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Effects of Real Exchange Rate Volatility on Tourism Receipts and Expenditures in Turkey

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Abstract

The tourism industry has expanded worldwide over recent decades to become an important global business sector. The Turkish tourism sector has followed this trend, and Turkey is now a major global tourist destination. We examined the relationship between real effective exchange rate volatility and tourism receipts and expenditures in Turkey during the period from 1994:01 to 2013:08. Volatility in the real effective exchange rate was obtained with a generalised autoregressive conditional heteroscedasticity (1,1) model. The long-term relationship between the series was determined by the Johansen cointegration test, and the direction of this relationship was determined using pairwise Granger causality. Our empirical results indicate that there is a positive long-term relationship between the real effective exchange rate and tourism receipts and expenditures.

JEL classification numbers: F31, G24
Keywords: Tourism receipts, Real effective exchange rate, GARCH, Johansen cointegration

1 Introduction

The worldwide tourism sector has experienced substantial growth in recent decades and has become an important sector in the global economy; global tourism receipts reached US $1,075 billion in 2012. Of these receipts, 43% (US $457 billion) were from countries in Europe, 30% (US $323 billion) were from countries in Asia and the Pacific, and 20% (US $215 billion) were from countries in the Americas. The Middle East and Africa earned 4% (US $47 billion) and 3% (US $34 billion) of those total receipts, respectively (World Tourism Organization, 2013).

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In terms of national rankings, the United States topped the list of major destinations, and Turkey placed 12th on that list.

Table 1: Tourism Receipts of Top Destinations in 2012 (US$ billion)

Rank	Country	Tourism Receipts
1	US	128.6
2	Spain	55.9
3	France	53.7
4	China	50.0
5	Italy	41.2
6	Macao (China)	40.3
7	Germany	38.1
8	United Kingdom	36.4
9	Hong Kong (China)	31.7
10	Australia	31.5
11	Thailand	30.1
12	**Turkey**	**25.7**
13	Malaysia	19.7
14	Singapore	19.3
15	Austria	18.9

Source: World Tourism Organization, 2013.

The Turkish tourism sector has developed in parallel with global tourism and has become a key industry in Turkey's economic development. On the one hand, the tourism sector has contributed to economic growth; on the other hand, tourism has played an important role in financing chronic Turkish current account deficits. Thus, although Turkey generally runs current deficits, the Turkish tourism sector has always run a surplus, including a surplus of US $21.559 billion in 2012, as Table 2 demonstrates.

Table 2: Tourism Balance in the Turkish Tourism Sector

Year	Tourism Balance (US$ Million)	Tourism Balance Growth (%)
1994	3,455	---
1995	4,046	17.11
1996	4,385	8.38
1997	5,286	20.55
1998	5,423	2.59
1999	3,732	-31.18
2000	5,923	58.71
2001	6,352	7.24
2002	6,599	3.89
2003	1,1051	67.46
2004	13,597	23.04
2005	16,087	18.31

Year	Tourism Balance (US$ Million)	Tourism Balance Growth (%)
2006	14,468	-10.06
2007	15,781	9.08
2008	19,541	23.83
2009	18,405	-5.81
2010	17,391	-5.51
2011	20,171	15.99
2012	21,559	6.88

Source: Central Bank of the Republic of Turkey, Outstanding External Debt and Balance of Payments.

Many countries moved from fixed exchange rates to floating exchange rates after the collapse of the Bretton Woods system, which has resulted in wide fluctuations in both real and nominal exchange rates across the globe. The real effective exchange rate (REER) in Turkey has fluctuated widely following the adoption of the floating exchange rate, as shown in Chart 1. This study aims to empirically investigate the effects of volatility in the REER on Turkish tourism receipts.

