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Exchange Rate Volatility and Tourist Flows into Turkey

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This paper examines the effects of exchange rate volatility (ERV) on tourist flows into Turkey for the period 1994 - 2012. ERV affects tourist flows either by affecting potential travelers or the policy actions of tour operators by inducing them to switch travel locations in order to hedge their activities. In this study, international tourist flows into Turkey are measured by tourist arrivals and exchange rate volatility is measured, both, as a moving average of the logarithm of real effective exchange rate, as well as, by using only high and low peak values of the real effective exchange rate capturing the unexpected fluctuation of the exchange rate. The empirical methodology we use relies upon the theory of cointegration, error correction representation of the cointegrated variables and different volatility measurements of the exchange rate using the Autoregressive Distributed Lags (ARDL) modeling to cointegration. Our results show that (i) there is a negative relationship between exchange rate volatility and tourist flows into Turkey suggesting that potential travelers and tour operators react indeed to changes in exchange rates; (ii) there is a negative impact of the relative price ratio on the tourist flows; (iii) GDP per capita at tourist origin, measured in purchasing power parities (PPPs), exerts positive influence on tourist flows. Our findings suggest some direct policy implications: policy makers of a tourist destination country when design policies aiming to target potential markets for their tourist product, should, in principle, avoid markets prone to exchange rate volatility due to political, social upheavals or financial instability. Moreover, countries relying heavily on their tourism industry, should avoid using exchange rate policies to correct their international price competiveness, as these policies may end up to an exchange rate volatility that could, in turn, reduce substantially its tourism inflows in the longer run. This is especially true in the case of increasing ERV that escalates its negative influence on tourism flows.

Keywords: exchange rate volatility, tourist flows, Turkey, ARDL method

JEL codes: F41, L83

1. Introduction

Empirical studies have identified that changes in the exchange rate are associated with changes in international arrivals: a devaluation at destination induces inflows while a devaluation at the origin deters international tourist outflows. Although, the role of the exchange rate, either as a direct determinant or an indirect one -via its impact on relative prices between origin and destination, has been established by many studies, less attention has been given into the volatility of exchange rate that create an environment of uncertainty and thus reducing tourist inflows into a country incurring a volatile exchange rate. Tour operators perceive exchange rate volatility as an element of risk in their activities and thus they react by switching tourist flows into some other destination favoring countries that enjoy a relative exchange rate stability. The purpose of this paper is to explore the relationship between tourism flows and exchange rate volatility for Turkey, a country that is a major European destination for summer holidays.

The structure of the paper is as follows: Section 2, provides an overview of the relevant literature, Section 3, justifies the choice of the specific model and the choice of the variables. In section 4, data description and methodology issues are analysed. Section 5, presents our results and finally, Section 6, contains concluding remarks and analyses the policy implications of our findings**.**

2. Literature Review:

Most of the empirical studies examining the determinants of international tourist flows identify four major determinants: a) the real effective exchange rate; b) the relative prices between destination and origin; c) the income, approximated by the GDP of the origin country and d) the transportation cost (see e.g. among others Cheng Ka Ming (2012), Dwyer et al (2011), Zhang et al (2009), Song and Li (2008), Zaki (2008), Patsouratis et al (2005), Li (2005), Garin-Munoz (2000), Witt and Witt (1995), Crouch (1993)).

These empirical studies have concluded that an exchange rate devaluation at destination attracts tourist flows while an exchange rate revaluation at the origin reduces tourism outflows internationally (see e.g. among others Agiomirgianakis (2012); Song and Li (2008), Garin-Munoz (2000), Patsouratis, et. al. (2005) and Witt and Witt (1995) adopting what Artus (1970) has suggested, namely, that travelers are more aware of exchange rates that they use and they are using them as proxy for the cost of living abroad (see also Stabler et.al. (2010 pp.53-55) for a relative discussion)). The income in the country of origin affects positively the ability and inclination of people for travelling abroad. The cost of living at a destination relative to an origin, given by relative consumer prices between destination and origin is negatively related to tourism inflows (see, among others, Dwyer et al.2010 page 63-64). Transportation costs which is actually part of the overall cost of traveling to a destination, is negatively related in tourist flows see e.g. Agiomirgianakis (2012).

