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CURRENCY DEPRECIATION IN RALATION TO INTERNATIONAL TRADE:EVIDENCE FROM TURKEY

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Abstract

The paper examines the issue of currency depreciation in relation to international trade in Turkey spining the period 1990-2020 Autoregressive Destributive lag Model (ARDL) approach. The results reveals that inflation,Trade openness shows the positive long-run relationship with currency devaluation. While, exchange rate and remittances indicates negative relationship with currency devaluation that is influx of currency into the economy increases the value of such currency in domestic economy this will devaluate it. This also shows that there is a long run relationship between trade openess and currency devaluate that when there is increase in currency devaluation the acticities of trade will also increase. The study recommends that the government should encourage exports and discourage importation so as to have positive balance of trade as well as balance of payment.

Keywords: Trade, Inflatıon, Internatıonal Mıgratıon, Remıttances

JEL Classification: F18, E31, E51, F22, F24.

1. Introductıon

Integration into the world economy helps countries boost their economic growth and development and reduce poverty. After the trade liberalisation process has accelerated with the establishment of World Trade Organization (WTO) in early 90s, especially developing countries have become much more important in world trade and they have increased their incomes dramatically (IMF, 2001). However, trade liberalisation has created some serious problems in terms of exchange rate during the years.

For any country, the first effect is that an overvalued exchange rate will result in a balance of payments deficit, owing to the fact that trade liberalization will lead import prices to fall while import volumes to rise. With export production only responding to more favorable incentives with a time lag in the short term and the elimination of anti-export bias in trade policy, a country is likely to experience a balance of payments deficit, which may become unsustainable if the currency's real exchange rate is overvalued and continues to discriminate against exports. This may finally lead to the abandonment of the trade liberalization effort (Collier & unning, 1992). In contrast, a continued over-depreciation of a currency after trade liberalisation may unnecessarily boost import prices for both producers and consumers, restoring part of the pre-liberalisation anti-export bias to output. The negative effects of an unjustified and continued currency depreciation may be inflation, which will erode the advantage offered to exporters by a depreciated real exchange rate, or contraction due to higher rand import values, which is a leakage from the domestic economy and may also lead to import compression (Besley & Collier, 1989).

Selection of foreign trade policies for the economies of developing countries such as Turkey is important. Turkey, which entered into a radical trade change process in 1980, transitioned her trade liberalisation policies within the scope of the post-1980 liberalization process (Utkulu & Seymen, 2004). Turkey's trade activities has also accelerated by the help of adopting Customs Union Decision in 1995. Therefore Turkey eliminated customs duties for industrial goods of European Union (EU).

Turkey experienced many economic crisis during 90s and 2000s and international trade activites changed drastically as the Turkish currency "Lira" fluctuated severely. The share of intermediate and investment goods in total imports in Turkey fluctuated between 80 percent and 90 percent in the 1970-2020 period. In 2020, approximately 75 percent of total imports belong to intermediate goods and approximately 15 percent belong to investment goods. Especially since the import of intermediate goods is necessary for production increase and economic growth, the import of these goods is not very sensitive to price changes. Although the prices of investment goods increase, these goods must be imported for the continuity of production. Therefore, the diversity of goods in imports makes it difficult for the real exchange rate to affect imports. In terms of exports, the fact that nearly half of total exports (40 percent in 2020) are in consumer goods may mean that the real exchange rate may affect exports more. However, since approximately 60 % of total exports are in intermediate and investment goods, and the import of intermediate and investment goods is necessary in the production of these products, imports are inevitable for an increase in production and exports. In addition, it is expected that the effect of real exchange rate on exports will be more than the effect on imports in the short run (Çatalbaş, 2021).

In recent years, the Turkish lira has been depreciating rapidly against foreign currencies, which is affecting Turkey's international trade activities. The main objective of this study is to test the economic effects of the decline in the Turkish lira in relation to international trade. Specifically, this study aims to:

i. Examine the trend and pattern in exchange rate as relates to foreign trade activities in Turkey.

ii. Analyze the significance of Turkish Lira's indicators in the trade process of Turkey.

This paper is organized as follows; section two reviews the literature. Section three presents estimation technique used in the analysis. Section four is results and discussion while section five is conclusions and policy recommendations.