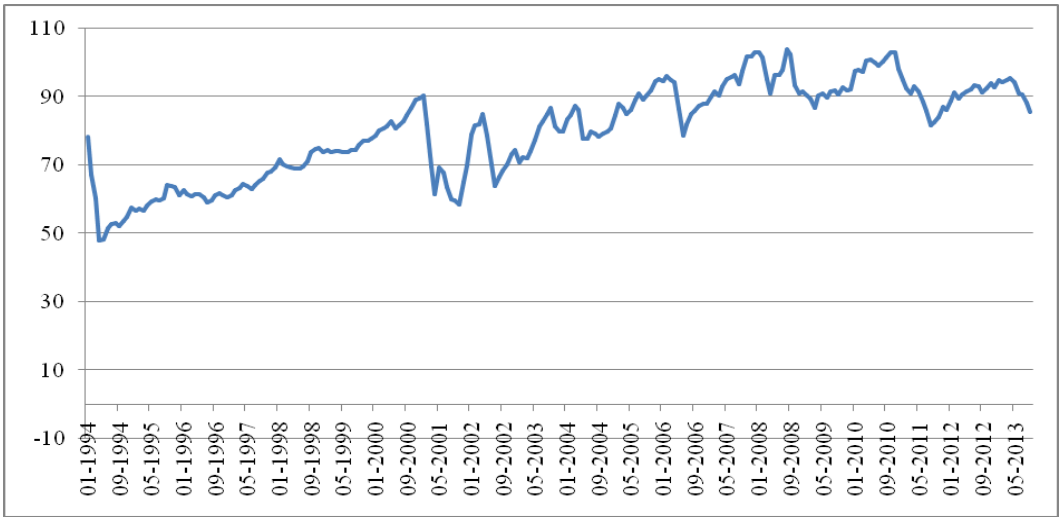

Chart 1: Real Effective Exchange Rate of Turkey (2010=100)
Source: Bank for International Settlements (BIS), Effective Exchange Rate Indices.

The remainder of the study is organised as follows. Section 2 outlines the previous literature. Section 3 presents the data and methods, empirical application and introduces the main findings. Section 4 concludes.

2 Literature Review

Most studies in the literature on exchange rates have concentrated on determining exchange rates' effects on foreign trade. Different forms of exchange rates and exchange

rate volatility have generally been used in these studies. Some studies, such as Rafiq (2013), Göçer and Elmas (2013), Shahbaz et al. (2012), Adeniyi et al. (2011), Shisong et al.(2011), Çelik and Kaya (2010), Aktaş (2010) and Alptekin (2009) have examined the effects of real exchange rates on the international trade of individual countries and blocs of countries by employing various econometric methods and have reached a range of findings. Rafiq (2013), Göçer and Elmas (2013), Shahbaz et al. (2012) and Shisong et al. (2011) found that the real exchange rate had a significant impact on foreign trade, although Aktaş (2010), Alptekin (2009) found that a change in the real exchange rate had no significant impact on foreign trade. Other studies, such as Adeniyi (2011) and Çelik and Kaya (2010), reached both findings in different countries.

Studies such as Poon and Hooy (2013), Suliman and Ali (2012), Bahmani-Oskooee and Hajilee (2012), D'Souza et al. (2010), Hayakawa and Kimura (2008), Köse et al. (2008) and Saatçioğlu and Karaca (2004) used exchange rate volatility to determine the effects of exchange rates on foreign trade and obtained a variety of results. Poon and Hooy (2013), D'Souza et al. (2010), Köse et al. (2008), Kasman and Kasman (2005), Saatçioğlu and Karaca (2004), Bredin et al. (2003) and Doyle (2001) found that exchange rate volatility had significant negative effects on foreign trade, although Kasman and Kasman (2005), Bredin et al. (2003) and Doyle (2001) found that exchange rate volatility had significant positive effects on foreign trade. Alternatively, Suliman and Ali (2012) reached both findings for different countries, whereas Bahmani-Oskooee and Hajilee (2012) found that industry responses to exchange rate volatility varied among industries.

