Management Studies, August 2014, Vol. 2, No. 8, 493-499
doi: 10.17265/2328-2185/2014.08.001

Exchange Rate Volatility: Effect on Turkish Tourism Incomes

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The Turkish economy has been facing account deficit problems in recent years and tourism revenues play an important role in financing this deficit. Tourism revenues are affected by exchange rate volatility and the effects of exchange rate volatility on tourism revenues need to be researched. The purpose of this study is to examine the effects of exchange rate volatility on tourism revenues. These effects were analyzed by using multivariate co-integration model and monthly data from January 2003 to December 2011. Findings suggest that exchange rate volatility has a negative effect on tourism revenues. Additionally, a weak relationship was detected in the long term between exchange rate and tourism revenues.

Key words: Turkey, tourism, exchange rate fluctuation, volatility, EGARCH

Introduction

Tourism is a socio-economic phenomenon, which starts with an economic decision about how to use leisure time and savings, and it has economic aspects such as investment, consumption, employment, exports, and government revenues. Since the beginning of civilization, tourism has emerged from people's curiosity about visiting and seeing different places. Since the 1950's, it has developed rapidly and has spread widely over long distances. The economic and political effects caused by tourism, which has become a monetary and social event at the present time, have significant consequences for a nation's economy, especially its international economic and political relations.

Now, tourism is one of the income providing factors in the world economy and is becoming a large investment and development sector. Tourism is considered to be one of the most important service sectors which enable countries to earn gains in economic, social, and cultural fields. For this reason, developed and developing countries which have tourism potential aim to raise the level of welfare in their country by

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emphasizing international tourism activities as a means to accelerate economic development and extend revenue to the base. For some countries, the tourism sector is the basis for their growth strategy. These countries have more foreign exchange input via export services and employment, and, therefore they are able to increase their GDP. Expansion of the tax base with an increase of national income and employment will result in a significant increase in state tax revenues. Increased tax revenues will help a country's development by increasing investment in central and local governments. Tourism revenues increase national income and create a multiplier effect on a national economy. This multiplier effect makes a positive impact on the economy and supports many sectors.

Turkey, which is surrounded by sea on three sides, is a country of high tourist potential with considerable historical and cultural heritage sites. Even though Turkey has many common touristic features with Spain, France, and Italy which are leading in tourism, it has remained well behind these countries in terms of tourism revenues.

Tourism in Turkey is seen as an economic activity based on using resources such as sun, sea, and sand, historical and natural beauties for many years. No significant investment has been made in tourism, but it is expected that tourism will bring a solution to the main problems of the country, i.e., foreign exchange shortages and unemployment.

Turkey's tourism sector has caught the trend of growth in world tourism as a result of arrangements made after 1980 with increased investments in tourism, and it has been one of the main sectors which constitute a major source of income and employment for the country's economy. While, in 1980, Turkey had 1.2 million tourists and $327 million in tourism revenue, in 2011 it grew to 36 million tourists and $23 billion in tourism revenue.

Security, interaction, and exchange rates brought by the global economy are the most important determinants of a country's tourist arrivals and tourism revenues. Effectiveness of any progress in the impact of foreign exchange rates on Turkish tourism will depend on the degree of competitiveness of Turkish tourism in the world tourism market. Corresponding to any change in the exchange rate, the increase/decrease in demand for Turkish tourism shows that Turkish tourism has world-class service quality corresponding to this demand. The competitiveness of Turkish tourism depends on features that are less substitutable than other countries' tourism, such as nature, culture, religion, health, adventure, and sport tourism. These features provide Turkey with a competitive advantage over many countries.

In this study, the effect of the real exchange rate fluctuations on Turkey's tourism revenues will be examined within the framework of a co-integration analysis and error correction model, using monthly data covering the period from January 2003 to December 2011. For this purpose, some studies which are mentioned in the literature are examined, and then the data and methods used in study are introduced, and findings which were obtained from the result of the application are presented. The study ends with a conclusion section where general assessments were made.

Analytical Framework

Many studies in the literature have examined the factors that affect tourism revenues. Garin-Munoz and Perez-Amaral's study (2000) for Spain found a positive correlation between tourism revenues and national income, but a negative relationship between tourism revenues and exchange rate volatility.

Tse (2001) found that the exchange rate affects tourism income in his study for Hong Kong. Eilat and

Einav (2004) found that the exchange rate is an important factor which affects tourism revenues in developed countries. In this study, the observed fluctuations in the exchange rate arguments which were used in previous studies were investigated.