2. Lıterature Revıew

2.1 Conceptual Issues

Currency depreciation is a fall in the value of a currency in terms of its exchange rate versus other currencies, it can occur due to the factors such as economic fundamentals, interest rate differentials, political instability, or risk averson among investors.

International trade also known as foriegn trade or externatal trade involves the exchange of goods and services between two or more countries. The principles underlying the buying and selling between one country and another is specialization (Cole, 2015).

2.2 Theoretical Literature Review

In the last few decades, a large number of studies have been conducted to investigate the short and long run relationships between the exchange rate and the trade balance. One of the very first attempts in the literature to outline the possibility of the J-curve phenomenon was made by Magee (1973). He proposed two possible explanations for the existence of a deteriorating trade balance as a result of currency depreciation. Initially, contract rigidities take time to wear off. Secondly, currency depreciation has a pass-through effect on domestic prices, which may not occur for some time after the depreciation.

It is important to reveal short and long term effects of exchange rates on the trade balance in Turkey, which has a chronic current account deficit problem for many years. Because, firstly, if there is no stable long-term relationship between the exchange rates and trade balance, then Turkey's competitive power cannot be increased and the current account deficit problem cannot be solved. Secondly, if there is a relationship between the two variables, benefits resulting from positive developments in the trade balance must be greater than the costs incurred due to devaluation (due to the J-curve effect, trade balance may be adversely affected especially in the short run).

Third, these effects will provide information about international economic activities and hereby will help governments and central banks in creating exchange rate policies (Vergil & Erdoğan, 2009).

Literature reviews by Bahmani-Oskooee and Ratha (2004) and Bahmani-Oskooee and Hegerty (2010) investigate the "J-Curve" effect, in which depreciations are followed by a temporary deterioration of a country's trade balance before an improvement takes hold, and subsequent studies have expanded on this literature. First, introduction of error-correction modelling and cointegration techniques led Rose and Yellen (1989) provide a new definition of the J-curve, i.e. short-run deterioration in the trade balance (assessed by error-correction modelling) combined with long-run improvement (assessed by cointegration method). The second direction is due to introduction of asymmetric error-correction modelling and asymmetric cointegration by Shin et al. (2014) which led Bahmani-Oskooee and Fariditavana (2015, 2016) to introduce the concept of asymmetric J-curve. In general, mixed results have been discovered, regardless of whether the trade is aggregate, bilateral, or industry-level.

Since the theoretical overview does not give a clear answer about the connection between currency depreciation and international trade, it is necessary to make an overview of empirical research which is the topic of the next section.

2.3 Empirical Literature Review

Kamoto (2006), examined the validity of the J-Curve effect on trade balance sheets as a result of the devaluation in the study connected with the methods of South Africa and Malawi for the period of 1970-2004 using multiple cointegration analysis, impulse-response function and error correction model. According to the results of this study, positive effects were found for South Africa and J-curve effect was realized, but for Malawi significant results could not be reached and the J-curve was not realized. Choi (2017), explored the impact of the real Exchange rate and its volatility on trade balance and real GDP using 18 OECD countries. The study found that real currency depreciation leads to improvement of trade balance in most of the examined developed countries, but trade balances after real depreciation of currency do not follow J-curve patterns. In the case of Armenia, Barseghyan and Hambardzumhyan (2017) investigated the impact of exchange rate volatility on Armenia's export with it's leading trading partner within the range of 2007 and 2016. They opined that volatility of exchange rate has a significant negative impact on export both in the short and long run. Kumar et al. (2020) researched the impact of currency depreciation on exports in SAARC -Bangladesh, India, Pakistan and Sri Lanka- countries from 1981 to 2017 using panel ARDL and ECM techniques. The panel ARDL model revealed an inverse relationship of currency depreciation with exports in the long run and significant implication of ECM in the short run.

Among some actual studies, Oluwatoyın et al. (2021), analyzed the impact of currency fluctuations on export revenue of some selected African countries for the period of 1990 to 2019. For the estimation of the variables GMM is applied. They revealed that inflation rate has positive but without significant effect on export revenue of the selected countries, while money supply and exchange rate has strong, poisitive and statistical significant effect on export revenue. Dilanchiev and Taktakishvili (2021) inspected the impact of Georgian Lari's exchange rate depreciation on Georgia's export using monthly GEL exchange rate data from May 2006 to April 2020. The paper employed Autoregressive Distributed Lag Model (ARDL). They observed that the exchange rate depreciation has an inverse long-run effect on export in the long-run period. According to the outcomes, the exchange rate impact on Georgia's export shows inelastic demand for Georgia's export goods.