There are a limited number of studies that have examined the effects of volatility in the REER on various sectors of the economy and on tourism, in particular. These studies have generally examined the effects of real exchange rates on tourism receipts/demand and on tourist arrivals, and they have reached different findings. Cheng et al. (2013) examined the effects of the real exchange rate on United States tourism export revenues and import spending during the 1973-2010 period by using vector autoregressive models and found that depreciation increased tourist receipts but did not affect tourism expenditures. Tang (2013) employed bounds testing and error-correction modelling to examine the relationship between tourism receipts and real exchange rates in Malaysia during the 1974-2009 period and found that real exchange rates had a positive and significant effect on real tourism receipts.

Cheng et al. (2013) examined the exchange rate effects on American tourism with structural vector autoregressive models during the 1973-2007 period and found that depreciation increased the US tourism trade balance and that only export income was marginally sensitive to the exchange rate. Saayman and Saayman (2013) examined exchange rate volatility on tourist arrivals and spending in South Africa with an autoregressive distributed lag model and a bounds test approach and found that exchange rate volatility influenced tourist spending and arrivals significantly in South Africa.

De Vita and Kyaw (2013) examined the role of exchange rates in tourism demand by using data from Turkey's tourist arrivals from Germany during the 1996-2009 period and found that exchange rates are significant determinants of tourism demand. In addition, this same study found that exchange rate volatility may be included in the tourism demand equation in place of cost of living to reflect the uncertainty avoidance.

Hui and Yining (2012) used a regression analysis to examine the effects of REER volatility on tourism receipts over the past 20 years on the data for China's nine major tourism source countries and found that the REER had negative effects on tourism receipts. Pu et al. (2011) examined the relationship between the real exchange rate and

Chinese inbound tourism from the US by using both a co-integration test and a causality analysis and found that there is a long-term relationship between the real exchange rate and American arrivals and that the real exchange rate was the Granger cause of American visitor arrivals.
Santana-Gallego et al. (2010) examined the effect of exchange rate systems on the tourism sector with a panel data analysis and found that the exchange rate arrangement is a key factor in determining tourist arrivals. However, Quadri and Zheng (2010) examined the effect of exchange rates on international tourism demand in Italy with a regression approach and found that exchange rates did not affect demand.

3 Data and Method

We used the monthly data of total tourism revenues, tourism expenditures and REER volatilities from January 1994 to August 2013 to investigate the effects of REER volatility on the tourism sector. The REERs for Turkey were taken from the database of the Bank for International Settlements (BIS). The BIS REER indices are calculated for 61 countries (including individual euro area countries and, separately, the entire euro area as an entity) and utilise 2010 as the base year. Turkey's total tourism revenues and expenditures were taken from the electronic data delivery system of the Central Bank of the Republic of Turkey (CBRT).
We examined the relationship between the REER and tourism revenues and expenditures in a time-series analysis. First, we conducted the stationarity tests of the series with an Augmented Dickey-Fuller test (ADF) and a Phillips-Perron (PP) test. We then determined the optimal lag length for the series to be estimated, and the long-term relationship among the variables was analysed with a Johansen cointegration test. However, short- and long-term relationships among the variables were tested by causality analysis and the Vector Error Correction Model (VECM).
The variables used in the econometric analysis and their symbols are presented in Table 3. All variables were deseasonalised by CENSUS X21 filters. Eviews 7.1 software package was used in the analysis of the dataset.

Table 3: Variables Used in the Econometric Analysis and Their Symbols

Variable Symbols	Variables
REERV	Real Effective Exchange Rate Volatility
TR	Tourism Revenues
TE	Tourism Expenditures

To find exchange rate volatility ex ante, we utilised a generalised autoregressive conditional heteroscedasticity (GARCH) process (Bollerslev, 1986) to model the conditional exchange rate variance.

