



REEL EFEKTİF DÖVİZ KURU VE REEL EFEKTİF DÖVİZ KURU OYNAKLIĞI'NIN TÜRKİYE'NİN AVRUPA BİRLİĞİ'NE İNCİR İHRACATI ÜZERİNE ETKİSİ

*The Effects of Real Effective Exchange Rate and Real Effective Exchange Rate Volatility of
Turkey's Fig Export to the European Union**

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ÖZ

Bu çalışmada reel efektif döviz kuru ve reel efektif döviz kuru oynaklığının Türkiye'nin Avrupa Birliği'ne incir ihracatı üzerine etkisi sınır testi çerçevesinde 1997Q1-2015Q3 dönemi için incelenmiştir. Çalışmada reel efektif döviz kuru oynaklığının hesaplanması için EGARCH yöntemi kullanılmıştır. Ayrıca çalışmada değişkenlere ilişkin durağanlık analizleri ADF ve PP birim kök testi kullanılarak yapılmıştır. ADF ve PP testleri sonuçlarına göre tüm değişkenlerin farklı seviyelerde durağan oldukları görülmüştür. Sınır testi yaklaşımına göre değişkenler arasında eş bütünleşme ilişkisi tespit edilmiştir. Elde edilen bulgular reel efektif döviz kuru ve reel efektif döviz kuru oynaklığının kısa dönemde Türkiye'nin Avrupa Birliği'ne incir ihracatı üzerinde etkili olmadığı fakat uzun dönemde reel efektif döviz kuru oynaklığının pozitif etkilediği görülmüştür. Uzun dönemde reel efektif döviz kuru oynaklığındaki %1'lik bir artışın AB'ye incir ihracatını %2,457 artıracakı tespit edilmiştir. Hata düzeltme teriminin katsayısı -1,095, negatif ve istatistiksel olarak anlamlı hesaplanmıştır. Hata düzeltme teriminin katsayısının 1'den büyük olarak hesaplanması sistemde meydana gelen kısa dönemli dengesizliklerin dalgalanarak fakat her seferinde azalarak dengeye geldiğini göstermektedir.

ABSTRACT

In this study, the effects of real exchange rate and real exchange rate volatility on Turkey's fig export to the European Union were examined via bounds testing for the 1997Q1-2015Q3 period. In this study, EGARCH method was used for calculating the real effective exchange rate. However, the unit root tests of parameters were performed using ADF and PP unit root tests. According to the results of ADF and PP tests, all of the parameters were observed to be stationary at various levels. According to the Bounds test approach, it was determined that there is a cointegration relationship between the variables. The findings obtained revealed that the real effective exchange rate and real effective exchange rate volatility have no effect on Turkey's fig export to the European Union in short-term, whereas this volatility has positive effects in long-term. In the long term, 1% increase in real effective exchange rate volatility increases the fig export of Turkey to the EU by 2.457%. The ECT coefficient value was calculated to be -1.095 and it was negative and statistically significant. The absolute value of ECM coefficient higher than 1 indicates that the system balances by fluctuating, and this fluctuation will ensure the balance in long-term by decreasing in each cycle.

1. INTRODUCTION

With exciting the Bretton Woods Agreement in the year 1973, the economists paid importance to examine the exchange rate volatility and the effects of exchange rate volatility on import and export. There is no theoretical relationship between the volatility of exchange rate and the international trade flows. But, however, the factors affecting the exchange rates also affect directly or indirectly the trade flows. Besides that, it is controversial if the exchange rate volatility affects the trade flows. The studies examining the relationship between the exchange rate volatility and the international trade volume concluded in different results.

* This paper based on a PhD titled "Determining the effects of exchange rate and exchange rate volatility on Turkey's agricultural export to the European Union".

Some of the studies reported that exchange rate volatility has negative effects on international trade flows, whereas some others reported that the volatility of exchange rate positively influences the international trade flows. In literature, there also are studies, which reported that exchange rate volatility had uncertain effects on the international trade flows.

Turkey adopted fixed exchange rate regime until the 1980s, floating rate regime, in which the exchange rates were determined by the market but Central Bank continuously directed the rates, in 1980s, and the band regime until Crisis of The year 2001. The latest change in exchange rate regime was made after the crisis in the year 2001; Turkey announced the transition to floating rate regime and the intervened floating rate regime was applied in practice. The regime implemented in Turkey now is dirty floating exchange rate regime (Hepaktan, Çınar and Dündar, 2011:64-68).