Model Specification, Variable Definitions, and Data Sources

The variables used in this study are monthly values, covering the periods of January 2003 to December 2011. The exchange rate for 2003 (which is 100) is based on the real effective exchange rate index. The real effective exchange rate index is calculated according to the definition of the central bank in developing countries. An increase in the index refers to real appreciation of the Turkish lira (TL). To calculate the index, this study used the index of consumer prices as the domestic and foreign price index. Tourism revenues are expressed in millions of dollars.

$$\text{income\_sa} = \vartheta_0 + \vartheta_1 \text{exch\_trd}_{t-i} + \vartheta_2 \text{exch\_vol} + u \quad (1)$$

In this model income_sa represents tourism revenues, θ_0 represents the fixed term, exch_trd represents the exchange rate, exch_vol represents the exchange rate fluctuation, and u represents the error term. The variables used in this study were seasonally adjusted by using the method of Tramo Seats. Compilation of data, Central Bank of the Republic of Turkey, and Travel Agents Association of Turkey's statistics were used. In this method, firstly outlier values were determined in the Tramo model, then the optimized linear series were separated in the Seats model with respect to seasonal, trend and irregular components (Gomez & Maravall, 1998). Eviews of eight econometrics package program was used to estimate the models.

Measuring Real Exchange Rate Volatility and Result

Many different methods have been used in the literature to model exchange rate volatility. GARCH-type methods are the most commonly used of these methods. The GARCH process fails to capture the asymmetry in the structure of variance, because the unconditional variance is defined only as a magnitudes function regardless of the signs of lagged error terms in the GARCH model. Nelson (1991) developed an exponential GARCH (EGARCH) model which models conditional variance and lagged error terms by considering both the magnitudes and signs by taking into account the asymmetry in the structure of volatility (Takaendesa, Tsheolet, & Aziakponoa, 2005, p. 3; Chol, Fang, & Fu, 2009, p. 2163; Agung, 2009, p. 437). The conditional variance equation in the EGARCH model (Takaendesa et al., 2005, p. 4) is expressed as:

$$\log(\sigma_t^2) = c + \alpha_1 \left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \gamma_1 + \frac{\varepsilon_{t-1}}{\sigma_{t-1}} + \log\beta_1(\sigma_{t-1}^2) \quad (2)$$

In this model, the γ parameter shows the effect of leverage.

A positive sign for this coefficient indicates that same sized positive shocks have made more impact than negative shocks. A negative sign means that the impact of negative shocks is larger than the impact of positive shocks. If the coefficient is equal to zero, this indicates that the impacts of positive and negative shocks will be equal to each other in size, and that positive and negative shocks will not impact the exchange rate uncertainty (Brandt & Jones, 2006, p. 474).

The real exchange rate volatility examined in this study was estimated with the Auto-Regressive (AR) models and Ordinary Least Squares (OLS) method. In this context, AR models with different delay lengths were tested. According to the significance of the parameter criteria, the model used in the OLS model is:

$$\text{exch\_trd}_t = \alpha_0 + \beta_1 \text{exch\_trd}_{t-1} + \beta_2 \text{exch\_trd}_{t-2} \quad (3)$$

Breusch-Godfrey Lagrange Multiplier (LM) test was used to determine whether or not the residuals containing autocorrelation were obtained from the OLS estimation. Compatibility with the structure of ARCH was examined with the ARCH-LM test. Breusch-Godfrey LM test was calculated as LM = $(n - q)R^2$ and the LM test statistic was used (Table 1). The Breusch-Godfrey LM test required the assumption of constant variance, but it could be made resistant (robust) to the variance of the variable. The presence of ARCH effects in the model was investigated in the ARCH-LM test (Green, 2002; Engle, 1982).

Table 1

Breusch-Godfrey and ARCH-LM Test Results

	Breusch-Godfrey LM	ARCH-LM
exch_trd	3.69* (0.02)	4.77* (0.09)

Notes. * denote statistical significance at the 10% level; numbers in brackets are *p*-values.

It was determined that the real exchange rate had a suitable structure with ARCH-type models in the analyzed time series (Table 2).

Table 2

EGARCH Model Results

	Co-efficient	Probability
α_0	108.21	0.00
$\text{exch\_trd}_{t\text{-}1}$	1.29	0.00
$\text{exch\_trd}_{t\text{-}2}$	-0.34	0.00
c	0.85	0.06
α_1	0.52	0.01
γ_1	-0.48	0.00
β_1	0.29	0.31

When forecast results are analyzed, it is observed that γ_1 coefficient which shows the effect of asymmetry, was negative and highly significant. This situation indicates that there were more negative shocks that increased the real exchange rate volatility than positive shocks. The model's errors were estimated with EGARCH—whether or not the effect of ARCH was tested with ARCH-LM test.

Table 3

ARCH-LM Test Results

	ARCH-LM
exch_trd	0.185058 (0.66)

Note. Number in brackets is *p*-value.

As a result of the test, no ARCH was found (Table 3). Applied models are said to be successful in detecting volatility clusters.

Unit Root Test Results

In the time series analysis, the data must be static (Gujaratin, 2009, pp. 713-726). When series are static, they carry very little information related to the past (Enders, 1995, p. 239). Therefore, a stability analysis of the variables was made with an expanded Dickey and Fuller (1981) unit root test (Table 4).