The GARCH (p,q) model is defined by the following:

$$y_k = \sigma_k . \varepsilon_k$$

$$\sigma_k^2 = \omega + \sum_{i=1}^{p} \alpha_i . y_{k-i}^2 + \sum_{j=1}^{q} \beta_j . \sigma_{k-j,}^2$$

where $\omega > 0,$ $\alpha_i \geq 0,\ \beta_j \geq 0,$ and the innovation sequence $\{\varepsilon_i\}_{i=-\infty}^{\infty}$ is independent and identically distributed with

$E(\varepsilon_0) = 0$ and $E(\varepsilon_0^2) = 1$.

The main idea is that σ_k^2, the conditional variance of y_k given information available up to time k-1, has an autoregressive structure and is positively correlated to its own recent past and to recent values of the squared returns, y^2. This captures the idea of volatility (i.e., the conditional variance) being "persistent": large (small) values of y_k^2 are likely to be followed by large (small) values (Fryzlewicz, 2007).

Table 4: GARCH Modelling of REER Series

Variable	Coefficient	Std. Error	z-Statistic	Probability
C (a_0)	2.061831	1.042880	1.977055	0.0480
REER (-1) (a_1)	0.976377	0.012156	80.31981	0.0000
Variance equation				
C (α_0)	1.100783	0.353218	3.116439	0.0018
RESID(-1)^2 (α_1)	0.260634	0.071896	3.625136	0.0003
GARCH(-1) (β_1)	0.588088	0.090733	6.481485	0.0000

Notes: Dependent variable: REER. Method: ML-ARCH (Marguart); Normal Distribution. Sample (adjusted): February 1994–August 2013. Included observations: 235 after adjustment. GARCH = C(3) + C(4) RESID(–1)^2 + C(5)GARCH(–1); C, constant; RESID, residual. $\alpha_1$refers to ARCH. F-statistic: 324.667 Probability (F-statistic): 0.0011. REER, real effective exchange rate; GARCH, generalised autoregressive conditional heteroscedasticity; ML-ARCH, maximum likelihood-autoregressive conditional heteroscedasticity.

Different levels of GARCH (p,q) were tested, and according to the results obtained from the Akaike information criterion (AIC) and the Schwarz information criterion (SC), GARCH (1,1) provided the most suitable combination.

We tested the stationarity of the variables before the co-integration and causality analysis. We found that tourism revenues (TR) and tourism expenditures (TE) variables are not stationary at level because the p value is greater than 0.05. Therefore, we took first differences of the TR and TE variables, and then both variables became stationary according to the ADF test statistic. TR and TE were also found to be nonstationary at level, according to the PP statistic and the ADF statistic, because the p value is greater than 0.05. Both variables also became stationary according to the PP statistic after we took the first differences of the TR and TE variables.

All the variables were stationary at first difference I(1) according to the ADF and PP tests, which enabled us to analyse the long-term relationship among the variables. We used the co-integration test developed by Johansen (1988) to determine whether there was a long-term relationship among the variables. The optimal lag length should be determined

before performing the co-integration test. The REER volatility (REERV) series is formed using the GARCH model, and there was no need for a test for stationary status because the series had already acquired a stationary nature as a result of the GARCH conversion.

Table 5: Stationarity Results of the Variables

	Level		First Degree	
Test / Variable	ADF Test Statistic	PP Test Statistic	ADF Test Statistic	PP Test Statistic
REERV	-4.842595 p=0.0005	---	---	---
TR	-2.137006 p=0.5219	-1.118594 p= 0.2390	-5.561573 p=0.0000*	-8.724653 p=0.0000*
TE	-2.436427 p= 0.3598	-1.767782 p= 0.0733	-5.771811 p= 0.0000*	-34.91970 p= 0.0000*

*MacKinnon (1996) one-tailed p-values.

The series were deseasonalised by CENSUS X21 filters when stationarity analyses were conducted for the variables. Crisis and policy change periods were considered with regard to statistical significance, and as long as their trend and fixed components were significant in the model selection, they were included in the model. The minimum lag length that eliminated the autocorrelation was selected in the lag length selection.

