for the predictive model according to the analysis results. Also, the calculated statistics

show that the long-term relationship is meaningless. However, considering the signs of statistical values calculated according to the interpretive Bayesian analysis, a long-term inverse relationship between the dependent variable exchange rate and imports and a similar relationship with exports were observed.

2. THEORY (TRADITIONAL EXCHANGE RATE THEORY)

In international trade relations, payment is usually made in reserve currency. Therefore, the Traditional Exchange Rate Theory discusses the effect of foreign trade volume on the exchange rate. In other words, the basic assumption of the theory is the relationship between foreign trade volume and exchange rate. According to the theory, it increases the exchange rate required to finance the current account deficit. The foreign exchange supply causes the exchange rate to fall. In other words, the exchange rate takes a position according to the balance of payments.

According to Seyidoğlu (2007: 418), all variables that affect foreign trade volume also affect the exchange rate. The exchange rate is also directly related to the general price level in the international market. There is an inverse relationship between the exchange rate and import. While the demand for the product whose price is falling in the market increases, the demand for the product whose price is increasing decreases (Krugman and Obstfeld, 2003: 436-37; Altıntaş and Çetin, 2008: 36-37). In other words, while the increase in the exchange rate decreases the demand for imported products, it increases the demand for domestic products. As the demand for imported goods increases, the foreign exchange supply also increases (Dinler, 2007: 240).

Foreign exchange demand refers to the financing to be paid at the end of the current year (Dinler, 2007: 240). Therefore, one of the main variables affecting the foreign exchange supply in the domestic market is export. The theory claims that there is a similar relationship between export and exchange rates. Export-based imports are also directly affected by exchange rate changes. Therefore, the change in the exchange rate changes the competitiveness of the country. As the change in the currency will affect the price of imported products, changes in consumer preferences are expected. As a result, substitution can cause a reduction in domestic production. The decrease in the domestic market also affects the labour market negatively (Bilgin, 2004: 82).

Unstable exchange rates increase the uncertainty in foreign trade. Therefore, it negatively affects long-term plans and commercial relationships. Conversely, a stable exchange rate

increases confidence in the market. The safe market also facilitates the investor to establish long-term commercial relationships (Salvatore, 2019: 9; Baxter and Kouparitsas, 2006: 11). Due to the fluctuations in exchange rates, the risk to be undertaken by international businesses increases. The high risk in foreign trade causes a contraction in import and export volumes. That is, there is a negative relationship between exchange rate volatility and foreign trade volume (Hodge, 2005: 5).

In reality, as the theory suggests, foreign trade volume is not the only variable affecting exchange rate change. Different results obtained in empirical studies prove this. According to Arize (1997) and Takaendase et al. (2005), national and international uncertainties also affect the exchange rate level. Also, these uncertainties harm imports and exports. When uncertainty increases, domestic investors are expected to use their savings in favour of foreign exchange. Apart from this, the portfolio preferences of foreign investors and loans were taken from international financial institutions also affect the exchange rate (Ertek, 2007: 413-414). Markets and financial structures of countries without reserve money features are more affected by changes in exchange rates. Therefore, the competitiveness of states in international markets is directly dependent on exchange rate changes (Yılmaz and Kaya, 2007: 70).

As a result, although the theory has been heavily criticized, it has provided very simple and useful suggestions for understanding the relationship between exchange rate and terms of trade. In summary, the dependent variable of the traditional exchange rate approach is the exchange rate and the independent variable is the trade rates. The assumption of the theory is a fully integrated foreign trade and free exchange rate regime. Therefore, the trade rate at the end of the current year is the main variable in the up or down movement of the exchange rate. Many variables in the real world affect both the exchange rate and terms of trade. Some of these are global eco-political and strategic choices, cultural differences and ideological influences. The variables are not quantitative, making it difficult to analyze the relationship with the exchange rate.

3. LITERATURE

Many studies in the literature investigate the relationship between the exchange rate and foreign trade volume. However, it is seen that studies have reached quite different results from each other. The reasons for the different results may arise from the level of development of the country studied, the variety of samples and variables, and different geopolitical situations. Besides, variables that cannot be included in the established model change the results of the studies. Advances in information processing technologies can also cause different results.

Therefore, it will not be very meaningful to develop an eco-political strategy according to the literature. Every country, every business, every economic structure should be suggested to act according to their own analysis. The reason for keeping the literature wide is that empirical findings lead to different results.