As a result of the analysis, the series have been tested separately using a formula that contains a constant

term and a constant trend term. Generally, the series were not static in the levels of all series, but they became static by taking first differences. As a result of the unit root tests, co-integration analysis was made to determine whether or not they were static to the same degree and thus whether there is a long-run relationship among the variables studied.

Table 4

ADF Unit Root Test Results

Variables	Level Values		First Difference Values	
	Constant	Constant/Trended	Constant	Constant/Trended
income_sa	-2.02	-2.53	-7.51*	-7.82*
exch_trd	-2.14	-3.28*	-7.51*	-7.821*
* = 1%	-3.49	-4.04	-3.49	-4.04
** = 5%	-2.88	-3.45	-2.88	-3.45
*** = 10%	-2.58	-3.15	-2.58	-3.15

Notes. The number of leads and lags was determined by the AIC; ***, **, and * denote statistical significance at the 1%, 5%, and 10% level.

Co-integration Results

The co-integration relationship was examined using the multivariate co-integration analysis developed by Johansen and Juselius (1990, pp. 169-210) (Table 5). Co-integration is a test based on linear combinations of non-stationary variables which are static in the long term. The presence of co-integration among variables means that there is a true long-term relationship.

Table 5

Johansen Co-integration Test Results

H0	H1	Eigen Values	Trace Statistic	Critical Value 5%	Max Statistics of Eigen Values	Critical Value 5%
$r = 0$	$r = 1$	0.14	18.90*	15.49	16.35*	14.26
$r \leq 1$	$r = 2$	0.023	2.54	3.84	2.54	3.84

Notes. The number of leads and lags was determined by the AIC; the bandwidth was selected by Newey-West estimator using the Bartlett kernel; * denote statistical significance at the 10% level.

Number of delay was determined to be two in the unrestricted VAR model, according to the criteria of Likelihood Ratio (LR), and Final Prediction Error (FPE) and autocorrelation, and variable variance problems were not observed in the error terms for the length of this delay. As a result of the co-integration test, a weak co-integration was observed between the exchange rate and tourism revenues.

Error Correction Model and Results

Because a long-term relationship between the series was determined, the causality and direction of the relationship among variables were investigated with the help of the Granger causality test. Granger (1988, pp. 199-211), has stated that when a long-term relationship among the variables is found, then they are co-integrated and the traditional Granger causality test does not apply. In this case, analyzing causality among the series would be more appropriate within the scope of the error correction model. Additionally, in this test approach, Engle and Granger (1987) also showed that there is a vector error correction mechanism (VECM) which corrects imbalances in the short term (Engle & Granger, 1987, pp. 251-276).

$$\Delta \text{income\_sa}_t = c + \sum_{j=1}^{m} \alpha \Delta\, \text{income\_sa}_{t-1} + \sum_{i=1}^{k} \beta \Delta \text{exch\_trd}_{t-i} + \gamma \text{exch\_vol} + v_{t-1} + \varepsilon_t \qquad (4)$$

In this model income_sa_t represents tourism revenues and lagged values, $\text{exch\_trd}_{t\text{-}1}$ is current level of

exchange rate and lagged values, exch_vol is exchange rate volatility, v_{t-1} is the lagged value of the errors obtained from co-integration test, and ε_t represents error term (Table 6).

The results of the regression show that an increase in the real exchange rate, i.e., a unit increase in the index, means appreciation of TL; so, it reduces the total tourism income. This result is consistent with economic theory. In addition, positive exchange rate volatility increases tourism revenues; and, the Granger error correction model states that, at the end of a period (that is one month), the imbalance ratio of 4.85% between short term and long term will resolve.

Table 6

Error Correction Model Results

Variable	Coefficient	*t*-ist
C	1,806.915	21.54585
income_sa$_{t-1}$	3.54600	6.1232590
exch_trd$_{t-1}$	-5.772309	-7.231490
exch_vol	0.932156	29.65433
v_{t-1}	4.859736	2.141006
r^2 = 0.90 DW = 2.33 Prob = 0.00		

Conclusions

In this study, the relationship between exchange rate volatility and Turkey's tourism revenues was examined. As an econometric model, firstly exchange rate volatility has been estimated with the EGARCH approach; then, the relationship among tourism revenues was investigated by including error correction model. According to the results obtained from the model, positive volatility in the exchange rate increases tourism revenues. In addition, the increase in the real exchange rate reduces the total tourism revenue.

In recent years, Turkey's economy has had a current account deficit problem and has closed this gap, to some extent, with tourism revenues. A stable exchange rate was estimated to be helpful to close the current account deficit by not allowing a decrease in tourism revenues. Last of all, tourism revenues are expected to promote economic growth with creating a multiplying effect on the national economy.

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