3.1 Determination of Lag Length

Our software package reported lag length results for the final prediction error (FPE), the AIC, the SC and the Hannan-Quinn information criterion (HQ). We determined lag lengths separately for two dependent variables in our model, TR and TE, which are presented in Table 6. The lag length of the TR variable was determined to be 8 according to all the criteria. However, the lag length of the TE variable was determined to be 3 according to the HQ information criterion and 6 according to the FPE, AIC and SC. The lag length of the FTE-DKV was determined to be 6 because most of the criteria predicted this measurement.

Table 6: Lag Length According to the FPE, AIC, SC and HQ Criteria

Endogenous Variables: FTR-REERV						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-5232.044	NA	3.65e+17	46.11492	46.14510	46.12710
1	-4846.697	760.5076	1.27e+16	42.75504	42.84557	42.79157
2	-4832.179	28.39726	1.16e+16	42.66237	42.81325	42.72325
3	-4819.881	23.83739	1.07e+16	42.58926	42.80049	42.67450
4	-4811.463	16.16817	1.03e+16	42.55034	42.82192	42.65992
5	-4809.880	3.013325	1.06e+16	42.57163	42.90356	42.70557
6	-4782.389	51.83246	8.59e+15	42.36466	42.75695	42.52296
7	-4777.811	8.551662	8.55e+15	42.35957	42.81220	42.54221
8	**-4741.752**	**66.71668***	**6.44e+15***	**42.07711***	**42.59010***	**42.28411***
Endogenous Variables: FTE-REERV						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	0	-4803.362	NA	8.36e+15	42.33799	42.36816
1	1	-4442.603	711.9810	3.61e+14	39.19474	39.28527
2	2	-4420.937	42.37864	3.09e+14	39.03909	39.18997
3	3	-4401.970	36.76441	2.71e+14	38.90722	**39.11845***
4	4	-4396.891	9.754171	2.68e+14	38.89772	39.16930
5	5	-4389.959	13.19380	2.61e+14	38.87188	39.20381
6	6	-4381.427	**16.08633***	**2.51e+14***	**38.83195***	**39.22424**
7	7	-4380.496	1.739206	2.58e+14	38.85899	39.31163
8	8	-4379.874	1.151030	2.66e+14	38.88875	39.40174

3.2 Co-integration Analysis

Co-integration is defined as co-movement among economic variables over the long term. Engle-Granger (1987) indicated that linear combinations of a series may be stationary even if the series is not stationary at levels if each of the variables is integrated at the I(1) level. Vector error correction models should be established because the inferences of standard Granger causality are not valid if the series is not linear, but their linear combinations are stationary. Thus, we must test the co-integration properties of the original series before applying the Granger causality test.

Two co-integration equations that determine the long-term relationship for each independent variable were specified because we have two independent variables (See Table 7).

Table 7: Results of the Johansen Co-integration Analysis

Johansen Co-integration Results for the FTR-REERV				
Hypotheses	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None *	0.588022	205.0319	15.49471	0.0001
At most 1 *	0.020229	4.618647	3.841466	0.0316
Hypotheses	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.588022	200.4133	14.26460	0.0001
At most 1 *	0.020229	4.618647	3.841466	0.0316

Johansen Co-integration Results FTE-REERV				
Hypotheses	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None *	0.261867	73.54595	15.49471	0.0000
At most 1 *	0.018761	4.318098	3.841466	0.0377
Hypotheses	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.261867	69.22785	14.26460	0.0000
At most 1 *	0.018761	4.318098	3.841466	0.0377

Trace and Max-eigenvalue test indicates 2 cointegratingeqn(s) at the 0.05 level.
* Denotes rejection of the hypothesis at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.

Both independent variables exhibited a long-term relationship with the dependent variable, and they comoved.