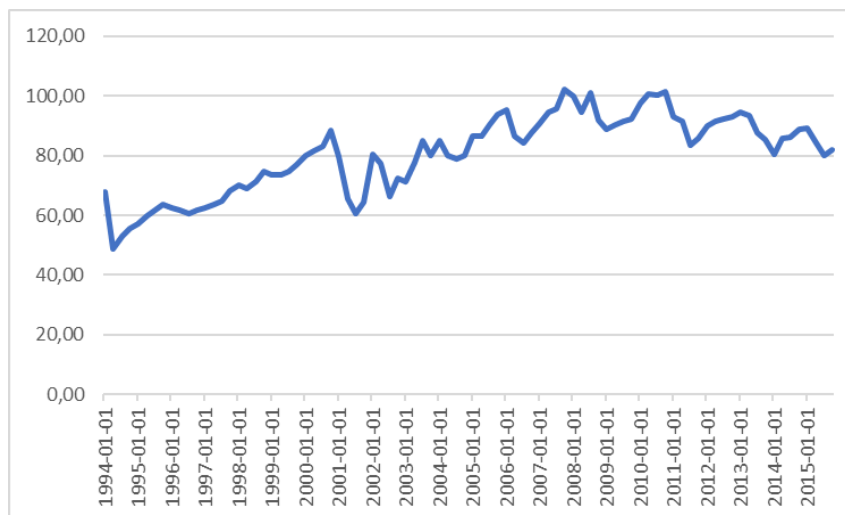


Figure 1. Real Effective Exchange Rates in Turkey (1994Q1-2015Q1)

In Figure 1, the changes in exchange rates in Turkey between 1994 and 2015 are presented. One of the important periods, in which significant changes occurred in exchange rates, is the crisis in 2000-2001. As seen in the figure, the exchange rates in Turkey followed a fluctuated path.

Turkey is the leading fig exported of the world; approx. 65% of world's fig export is made by Turkey. Given the Turkey's dried fig export data, it can be seen that France and Germany are the most important export destinations. 79% of Turkey's total dried fig export is made to Germany, France, USA, England, and Italy, respectively. Its share from total import is 29%. THE EU's share in our total amount of dried fig export is 51%, whereas other important markets of us are America and the Far East (Turkish Ministry of Economy). In the year 2014, Turkey exported approx. 550,000 tons of dried fig. Given the fresh fig export of Turkey between 2000 and 2014, it can be seen that the export increased approximately by 14% annually and the fresh fig export that was 6,140 tons in the year 2000 increased to 17,907 tons in the year 2014 (Arslan, 2015:14-15).

In this study, it was examined if real effective exchange rate and real effective exchange rate volatility have an effect on our fig export to the European Union, which is Turkey's traditional export market.

2. LITERATURE REVIEW

Table 1 summarizes the empirical studies on the effects of exchange rate and exchange rate volatility on Turkey's agricultural trade. In this table, the authors and the role of exchange rate are listed. The studies were ordered according to the year, in which they were carried out.

This table is presented here in order to provide different opinions regarding the effects of exchange rates and exchange rate volatility on the agricultural trade.