In examining the literature on the effects of exchange rates on international tourist flows one may note that much emphasis has been given into the changes or shocks or fluctuations of the exchange rate. Several studies have shed, some light into this direction see for example Patsouratis (2005) who shows that exchange rate fluctuations may be identified as the sole factor determining tourist flows, as the case of German tourism inflows in Greece. A result that can be attributed, both, to the perceptions of tourists that their cost of travelling becomes uncertain, as well as, to the behaviour of tour operators that hedge their activities away from countries incurring exchange rate volatility, see, e.g. Stabler 2010 pp.176-181 for a relative analysis. Earlier studies on the effects of exchange rate fluctuations on international tourist flows are summarized by Crouch (1993). Fewer, however studies focus rather on the exchange rate volatility such as Webber (2001), Chang et al (2009), Yap (2012), Santana Gallego (2010). In a seminal paper by Webber (2001), the volatility of exchange rate is identified as a significant determinant of the long run tourism demand as risk averse tourist may decide to cancel or delay or switch to another destination if there is too much volatility of the exchange rate. Also, exchange rate volatility may reflect political instability or social unrest in the destination country deterring tourists from this destination. Webber examining tourist outflows from Australia shows that exchanger rate volatility may lead tourists to abandon the idea of travelling to a particular country in 40% of cases.

Most recently Chiang et al (2009) initiated a further analysis into the effects of volatility of exchange rates showing that it is associated with the volatility into international tourist inflows in Taiwan. Yap (2012), initiated by the findings of Chiang et al (2009) in investigating whether exchange rate volatility results an increase in the uncertainty of tourist inflows into Australia, concludes that exchange rate volatility creates spillover effects on tourism arrivals in Australia though these effects may differ from stronger to weaker depending upon the sending country that creates these tourism inflows into Australia. On the other hand, Santana Gallego (2010) concludes that exchange rate volatility of zero i.e. a common currency, has the largest impact in tourism claiming that euro has increased tourist flows by 6.3%.

3. The Model

The model for examining the effects of exchange rate volatility on tourist flows is that used in Serenis and Tsounis (2014a and 2014b) modified to include different volatility measures and also to account for seasonality effects. Tourist flows (measured by tourist arrivals) are considered to be a function of relative prices, weighted per-capita GDP and exchange rate volatility, as follows:

$$\ln X_t = \lambda_0 + \lambda_1 \ln\left(\frac{P_X}{P_w}\right)_t + \lambda_2 \ln GDP_t + \lambda_3 V_t + \lambda_4 D_1 + \lambda_5 D_3 + \lambda_6 D_4 + \lambda_7 \mathrm{T} + \omega_t \quad (1)$$

where X is the number of tourist arrivals, P_X/P_w are relative consumer price indices between domestic country and the rest of the world (ROW), GDP is per capita GDP of the origin countries of tourists, measured in purchasing power parities (PPPs), V represents the two different measures of volatility, D1, D3, D4 are seasonal dummies, T is a time trend and ω is an error term.

The number of tourist arrivals is the number or persons (residents and non residents) arriving with sole purpose of tourism. The relative prices variable is constructed from the country's CPI deflated by an index comprised of world CPI for each country in our sample[1]. The variable following the relative prices is per capita GDP of the origin countries of tourists, measured in purchasing power parities (PPPs). The variable is calculated as a weighted average of the per-capita GDP of the tourists' origin country, the weights being the share of specific country in the total number of tourists' arrivals in Turkey. It has been included in the model because tourism vacations are affected by income. Finally, the last variable (V), represents exchange rate volatility which is measured in two ways: first, as a measure of time varying

[1] The inclusion of the relative consumer price P_X/P_w approximates reasonably the cost of tourism as it is adjusted by the exchange rate. For this reason, we do not include exchange rate as a separate variable see e.g. Witt and Witt 1995 and Patsouratis (2005) for a more detailed analysis.

exchange rate volatility, using the standard deviation of the moving average of the logarithm of real effective exchange rate and second, as a measure of high and low fluctuation of the average values of volatility by utilising a variable that captures high and low peak values of the real effective exchange rate.

Exchange rate volatility measurement

Exchange rate (ER) volatility is a measure that is not directly observable thus; there is no clear, right or wrong, measure of volatility. Even though some empirical researchers have examined alternative measures of volatility, for the most part, the literature utilizes a moving average measure of the logarithm of the exchange rate.

$$V_{t+m} = \left(\frac{1}{m}\sum_{i=1}^{m}(R_{t+i-1} - R_{t+i-2})^2\right)^{\frac{1}{2}} \quad (2);$$

where R is the logarithm of the nominal or real effective exchange rate, m is the number of periods, usually ranging between 4-12.

The application of such a measure has its benefits but it also has pitfalls. The main disadvantage is that it fails to capture and incorporate the potential effects of high and low peak values of the exchange rate.