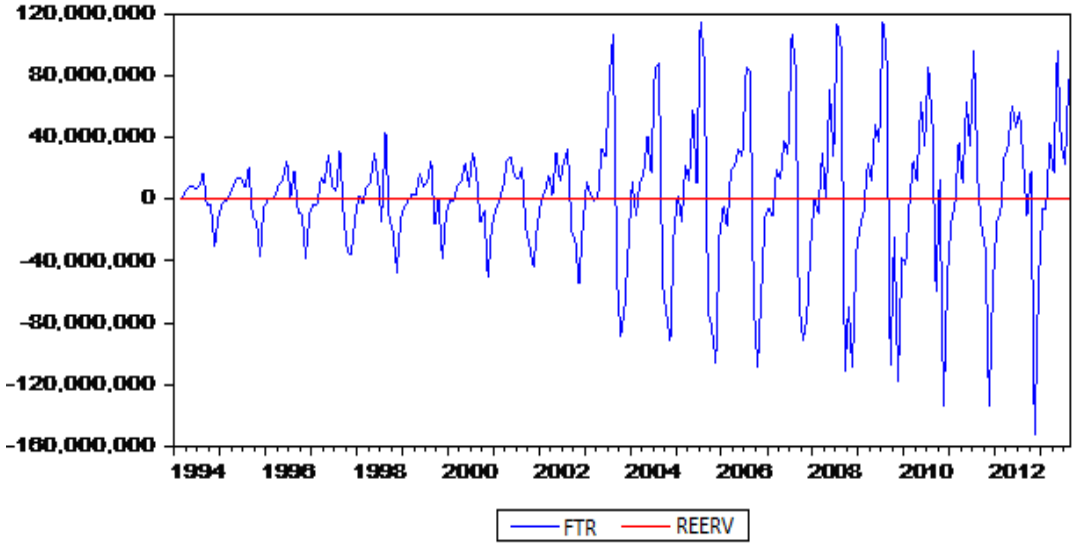

Figure 1: The Cointegration Relation of FTR and REERV Series
Note: FTR: Tourism Revenues, REERV: Real Effective Exchange Rate Volatility.

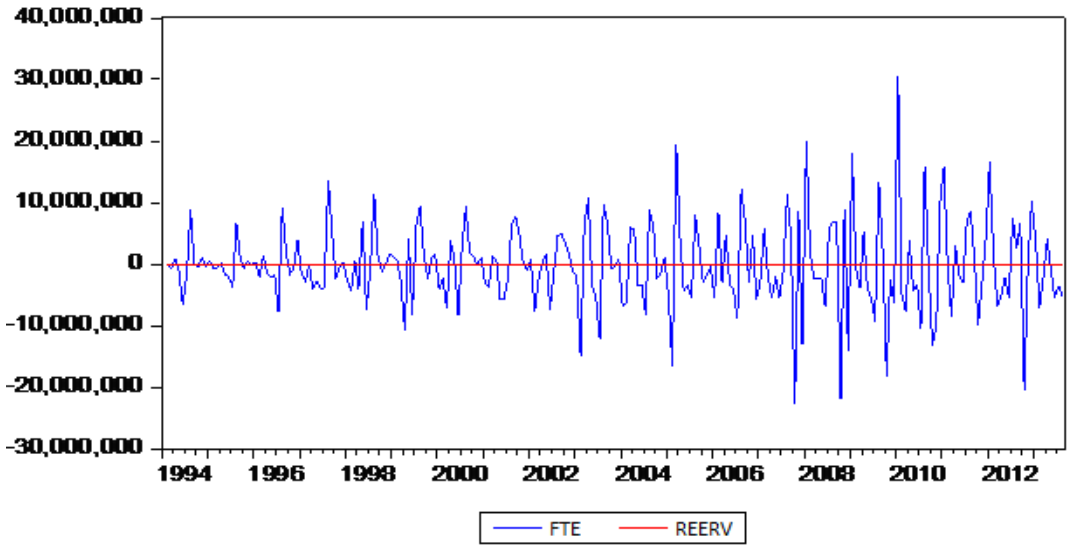

Figure 2: The Cointegration Relation of FTE and REERV Series
Note: FTE: Tourism Expenditures, REERV: Real Effective Exchange Rate Volatility.