In the extant literature, there are also several studies about currency depreciation-trade nexus in Turkey. For example, Brad et al. (1997), examined the validity of J-Curve with the error correction model and cointegration methods using quarterly data between 1969:1-1993:1. When the results of the study are considered on the basis of two separate periods, in the first period (1969:1-1979:4) any relationship between the exchange rate and the trade balance is out of the question. However, in the second period (1980:1-1993:1) after 1980 foreign trade liberalization and exchange rate-balance of payments in Turkey, it became obvious that there is a relationship. Accordingly, in this study, devaluation causes a deterioration in the trade balance in the first period. After seven periods, that is, in the long term,

improvement starts in the trade balance. This situation demonstrates the validity of the J-Curve in Turkey after 1980. Yılmaz and Kaya (2007) analyzed the data for the period 1990-2004 with VAR, Granger causality, variance decomposition and impact-response analysis and found that there is a mutual causality relationship between imports and exports. Besides they asserted that the changes in the real exchange rate did not have a significant impact on the foreign trade balance and conlcuded that the J-curve is not valid for Turkey. Yazici and Klasra (2010) investigated response of two sectors of Turkish economy, i.e. manufacturing and mining with 24.9% and 8.2% imported inputs respectively. They found an inverted J-curve pattern in both sectors. Barak and Naimoğlu (2018) examined the foreign trade volume and exchange rate changes of the fragile five countries, including Turkey, with ARDL analysis. In the study, a positive and significant relationship was found between the foreign trade volume and the exchange rate, both in the long and short term.

Among the newest studies, Sünbül (2021) investigated the real effective dollar sales rate and Turkey's import and export relationship with ARDL approach. The author found that there is there is a long-term negative relationship between the dependent variable exchange rate and the import from the independent variables. There is a positive relationship with export data. Çatalbaş (2021) analyzed the long and short term relationships between exports, imports and the real exchange rate in Turkey. Long-term relationship between the series was verified with vector error correction model (VECM) while short-term nexus was examined with the Granger causality test. According to the results of Granger causality test, it was found that there is a two-way causality relationship between real exchange rate and export at 1% significance level, and a one-way causality relationship from import to export and from import to real exchange rate. Furthermore, it was found that that deviations in the series in the short-term were stabilized in the long term. Lastly, Oskooee and Karamelikli (2021), found that the real lira-dollar rate has short-run asymmetric effects in 28 out of 45 industries that trade between Turkey and USA. By considering this, they added to asymmetric J-curve literature.

3. Methodology

3.1 Data and Sources

This part of the study explored the data source.. It involved annual data for Turkey on currency depreciation, exchange rate, inflation rate, export, and import which are all collected for the period spanning from 1990 to 2019. The data were obtained from Turkish central bank bulletin and World Bank (2019).

3.2 Method of Data Collection

The study used annual time series data and are all got from secondary sources which include Turkish central bank and World bank. Secondary data is a second-hand data collected by other parties and already having undergone statsitical analysis.

3.3 Model Specification

Currency depreciation is incorporated into the model in order to measure its effect and variation with the level of trade imbalances in the country as used by Mike (2016). Furthermore, exchange rate, inflation, remittances, and trade openness (tro) as a macroeconomic variables which also perceived by many scholars as the macroeconomic imbalance in the country.

Economic model is vital in model specification because it gives a partial relationship between the regressed and regressors in a precise manner as expressed in Equation 1:

$$trd_t = f(exr_t + \inf_t + rmt_t + tro_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$

Where

trd = total trade imbalances

Exr = exchange rate

Inf = inflation

rmt = remittance

tro = trade openness

e = error term

As usual the model in the equation (1) can be transformed in to the econometrics model as expressed in equation 2:

$$\ln Trd_t = \beta_0 + \beta_1 \ln exr_t + \beta_2 \ln \inf + \beta_3 + \ln rmt_t + \beta_4 \ln tro_t + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

β_0 is the coefficient of the lagged-dependent variable which shows the overall adjustment of the trade imbalances. β_1..... β_4 are coefficient of the explanatory variables expressed in logarithm.