Table 1: Empirical Studies on Turkey's Exchange Rate and Agricultural Trade

Author	Title	Period	Findings
Cumhur Buguk, Murat Isık, İlkyDellal and Albert Allen (2003)	The Impact of Exchange Rate Variability on Agricultural Exports of Developing Countries	1982Q1-1998Q4 Dried Fig and Grape 1986Q1-1998Q4 Tobacco	The exchange rates and exchange rate volatility were found to have no significant effect on Turkey's dried fig and grape and tobacco export.
Halil Fidan (2006)	Impact of the Real Effective Exchange Rate (Reer) on Turkish Agricultural Trade	1970-2004	It was emphasized that the short-term effects of real effective exchange rate on Turkey's agricultural import and export are smaller than long-term effects.
Şaban Nazlıoğlu and Cumhur Erdem (2010)	Exchange rate (volatility) and bilateral agricultural trade : Turkey vs .her major trading partners	1987Q1-2007Q4	It was concluded that exchange rates and volatility in exchange rates are among the most important factors determining the dynamics of Turkish trade flows relying on the agriculture.
Ekrem Erdem, Saban Nazlıoğlu and Cumhur Erdem (2010)	Exchange rate uncertainty and agricultural trade: panel cointegration analysis for Turkey.	1980-2005	It was reported that exchange rate level is less related to trade volume than with exchange rate uncertainty.
Orhan Gündüz (2010)	Effect of exchange rate on dried apricot export in Turkey : A vector autoregression (VAR) analysis,	2003:01-2008:12	It was concluded that exchange rate has a significant effect on the export of dried apricot.
Şaban Nazlıoğlu and Ekrem Erdem (2011)	Exchange Rates and Turkish Fresh Fruits and Vegetables Trade with the EU Countries: Bilateral Trade Data Analysis	1995Q1-2007Q2	J-curve effect was observed in 2 cases in short, whereas exchange rate was found to have a positive effect on the trade balance in 2 of 14 cases in long-term.
Gülstan Erdal, Hilmi Erdal and Kemal Esengün (2012)	The effects of exchange rate volatility on trade : evidence from Turkish agricultural trade	1995M1-2007M10	A positive relationship was found between real effective exchange rate and agricultural export and negative relationship with agricultural import.
Mehmet Yazıcı and M. Qamarul İslam (2012)	Exchange Rate and Turkish Agricultural Trade Balance with the EU (15).	1988Q1- 2008Q4	It was concluded that, in the short term, the real exchange rate has a variable effect on agricultural trade and the loss in value of TL has a corrective effect on the trade balance, whereas loss of local currency has negative effect in the long term.
Erşan Sever (2012)	Döviz Kuru Dalgalanmalarının Tarımsal Dış Ticarete Etkisi Türkiye Örneği	1989Q1-2012Q2	When compared to agricultural import, the agricultural export is exposed to the effects of real exchange rate volatility. The real effective exchange rate volatility negatively affects the agricultural export and import of Turkey.

3. STUDY DATA, METHODOLOGY, AND RESULTS

In this study, the effects of real effective exchange rate and real effective exchange rate volatility on Turkey's fig export to the EU countries are examined empirically. From this aspect, it is aimed to determine the effects of real exchange rate and real exchange rate volatility on the export of fig, which is one of the most important export goods of Turkey, to the EU countries, which are an important export destination of Turkey. The variables used in the study and their sources are specified in Table 2.

Table 2: Descriptions of Variables Used in Model

Abbreviation	Period	Description	Source
LNREER	1997Q1-2015Q3	Real Effective Exchange Rate	BIS
LNGDP	1997Q1-2015Q3	The EU's Real GDP	OECD
VOL	1997Q1-2015Q3	Calculated from LNREER series by using EGARCH (3,2) method.	EGARCH (3,2)
LNFIG	1997Q1-2015Q3	Fig Export	TÜİK

In the present study, the fig export group data (LNFIG) obtained from TÜİK were used. The sum of real GDPs of the EU countries was used as income of the EU countries, and this parameter was added into the model as foreign country income. An increase to occur in the income level of foreign countries would increase the import of foreign countries and the local export country. The increases in LNGDP that was used as foreign country income are expected to increase the fig export of Turkey to THE EU countries. In this case, the expected sign of LNGDP is positive. The amount of real effective exchange rate data obtained from BIS database was determined by taking the year 2010 as a base. By taking its algorithm, the name of the parameter was abbreviated as "LNREER". In the case of an increase in real effective exchange rate, i.e. the loss of value of local currency, the export is expected to increase. The main reason for this is the relative fall of the prices of export products of exporter country. As stated by Bahmani Oskooee and Wang (2008), the value decreases in the real exchange rate are expected to increase the agricultural export. In this case, the expected sign of LNREER is negative.

The volatility series used in present study was calculated over real effective exchange rate obtained from BIS. Moreover, one of the secondary objectives of the present study is to estimate the exchange rate volatility of Turkey. In parallel with the studies in literature, the natural algorithm of exchange series was calculated and abbreviated as LNREER. First of all, the stationarity of series was examined and, as a result of stationarity test of LNREER series, the series was found to be stationary in terms of primary difference. The results of LNREER series' stationarity analysis is presented in the results section. After examining the stationarity of LNREER series', the ARIMA structures that are the most suitable ones for LNREER series' was analyzed. According to AIC information criteria, ARIMA (2,1,1) structure was determined to be the most suitable ARIMA model. In order to test if there is the ARCH effect on ARIMA (2,1,1) model, ARCH-LM test was performed. According to ARCH-LM test results, the possibility of F-statistics was calculated to be 0.0108. Accordingly, the main hypothesis that was established based on the absence of ARCH effect was rejected, and it was concluded that there is ARCH effect.