There are two co-integration equations that determine the direction and degree of the relationship for each independent variable (See Table 8). There is a positive relationship between EERV volatility and tourism receipts and expenditures in Turkey. Thus, increases in REER volatility cause increases in tourism receipts and expenditures, and decreases in REER volatility cause decreases in tourism receipts and expenditures.

Table 8: Co-integration Equations

Johansen Co-integration Equation for the FTR-REERV	
FTR	REERV
1.000000	-25770.07
	(40142.5)
Johansen Co-integration Equation for the FTE-REERV	
FTE	REERV
1.000000	-445.0528
	(10156.9)

3.3 Vector Error Correction Model

The Engle-Granger model contains a vector error correction mechanism that eliminates the short-term imbalances in the event that there is co-integration between two variables. A long-term equilibrium model and a short-term error correction model are generally proposed for causality tests. Error correction models provide an opportunity to integrate both long-term relationships among variables (equilibrium relations) and short-term matching behaviour (imbalance).

We reached a separate vector error correction model for each independent variable in the model. The results of the vector error correction model for both D(FTR)-D(REERV) and D(FTE)-D(REERV) were found to be statistically significant. Therefore, there was a short- term relationship among the variables, and equilibrium was reached by means of both variables. Consequently, we found that the model was significant and that there was

neither autocorrelation nor a heteroscedasticity problem; in addition, we found that the model form is significant. Thus, we determined that there were both short- and long-term relationships among the variables.

Table 9: Results of the Vector Error Correction Model

Vector Error Correction Model for the D(FTR)-D(REERV)		
Error Correction	D(FTR)	D(REERV)
CointEq1	-5.628051	-6.29E-08
	(0.25948)	(3.0E-08)
	[-21.6895]	[-2.09619]
Vector Error Correction Model for the D(FTE)-D(REERV)		
Error Correction	D(FTE)	D(REERV)
CointEq1	-3.055220	2.79E-07
	(0.35951)	(1.5E-07)
	[-8.49841]	[1.90372]

3.4 Causality Analysis

A causality analysis is used to determine causation between two variables and to determine the direction of the relationship in the event that there is a relationship. We examined the relationship by the VAR Granger Causality Test and the Pairwise Granger Causality Test after we determined that there were both short- and long-term relationships among the variables. We found that tourism receipts and expenditures were not the Granger cause of REER in Turkey. Similarly, REER did not Granger cause tourism receipts and expenditures. In other words, tourism receipts and expenditures were not dependent on their own lagged values or the lag values of REER volatility.

Table 10: Results of Pairwise Granger Causality Test

Results of Pairwise Granger Causality Test for the FTR-REERV			
Null Hypothesis	Obs	F-Statistic	Prob.
REERV does not Granger Cause FTR	227	0.35788	0.9414
FTR does not Granger Cause REERV		1.18211	0.3112
Results of Pairwise Granger Causality Test for the FTE-REERV			
Null Hypothesis	Obs	F-Statistic	Prob.
REERV does not Granger Cause FTE	229	2.05759	0.0594
FTE does not Granger Cause REERV		1.35135	0.2357

4 Conclusion

The tourism sector is one of the few sectors in Turkey that operates in a surplus. Thus, it is important to note that economic growth finances the chronic current deficits. However, the volatility in exchange rates increased in Turkey with the transition from fixed exchange rates to floating exchange rates in 2001. This study examined the possible effects of REER volatility on tourism receipts and expenditures by using Johansen cointegration and Granger causality analyses.

Our empirical results indicate that there is a positive long-term relationship between the REER and tourism receipts and expenditures. However, we found that tourism receipts

and expenditures are not the Granger cause of REER and, similarly, that REER is not the Granger cause of tourism receipts and expenditures.

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