3.4 ARDL model specification

In addition, the study applied the autoregressive distributive lag (ARDL) model approach to cointegration, which was popularized by Pesaran and Shin (1995), Pesaran and Smith (1997) and Pesaran, Shin and Smith (2001). This approach is chosen over other approaches because of its several advantages. First, ARDL approach can be applied without taking into account whether the explained variables are I(1) or I(0). This implies that the combination of I(1) and I(0) or mutually co-integrated are possible using ARDL approach. Second, it yields unbiased estimates in regression analysis and can be applied on small sample data while the Johansen co-integration requires large sample data for validity. Third, the ARDL approach to co-integration enables estimation using ordinary least squares method once the lag of the model is identified. Furthermore, Tang (2006) stresses that the ARDL approach is also applicable when the explanatory variables are endogenous and it has power to correct for serial correlation. Lastly, ARDL approach allows estimation of different variables with dissimilar optimal number of lags.

According to Pesaran and Smith (1997), the ARDL approach to co-integration requires the following two steps: First, to determine the existence of any long-run relationship among the variable of interest using F-test. Again, to estimate the coefficients of the long-run relationship and determine their respective values, followed by the estimation of the short-run parameters of the variables with the aid of error correction representation of the ARDL model.

The first step in ARDL approach is to estimate the conditional ARDL which is specified for Model 1 and expressed in the following equation as:

$$\Delta \ln trd_t = \beta_0 + \beta_1 \ln exr_{t-1} + \beta_2 \ln \inf_{t-1} + \beta_3 \ln rmt_{t-1} + \beta_4 \ln tro_{t-1} + \sum_{i=1}^{p} \theta_{i1} \Delta \ln trd_{t-1} + \sum_{i=1}^{p} \theta_{i2} \Delta \ln rmt_{t-1}$$

$$+ \sum_{i=1}^{p} \theta_{i3} \Delta \ln tro_{t-1} + e \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots eq(3)$$

where ß$_0$ is the drift component, µt is the stochastic error term, Δ is the first different operator, the parameters ß$_0$–4denote the long-run parameters, while θ$_1$–4 represents short-run parameters of the model to be estimated through the error correction framework of ARDL. lnexr is the natural log of exchange rate lntrdr is the natural log of trade imbalances, lnrmt the natural log of remittances, inf is the natural log of inflation, lnTOP is the natural log of trade openness , ρ is the optimal lag length and ß$_1$–4 are the coefficients to be estimated in the model.

After that we can equally apply equation (4) to estimate the hypothesis that there is no co-integration relationship among the variables against the alternative hypothesis that there is long-run relationship between the variables. This is specified as;

H0 : $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$

H1 : $\alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq 0$

α_1–α_4 remain as previously defined.

where ß$_0$ is the drift component, µt is the stochastic error term, Δ is the first different operator, the parameters ß$_0$–4denote the long-run parameters, while θ$_1$–4 represents short-run parameters of the model to be estimated through the error correction framework of ARDL. lntrd is the natural log of total trade imbalances, lnexr is the natural log of exchange rate, lninf is the natural log of inflation, lnrmt is the natural log of remittances, lntro is the natural log of trade openness , ρ is the optimal lag length and ß$_1$–4 are the coefficients to be estimated in the model.

However, it's important to look at the short-run and long- run coefficients of the variables in order to determine their behaviors in relation to terrorism as mentioned by Jibir& Aluthge (2019). To generate the long- run coefficient, equation (3) described in the coming equation as:

$$\ln trd_t = \beta_0 + \sum_{i=0}^{p} \beta_1 \ln trd_{t-1} + \sum_{i=1}^{p_1} \beta_2 \inf_{t-1} + \sum_{i=1}^{p_2} \beta_3 \ln rmt + \sum_{i=0}^{p_3} \beta_4 \ln tro_{t-1} + e_t \quad \text{.....(4)}$$

When the long-run cointegration equation were established, the short-run cointegration equation can be specified in the following manner

$$\Delta \ln trd_{t-1} = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta \ln exr_{t-1} + \sum_{i=1}^{p} \beta_2 \Delta \ln \inf_{t-1} + \sum_{i=1}^{p} \beta_3 \Delta \ln rmt_{t-1} + \sum_{i=1}^{p} \beta_4 \Delta \ln tro_{t-1} + e_t \quad \text{.....(5)}$$

Looking at the short-run ARDL model, $\beta_1 - \beta_4$ remain unchanged in the model, while Δ represents coefficients of short-run dynamic to be estimated.