High and low peak values of the exchange rate capture the unpredictable factor which may alter the tour operators' behaviour. Many empirical researchers have in the past commented on the importance of unexpected values of exchange rate for exports. Akahtar and Hilton (1984) concluded that exchange rate uncertainty is detrimental to the international trade. Others researchers have applied volatility measures which attempted to incorporate unexpected movements of the exchange rate. Some have proposed the average absolute difference between the previous forward rate and the current spot rate as a better indicator of exchange rate volatility (Peree and Steinherr 1989). Awokuse and Yuan, (2006) applied a measure of volatility which included the variance of the spot exchange rate around the preferred trend. However, as suggested by De Grauwe (1988) risk preferences to unpredictable movements of the exchange rate play a vital role on exporters' behaviour. As a result, it is possible for a producer to either increase or decrease exports during a period for which exchange rates take up extremely high and low values. A moving average does reduce these high and low values and therefore, in some cases of extreme fluctuation of the exchange rate proves inadequate to fully capture the effects of volatility on exports.

With the above arguments in mind, we examine two sets of estimated equations, in this study. The first, contains the standard deviation of the moving average of the logarithm of the real effective exchange rate as a measure of volatility (V1) and the second, contains a variable capturing only high and low values of the exchange rate (V2).

In order to derive the second measure of volatility the average value of the exchange rate is calculated. V2 is constructed to capture only the values for which the exchange rate fluctuates above and below a certain percentage of the average value. Since we don't know for each country which values are perceived as high or low points we examine various cases for which the exchange rate increases above and below different certain thresholds ranging from 3%-7% and we will report the first statistically significant values that we obtain.

4. Data description and Methodology

The data selected in this study are for Turkey, a country that is a major European destination for summer holidays.

Quarterly data are employed to explore the relationship between tourism services exports and exchange rate volatility that cover the period of the fourth quarter of 1994 to the fourth quarter of 2012. Tourist arrivals and GDP are obtained from Eurostat while the CPI values and real effective exchange rates are derived from International Financial Statistics (IFS).

Estimating methodology

In order to examine the long-run relationship (co-integration) between the tourist flows, the exchange rate volatility and the other explanatory variables of per-capita GDP and relative prices a cointegration analysis has been used. Before examining the existence of co-integration between the variables, we analyse first, the order of integration of the variables considered. This analysis is usually done using the ADF (Dickey, Fuller, 1981) or the P-P (Phillips, Perron, 1988) unit root test. The P-P unit root test was used to test the series for stationarity.

Table 1: Phillips-Peron unit root test results

series	Level	First difference
lnX	-2.02204	-4.85082*
lnGDP	-7.10305*	-4.35388*
V1	-3.665791	-6.15042*
lnP	-2.484047	-5.67965*
V2	-4.59118*	-6.55632*

Note: All tests are performed using the 5% level of significance; lnX is the logarithm of tourist arrivals, GDP represents the logarithm of a weighted index composed of the sums of each countries real gross per capita domestic product in PPP multiplied by the corresponding percentage of tourist flows from each country to Turkey, V1 is volatility measured as the moving average of the standard deviation of the exchange rate, V2 is the volatility measured capturing values above and below 6% of the average value of the moving average or the exchange rate and P is the logarithm of the country's CPI to world's CPI. All tests are performed to a maximum of three lags. The null hypothesis of a unit root is tested against the alternative. The asterisk denotes significance at least at 5% level.
Source: authors' calculations

The values of the P-P test are presented in the above Table 1. The null hypothesis (H_0) of a unit root (non-stationarity) is tested against the alternative. H_0 was rejected at 5% level of statistical significance for lnGDP and V2 while lnX, V1 and lnP were found to be non stationary at their level. However, the null hypothesis was rejected for their first difference and it is concluded that the variables lnGDP and V2 are I(0) while lnX, V1 and lnP are I(1).

When there are only I(1) variables, the maximum likelihood approach of Johansen and Juselius (1990) can be used. In our case the system contains I(0) and I(1) variables and therefore, the Autoregressive Distributed Lag modeling (ARDL) suggested by Pesaran *et al.* (1999, 2001) will be used. The ARDL method can be applied on a time series data irrespective of whether the variables are I(0) or I(1) (Pesaran and Pesaran, 1997), it provides unbiased estimates of the long-run model and validates the t-statistics even when some of the regressors are endogenous (Laurenceson and Chai, 2003). However, it is necessary to check that the variables are not I(2) because, in this case, ARDL would produce spurious results (Oteng-Abayie et.al., 2006). As it can be seen from the above Table, the variables are either stationary on their level or at their first difference.