For volatility modeling, the most suitable model in terms of AIC and SC information criteria was determined to be EGARCH (3,2) volatility model, and it was used in obtaining VOL series to be used in present study. After establishing the EGARCH (3,2) model, the ARCH-LM test was repeated, and the heteroscedasticity problem was found to be eliminated. Bahmani and Oskooee (2008) stated that the increases in exchange rate volatility would decrease the export. In this case, the coefficient of VOL variable is expected to be negative. But, the tradesmen have been observed to be able to increase their trade flows by benefiting from suitable real exchange rate in periods, when the exchange rate volatility has been high. Magee (1973) reported that the coefficient of “exchange rate volatility” parameter might be positive or negative. In the present study, the coefficient of exchange rate volatility was expected to be uncertain.

While examining the effects of exchange rate on agricultural export and establishing the long-term agricultural export, the below-mentioned model reported in a study of Bahmani-Oskooee and Goswami (2004) was taken into consideration:

$$LNFIG_t = a + bLNREER_t + cVOL_t + dLNGDP_t + \epsilon_t$$

In stationarity analysis, ADF and PP unit root tests were used. Based on “Constant” and “Constant and Trend” models, the unit root test results of ADF and PP are presented in Table 3.

Table 3: Unit Root Test Results of ADF and PP

VARIABLE			ADF		PP	
			Constant	Constant and Trend	Constant	Constant and Trend
LNREER	Level	T- Statistics	-2.702	-2.728	-2.545	-2.487
		1%	-3.522	-4.087	-3.522	-4.087
		5%	-2.901	-3.472	-2.901	-3.472
		10%	-2.588	-3.163	-2.588	-3.163
	Primary Difference	T- Statistics	-7.626	-7.682	-8.339	-10.291
		1%	-3.523	-4.089	-3.523	-4.089
		5%	-2.902	-3.473	-2.902	-3.473
		10%	-2.588	-3.163	-2.588	-3.163
VOL	Level	T- Statistics	-8.216	-8.295	-8.218	-8.312
		1%	-3.532	-4.101	-3.532	-4.101
		5%	-2.906	-3.478	-2.906	-3.478
		10%	-2.59	-3.167	-2.59	-3.167
LNGDP	Level	T- Statistics	-1.722	-2.151	-2.576	-1.908
		1%	-3.523	-4.089	-3.522	-4.087
		5%	-2.902	-3.473	-2.901	-3.472
		10%	-2.588	-3.163	-2.588	-3.163
	Primary Difference	T- Statistics	-3.523	-3.631	-3.523	-3.631
		1%	-3.523	-4.089	-3.523	-4.089
		5%	-2.902	-3.473	-2.902	-3.473
		10%	-2.588	-3.163	-2.588	-3.163
LNFIG	Level	T-Statistics	-1.552	-9.553	-4.508	-9.619
		1%	-3.527	-4.087	-3.522	-4.087
		5%	-2.904	-3.472	-2.901	-3.472
		10%	-2.589	-3.163	-2.588	-3.163

The different levels of stationarity of ADF and PP determined As a result of unit root tests make it impossible to obtain good results from Engle-Granger and Johansen cointegration tests. Examining the studies on exchange rate volatility and trade flows, Bahmani-Oskooee M. and Hegerty W. (2007) determined that the trade series generally include the unit root, whereas the volatility series were observed to be stationary. The authors recommended the use of bounds test in further studies on exchange rate volatility and trade flows. According to the results of stationarity tests in the present study, the bounds test approach developed by Pesaran et al. (2001) and allowing the analysis of cointegration relationship without considering the stationarity levels of parameters was determined to be the most appropriate method.

Table 4: Bounds Test and ARDL Model Estimation Results

Estimated equation = LNFIG= f(LNREER, VOL, LNGDP)		
Optimum length of delay: ARDL(1,0,1,0)		
LNFIG(-1)	-0.095	-0.783[0.437]
LNREER	0.328	0.777[0.440]
VOL	0.356	0.283[0.778]
VOL(-1)	4.859	3.675[0.001]*
LNGDP	1.152	0.777[0.440]
CONSTANT	-2.825	-0.122[0.903]
TREND	0.012	3.067[0.003]*
Definitional Tests	Statistics	
A: Serial Correlation	4.087[0.394]	
B: Functional Form	1.719[0.190]	
C: Normality	1.223[0.542]	
D: Heteroscedasticity	0.878[0.348]	
Bounds Test	Critical Values	
F-Statistics = 24,073	Lower Limit	Upper Limit
5%	4.286	5.386
10%	3.614	4.621

Note: A: LM test, serial correlation of residuals; B: Ramsey's RESET Test, square of modified value was used, C: On the kurtosis and skewness test of residuals, and D: established on the squares of regression residuals over squared and modified values.