4.0 Result and Discussion

4.1 Descriptive Statistics of the Data Used

Table 1 explains descriptive statistics. The mean average of yearly records of trade imbalance in Turkey are 22 % to a maximum value of 23.000 % , and the volatility was 3.3 %. In the same vein, the average yearly inflows of remittances to Turkey is 87 percent with a maximum value of 30 % , and also with the volatility as 21.2 %. Exchange rate has the average value of 16 % with a maximum value of 7.100 % and at the same time the volatility is recorded as 7.5 %, equally the trade openness has the mean value of 47 % with a maximum value of 62 % with the volatility as 8.20 %.

Table 1. Descriptive Statistics

	TRD	EXCHANGERATE	INFLATIONRATE	PERSONALREMITTANCES	TRADEOPENNESS
Mean	22.50777	1.619524	35.83000	0.871419	47.43016
Median	23.00600	1.426000	15.18000	0.308000	48.32800
Maximum	32.74100	7.016610	105.2200	2.211000	62.68300
Minimum	13.36500	0.002610	6.250000	0.106000	30.47600
Std. Dev.	4.549804	1.717238	32.55844	0.827395	8.498587
Skewness	-0.205878	1.559968	0.630303	0.493668	-0.361022
Kurtosis	3.390262	5.171788	1.839909	1.392246	2.810154
Jarque-Bera	0.415719	18.66544	3.790960	4.597957	0.719961
Probability	0.812321	0.000088	0.150246	0.100361	0.697690
Sum	697.7410	50.20523	1110.730	27.01400	1470.335
Sum Sq. Dev.	621.0215	88.46721	31801.56	20.53746	2166.780
Observations	31	31	31	31	31

Source: Author's computation using e-views 10

All the variables in the data set are positively skewed except trade and trade openness which are negatively skewed, but generally all the data are normally distributed.

4.2 Unit Root Test

Before adopting the ARDL bound test, we have to test for the stationarity of all the variables in the model to determine the order of integration of each of the variable. This is imperative because we want to ensure that the variables are not second-order stationary, that is I(2) and also to stay away from deceptive results. As reported by Ouattara (2006) the calculated F-statistics which Pesaran et al. (2001) furnished are not genuine in the company of I(2) variables, since the bound test are based on the assumption that variables are either I(0) or I(1). Therefore, the use of unit root test in the ARDL method may still be needed to make sure that

none of the variables are integrated of order 2 or above.

Table 2. ADF Results of the Unit Root Test

Variables	Order of integration	Included in the model	ADF test statistics	McKinnon critical value
Trd	**I(1)**	Trend and intercept	-5.347	5% = -2.97
Exr	**I(1)**	Trend and intercept	-3.218	1% = -2.65
Inf	**I(0)**	Intercept	-4.763	5% = -2.980
Tro	**I(0)**	Trend and intercept	-4.001	5% = -3.574

Source: (E-views 10, 2022)

The result of the Augmented Dickey Fuller represented in Table 2. The test was conducted both at level with trend and trend and intercept, and with differencing at level with trend and trend and intercept. As you can be ascertained in table 2 the result of the unit root test shows the presence of unit root (non-stationarity). On the application of the ADF for the variables to be stationary, the ADF statistics (in absolute terms) must be greater than the standard critical value at the level of significance: 1%, 5%, or 10%. The ADF result shows that trade imbalance, exchange rate are not stationary at level but they all became stationary after taking the first difference of the series at integration of order one i.e I(1) at 5% and 1% respectively. Inflation rate and trade openness are all stationary at level that the integration of order zero I (0) respectively.

Table 3: Phillips-Perron Test for Unit Root

Variables	Order of integration	Included in the model	Phillips-perron test statistics	McKinnon critical value
Trd	I(1)	Trend	-9.217	5% = -2.960
Exr	I(1)	Trend & intercept	-8.218	1% = -3.967
Inf	I(1)	Intercept	-5.302	5% = -2.967
Tro	I(1)	Trend & intercept	-8.116	1% = 3.679

Source: (E-views 10, 2022)

Phillip-perron test of the unit root is also applied and this can also be seen by comparing Phillip-perron test with critical values (absolute terms) at 1%, 5%, and 10% levels of significance. The Phillip's-perron result has shown that all are stationary but after taking the first difference of integration of order one i.e I(1) at 5%, 1%, and 10% levels of significance respectively.