Clark (1973) found an inverse and significant relationship between exchange rate risk and foreign trade volume. However, Hooper and Kohlhagen (1978) could not find any relationship. Koch and Rosensweigh (1992) analyzed the relationship between the US dollar and the US foreign trade volume using the Granger Causality Test and found a weak relationship between dollar trade volume. Therefore, he criticized the assumptions of the Traditional Exchange Rate Theory. Savvides (1992) examined the impact of exchange rate changes on foreign trade volume in both developed and developing countries. Thus, it has been proven that the development levels of the countries affect the results. Similarly, Als and Oskooee (1995) could not find a long-term relationship between variables in their study, where they examined the relationship between exchange rate and foreign trade for developed and less developed countries. Unlike others, Sercu and Uppal (2003) linked the relationship between exchange rate and foreign trade volume to transportation costs and risk factors.

Baum et al. (2004) analyzed the relationship between foreign trade volume and exchange rate of thirteen developed countries using the GARCH method, but could not reach a meaningful result outside Germany. Wang and Barrett (2007) analyzed Taiwan's foreign trade figures on a sectoral basis with the exchange rate variable. In the analysis made with the GARCH-M method, it could not find a relationship in other sectors other than the agricultural sector and exchange rate.

Petrović and Gligorić (2010: 23-41) analyzed Serbia's foreign trade volume and exchange rate data for the period 2002M01-2007M09 with the ARDL boundary test. It determined that the change in the exchange rate had a positive impact on foreign trade volume in the short and long term. Baek (2014) examined the trade volume and exchange rate relationship between the USA and South Korea. In the analysis made with the ARDL limit test, it is concluded that exchange rate changes have a direct effect on the foreign trade volume for both countries. Barak and Naimoğlu (2018) examined foreign trade and exchange rate changes in five fragile countries. As a result of ARDL panel data analysis, it found a strong correlation in the same direction between trade volume and exchange rate in both the long and short term.

As a result, when the literature is examined, it is seen that there are many studies. When the studies in this article are examined, it is seen that the development levels, currencies,

analysis methods and data sets of the countries are different. Each different variable directly affects the experimental results.

4. METHOD

Central Bank of the Republic of Turkey Electronic Data Dissemination System Study (EDDS) data are used. Analyzes were made with Eviews 10 program. USD / TL exchange rate dependent variable, import and export volume are independent variables. The data set consists of 91 observations for the period 2013M01-2020M07. Due to the root types of the data, the ARDL Boundry test was used in the analysis. The long and short term cointegration relationship between variables and the direction of the relationship was examined in the study. Results are evaluated according to both classical and Bayesian approaches. Empirical findings may differ according to the data set used, analysis method and package program.

4.1. Analysis Method

According to ARDL Boundary test approach; The calculated value is compared with the calculated table values and comments are made. For the reliability of ARDL Limit test results, other tests should be applied to the data sets before and after the test. According to Pesaran, Shin, and Smith (2001), the ARDL boundary test can analyze the degree of cointegration between variables. The variables are expected to be stationary at the I (0) level or I (1) level. According to Quattro (2004), it would be wrong to use variables that do not provide the assumption of stationarity.

Before proceeding to the ARDL Boundary Test, the stationarity checks of the time series are made. For fixed series, a model is estimated by the ARDL Limit Test. Specification tests should be done to make the predicted model meaningful. These tests; Autocorrelation Test, Variance Analysis, Specification Error Analysis and Normality Tests. The model passing the specification tests can be interpreted in terms of short and long term cointegration and relationship according to the calculated values. The interpretation of the same values with a Bayesian approach is the researcher's choice.

4.2. Unit Root Test

Often, financial data take an erratic path. However, in econometric analysis, the data are expected to be stable for correct results. Therefore, the first step in the analysis is to determine the stationarity (unit root) in the series. Many methods have been developed for unit root research. Each test has its strengths and weaknesses and can offer different results. However, the literature does not present any restrictions on the method researchers will choose. In this

study, the Phillips-Perron Unit Root Test was preferred. The stationarity results of the variables used are given in Table 1.

Table 1. Stationary Results of the Variables

Variable	Calculated Statistics	Calculated P value	Explanation
USD / TL Rate	-5.944.502	0.0000	Calculated Phillips-Perron test statistic = -5.944502 is stationary since it is -3.50559 at 1% significance level. Likewise, it is fixed for 5% and 10%. Test data is significant as P = 0.0000 <0.05. In I (1).
Import	-4.411.013	0.0006	Calculated Phillips-Perron test statistic = -4.411013 is stationary since it is -3.504727 at 1% significance level. Likewise, it is fixed for 5% and 10%. Test data is significant as P = 0.0006 <0.05. I (0)
Export	-5.983.997	0.0000	Calculated Phillips-Perron test statistic = -5.983997 is stationary since it is -3.504727 at 1% significance level. Likewise, it is fixed for 5% and 10%. Test data is significant as P = 0.0000 <0.05. I (0).