In Table 4, the F-statistics value calculated at 5% significance level was found to be 24.073; since this is higher than the upper limit of 5.386, H₀ hypothesis was rejected. Thus, it was determined that there is a cointegration relationship between the variables.

In Table 5, the long-term coefficients calculated based on the estimations of ARDL (1,0,1,0) model are presented.

Table 5: Long-term Estimation Results of ARDL

Dependent Variable LNFIG		
Variables	Coefficient	T-statistics [Prob]
LNREER	0.299	0.762[0.449]
VOL	4.759	2.457[0.017]**
LNGDP	1.051	0.789[0.433]
CONSTANT	-2.578	-0.122[0.903]
TREND	0.011	3.204[0.002]*

Note: (*), (**) and (***) indicate statistical significance of coefficients at 1%, 5%, and 10% levels, respectively.

According to Table 5, the real effective exchange rate volatility (VOL) is statistically significant and positive. This is in parallel with the literature in the way supporting the uncertainty of volatility's effect on export. 1% increase in real effective exchange rate increases the fig export of Turkey to the EU by 2.457%.

The short-term relationship between the variables was examined by using an error correction model based on ARDL (1,0,1,0) model. The estimation results of the model are presented in Table 6.

Table 6: Error Correction Model Estimation Results for Fig Export

Dependent Variable ΔLNFIG		
Variables	Coefficient	T-Statistics[Prob]
ΔLNREER	0.328	0.777[0.440]
ΔVOL	0.356	0.283[0.778]
ΔLNGDP	1.152	0.777[0.440]
dTREND	0.012	3.067[0.003]*
ecm(-1)	-1.095	-8.954[0.000]*

Note: (*), (**) and (***) indicate statistical significance of coefficients at 1%, 5%, and 10% levels, respectively.

Considering the ECM coefficient, the value of the coefficient is negative and statistically significant as expected. According to the error correction model estimation results, there is no statistically significant variable coefficient. The absolute value of ECM higher than 1, as stated by Narayan and Smyth (2006), indicates that the system balances by fluctuating, and this fluctuation will ensure the balance in long-term by decreasing in each cycle.

In Figure 2, the CUSUM and CUSUMQ test results indicating the consistency of model are presented. As a result of CUSUM and CUSUMSQ tests, the residuals of the model were found to be within limits, and it was determined that the parameters were consistent.

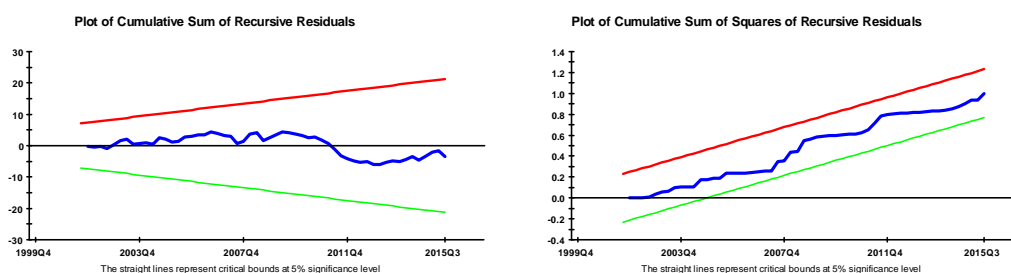


Figure 2: Plot of CUSUM of Squares and CUSUM Tests

4. CONCLUSION

In this study, by using the quarterly data of Turkey between 1997 and 2015, the short-term and long-term effects of real effective exchange rate and real effective exchange rate volatility on Turkey's fig export to The European Union countries were analyzed via Bounds test method. In the present study, EGARCH method was used for calculating the real effective exchange rate volatility.

According to the results based on bounds test method, a cointegration relationship was found between real effective exchange rate and real effective exchange rate volatility and Turkey's

fig export to the EU countries. Considering the long-term coefficients, the real effective exchange rate volatility (VOL) is statistically significant and positive. This result supports the conclusion of Oian and Varangis (1994) for Sweeden, the United Kingdom, and the Netherlands. In short-term, none of the variables calculated with error correction model based on ARDL approach was found to be statistically significant at 5%.

It was concluded that, in short-term, the real effective exchange rate and real effective exchange rate volatility were found to have an insignificant effect on Turkey's fig export to the EU countries. In long-term, however, the real effective exchange rate volatility has a positive effect on Turkey's fig export to the EU countries. In conclusion, it can be stated that fig exporters in Turkey might take measures against the fluctuations in foreign exchange markets and that they might turn the risks originating from the uncertainty of exchange rate into an advantage.

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