4.3. Co-integration Analysis

The first step of the ARDL approach to co-integration is to estimate the conditional vector error correction model by using ordinary least square in order to test for the presence of long-run cointegration relationship among the variables included in the model. This is done by estimating the F-test for the joint significance of the coefficients of lagged levels of the variables. The bound test approach tests the null hypothesis that the coefficients of the lagged levels are zero. In other words, the F-statistic tests the null hypothesis of no long-run co-integration relationship between the variables. Given that the study employed annual time series data, it is paramount to decide the optimal lag length of the models especially for studies with small sample data as in the case of this study. The study determines the optimal lag length of the model by specifying the longest lag and testing until the lags that are significant are found.

Table 4: Estimated Long-Run Coefficient using ARDL Approach

Model 1(1,1,0,0,0) Dependent variable: TRD			Model 2 (1,1, 0,0,0,) Dependent variable : TRD		
Regressor	coefficient	p-value	Regressor	coefficient	p-value
Constant(-1)	1.294	0.615	EXCHANGERATE	-1.243822	0.0933
Trd	-1.908	0.06	INFLATIONRATE	0.086316	0.0425
Exr (-1)	-1.018	0.066	PERSONALREMITTANCES	-4.406119	0.0328
Inf	0.070	0.040	TRADEOPENNESS	0.473784	0.0000
Tro	0.387	0.014	C	1.580846	0.6089

Source: (E-views 10, 2022)

Starting with first Model 1, in the long-run, the coefficient of trade shows the negative and significant relationship with the level of currency devaluation at 5% significant in the country. This also implies that the more currency is devaluated the more the level of export which promote trade in the country by encouraging local production at a cheaper rate.

In the same vein, the coefficient of exchange rate shows a negative but significance at 1% level of significance, this is to shows that currency depreciation has a strong relationship with the trade in the country, the more country experience high rate of currency depreciation the more the trade activities.

Furthermore, the value of inflation indicates the long run relationship positively, that is to say inflation level has a long- run relationship with the currency devaluation. The more government devalues currency the more the level of inflation in the country. This indicated in the table 4 above. Trade openness also indicates the positive and significance at 5% significance level; this shows the long-run relationship between trade openness and currency devaluation.

Model2: in the second model the coefficient of exchange rate indicate the negative but significance at 1% level. This shows that the currency devaluation has a long-run effect on trade in the country that is the higher the currency devaluation the greater the trade. Inflation rate has a positive and significance at 5% level, this indicates that inflation has a long-run relationship that is to say the higher the currency devaluation the higher the inflation.

The remittances has a negative but significance this indicates that when indigenous citizens decided to send money home from abroad can promote trade due to the activities of citizens living abroad this has a long-run effect and indicate the relationship between trade and currency devaluation. Trade openness shows the positive and significance at 1% level this also shows that there is a long –run relationship between trade openness and currency devaluation that is when there is increase in devaluating currency the activities of trade will also increase.

Table 5. Estimated Short-Run Error Correction Model using ARDL Approach

ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCHANGERATE)	3.611734	0.503407	7.174579	0.0000
CointEq(-1)*	-0.818712	0.065729	-12.45581	0.0000
R-squared	0.849297	Mean dependent var		0.506800
Adjusted R-squared	0.843914	S.D. dependent var		2.786816
S.E. of regression	1.101006	Akaike info criterion		3.094667
Sum squared resid	33.94203	Schwarz criterion		3.188080
Log likelihood	-44.42000	Hannan-Quinn criter.		3.124551
Durbin-Watson stat	2.087969			

Source: (E-views 10, 2022)

Case 2: the result indicates the value of R-square as 84% this shows that the behavior of independent variable is fully explain by the behavior of dependent variables and the value of D-Watson statistics is greater than two this indicate the overall relationship between exchange rate and currency devaluation. The exchange rate also has the mean value of 0.506 with Akaike information criterion as 3.09, the overall result shows the fitness with a probability value of 0, 0000