As a result, the exchange rate data is fixed in I (1). Data import and export is constant at the I (0) level. Therefore, the difference series was used for exchange rate data in the analysis. However, the originals of export and import data were used.

4.3. ARDL Bounds Test

As a result of the analysis, the adjusted period 2013M07 2020M07, lag time 12, estimated ARDL model (5,0,0) was calculated. Based on the calculated values, the model was estimated with 85 observations due to the delays.

When Table 2 is examined, the estimated (5, 0, 0) model is significant since P = 0.000009 <0.05. The calculated F-statistic = 9.365713> I (0) bound and/or I (1) boundry indicates the cointegration relationship between the variables.

Table 2. ARDL Bounds Test Statistics

F-statistic	9.365713	2
Significance	I0 Bound	I1 Bound

10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

A value between I (0) boundary and I (1) boundary indicates that the cointegration between variables is not clear. Therefore, the values in Table 2 show that there is a cointegration relationship between variables at all levels.

4.4. ARDL Long Term Relationship Test

The Long Term Test statistic calculates the long term correlation coefficient of the model. When Table 3 is examined, the relation with 0.05 significance is insignificant since export P = 0.9540 and import P = 0.5526> 0.05. However, 0.10 is significant.

Table 3. Long-term Relationship Test Statistics

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Export	0.000000	0.000000	0.057894	0.9540
İmport	-0.000000	0.000000	-0.596501	0.5526
C	0.134078	0.161454	0.830439	0.4089

The sign of the calculated Coefficient value gives information about the direction of the relationship. In this context, while there is a long-term adverse relationship between the exchange rate and imports, it can be mentioned that there is a correlation in the same direction with exports.

For cointegration and long-term relationship to be significant, the estimated ARDL Boundary Test Model should be analyzed with specification tests.

4.5. Specification Analysis

Before the predictive ARDL model can be interpreted, it must go through some feature revisions. When the test results are examined;

Autocorrelation Analysis (Series Correlation LM Test);

Autocorrelation is not required for the series and predicted ARDL model used. For this, the Breusch-Godfrey Series Correlation LM Test can be used. Since the calculated P Chi-Square is 0.8907> 0.05, there is no autocorrelation problem in the model.

Normality Test (Jarque-Bera);

It examines whether the variables are normally distributed. For this purpose, the Jarque-Bera normality test can be done. The series is normally distributed as P = 0.476754> 0.05.

Heteroscopicity Test;

Examines whether there is a variance problem in the model. For this purpose, the Breusch-Pagan-Godfrey Test can be used. Calculated test statistic Obs * R-square is 8.063092 and since the probability value for this value is P Chi-square (7) = 0.3271> 0.05, the variance of the model is constant.

Specification Error Analysis (Neglected Variables);

It examines whether there is a specification error in the model. For this, "Inverse Value Squares" can be used. The purpose of the test is to see if errors were made while building the model. Since the calculated F statistic value is 0.000912 and the probability of this value is P = 0.9760> 0.05, there is no specification problem in the series.

When the assumptions of the ARDL Bounds Test estimation model are examined; There was no specification problem in the model. In this case, cointegration and long-term relationship results can be accepted for ARDL test.

4.6. ARDL Bounder Test Results

In this study, the USD / TL series is the dependent variable consisting of 93 observations. Data import and export are arguments. For the Unit Root test, the exchange rate remained constant at I (1), with import and export data at I (0). The model (5, 0, 0) was estimated with the ARDL Limit Test. The number of observations dropped to 85 due to the model's delayed prediction. The cointegration relationship between the predictive model and the variables was found. However, although the statistics calculated for a long-term relationship are not significant for P = 0.05, they are also significant for P = 10.

When the signs of the statistical values calculated are evaluated with the Bayazcı Approach, it can be said that there is a long-term inverse relationship between the dependent variable exchange rate and imports. A long-term relationship has been found in the same direction as exports. The results obtained in this study are consistent with the theory. However, it is not possible to say the same for the literature.

5. CONCLUSION AND RECOMMENDATIONS

In an economic context, policy makers aim to increase social welfare. Economic tools are used to develop policy making strategies and achieve goals. In doing so, keeping the general

level of the exchange rate under control, which is thought to be directly related to all economic processes, should be one of the first goals. To keep the exchange rate stable, it is necessary to understand the variables that are thought to affect the exchange rate. The purpose of this study is to produce scientific data for policy makers. The results obtained in this study coincide with the theory.

The literature can produce very different results even in the same analyzes due to its different economic structures, foreign trade policies and internal dynamics that are very difficult to predict. For this reason, it cannot be said that the result of this study is fully compatible with the literature. Further studies with other macro and micro variables are recommended to understand the change in exchange rate correctly.

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