4.4 Diagnostic Tests

The study conducted diagnostic tests for autocorrelation, heteroscedasticity, normality, stability and specification tests for the two models which are presented in Table 8. Breusch–Godfrey LM serial correlation test is conducted and the result indicates that null hypothesis cannot be rejected as the F-statistic for test for the two models is found to be 0.582 and 0.5789 with probability value of 0.5642 and 0.4402, respectively, indicating that there is absence of serial correlation in the two models. Further, the diagnostic tests also reveal that the two models are normally distributed. In the same vein, the models pass the test for heteroscedasticity. The study also tested for model misspecification using Ramsey RESET test and the results reveal that the models are correctly specified. Finally, Figures 3 and 4 display tests for stability of the ARDL models using the CUSUM and CUSUM square techniques proposed by Brown, Durbin and Evans (1975). The result reveals that the models lie within the 5% significant level indicating that the null hypothesis that the models are stable cannot be rejected. Thus, the null hypothesis accepted that the models for the effect of currency devaluation on trade imbalances in Turkey are stable at 5% level of significance.

Table 6. Model Diagnostics Test

	statistics	probabilities
Serial correlation	0.456	0.639
Heteroscedasticity	1.233	0.325
Normality test	1.360	0.505
Ramsey Reset test	0.232	0.818

Source: (E-views 10, 2022)

Diagnostic and significance tests were conducted on the variables in order to examine the robustness of the ARDL estimation. The results are presented above: From table 7 it can be seen that the model passes all the diagnostic tests. It shows that there is no evidence of serial correlation and the model is normally distributed. In the same vein, the model passes the tests for heteroscedasticity and linearity. At this juncture, the study tested for the stability of the model. The techniques applied are cumulative sum (CUSUM) test proposed by Brown et al. (1975). If the plot of the CUSUM remains within the critical limits of 5 percent significance level, the null hypothesis that all the coefficients are stable cannot be rejected. However, if one or another of the parallel line crosses, then the null hypothesis of parameters stability is rejected at 5 percent significant level. Figure 4 shows the result of CUSUM test. It indicates evidence of stability of the model as the critical line remains within the boundary at 5 percent significance level.

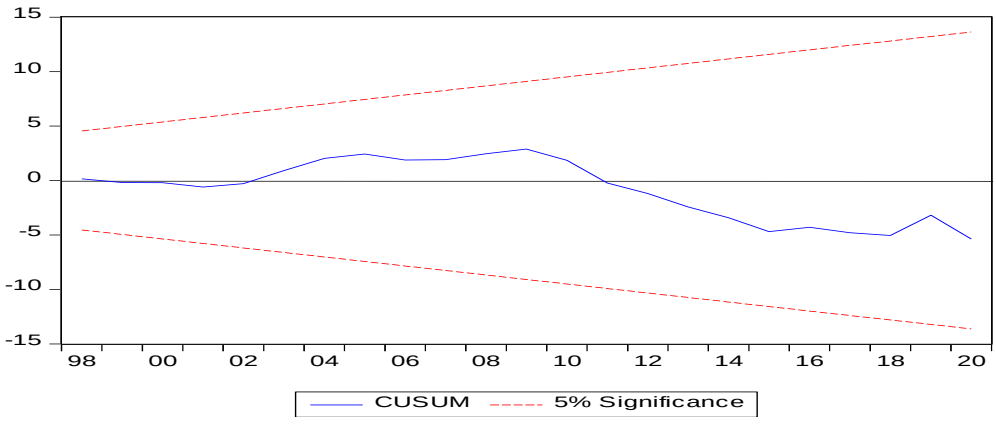

Figure 1: Cusum Table
Source: (E-views 10, 2022)

5.7 Recommendations

This study aims to identify the effect of currency devaluation and trade imbalances in Turkey using the time series data spanning between 1990-2020. The study slightly modified international trade theory (linder, 2000) that the activities of trade can duly influence by the currency devaluation in the economy. To achieve this study adopted the ARDL model for data analysis.

The study obtained variety of interesting results that are helpful for future policy prescription in government decision. The stationarity properties of time series data were cheeked. At level only two variables are stationary at level, however the other two variables are stationary after taking their first difference which pave way for ARDL co-integration analysis. The bounds test revealed a long-run co-integration among the variables in the model. Then short-run and long-run results provide a strong support by international trade theory

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