Following Perasan *et.al.* (1999, 2001) the ARDL representation of equation (1) is:

$$\Delta lnX_t = a_0 + \vartheta lnX_{t-1} + \sum_{i=1}^{\mu} \theta_i G_{i,t-1} + \sum_{j=1}^{p} a_j \Delta lnX_{t-j} + \sum_{i=1}^{\mu}\sum_{j=0}^{p} \beta_{ij} \Delta G_{i,t-j} + \tau T + \delta_1 D1 + \delta_3 D3 + \delta_4 D4 + \omega_t \quad (3)$$

where Δ is the first-difference operator, X is the exports of tourist services, $G=(lnP, lnGDP, V1$ or $lnV2)$ is the vector with the explanatory variables; P is the relative prices, *GDP* weighted average real domestic per-capita GDP (the weights used are the shares in total Turkey's tourists arrivals of the tourists flows from each country), *V1* and *V2* represents the first and second measure of exchange rate volatility, *D1*, *D3*, *D4* are seasonal dummies, T is the time trend, ω is a white noise error term, μ=3 is the number of explanatory variable, ϑ, θ_i are the coefficients that represent the long-run relationship, α_j, β_{ij} are the coefficients that represent the short-run dynamics of the model and p is the number of lag length. The ARDL method to co-integration requires: first, equation (3) is estimated and the lag order of the ARDL is determined using the AIC[2] lag selection criterion. To find the order of the ARDL model $8^{(\mu+1)}$=4096 regressions were estimated, for each measure of volatility. Second, a test was conducted that the errors in equation (3) are serially independent. The Lagrange Multiplier (LM) test was used to test the null hypothesis that the errors in equation (3) are serially independent against the alternative that there are autoregressive or moving average relationships in the errors. Then, the model is tested for stationarity (*i.e.* dynamic stability). The requirement is that the roots of the AR polynomials lie strictly outside the unit circle or alternatively, the inverse roots of the AR polynomials lie strictly inside the unit circle. In our case, the plot of the inverse roots of the AR polynomial was made. Fourth, from equation (3) a test for the existence of long-run relationship was made. This is called the 'bounds testing' approach to co-integration and it is associated to the hypothesis testing $H_0: \vartheta = \theta_1 = \cdots = \theta_i = 0$; *i.e.* the long-run relationship does not exist against the alternative $H_1: \vartheta \neq \theta_1 \neq \cdots \neq \theta_i \neq 0$ *that* the long-run relationship exists. Fifth, assuming that the bound test, described above, is conclusive and there is a cointegrating relationship, the coefficient of the Error Correction Term (ECT) and its statistical significance can be found by estimating:

[2] Akaike Information Criterion.

$$\Delta lnX_t = a_0 + \sum_{j=1}^{p} a_j \Delta lnX_{t-j} + \sum_{i=1}^{\mu}\sum_{j=0}^{p} \beta_{ij}\Delta G_{i,t-j} + eECT_{t-1} + \omega_t \ (4);$$

The coefficient of the error correction term, e, should be negative and statistically significant meaning that there is a co-integration between the dependent and the explanatory variables. The value of this coefficient shows the percentage change of any disequilibrium between the dependent and the explanatory variables is corrected within one period (one quarter).

Finally, the long-run impact of the explanatory variables to the dependent variable is calculated using the expression (Bardsen 1989):

$$\hat{\gamma}_i = -\frac{\hat{\theta}_i}{\hat{\vartheta}} \ (5);$$

where $\hat{\theta}_i$ and $\hat{\vartheta}$ are the estimated long-run coefficients in equation (3). The $\hat{\gamma}_i$s show how the dependent variable, in our case the logarithm of tourist flows measured by tourist arrivals, responds in the long-run to any change in the explanatory variables *i.e.* the logarithm of the per capita GDP, the logarithm of the relative prices and the logarithm of the measure of the exchange rate volatility. However, the $\hat{\gamma}_i$s provide a single value to quantify the long-run effect and they do not provide any information about the degree of variability associated to them (Gonzalez-Gomez *et.al.*, 2011). Further, confidence intervals for each coefficient cannot be constructed using traditional statistical inference because they do not follow the normal distribution since they are calculated as the division of two normally distributed variables. Following Efron and Tibshirani (1998) the bootstrap method, which is a non-parametric method, can be used in order to calculate empirically confidence intervals without assuming a specific distribution of the γ_is. In our case this was made for 95% level of statistical significance. If the zero is contained in the interval then the effect of the explanatory variable will not be statistically significant.

5. The Results

The lag order of the ARDL model, found with the procedure described in the section above, is: (7,6,0,2)[3], for both measures of volatility. The first number represents the distributed lags of *ln*X, the second the distributed lags of *ln*P, the third

[3] For the determination of the lag order of the ARDL model the maximum number of eight lags (p=8) in equation (3) was considered.

the distributed lags of *ln*GDP and the fourth the distributed lags of V1 or *ln*V2. The regression results and the necessary diagnostic statistics for the ARDL models are presented in the Appendix. The long-run impact of exchange rate volatility on tourist flows is shown in Table 3 and it will be discussed bellow.

The Lagrange Multiplier (LM) test was used to test the null hypothesis that the errors in equation (3) are serially independent. The F-statistic of the LM test had a value of 1.109 using measure 1 and 0.535 using measure 2 and it was not significant so, the null hypothesis of no-serial correlation was not rejected.

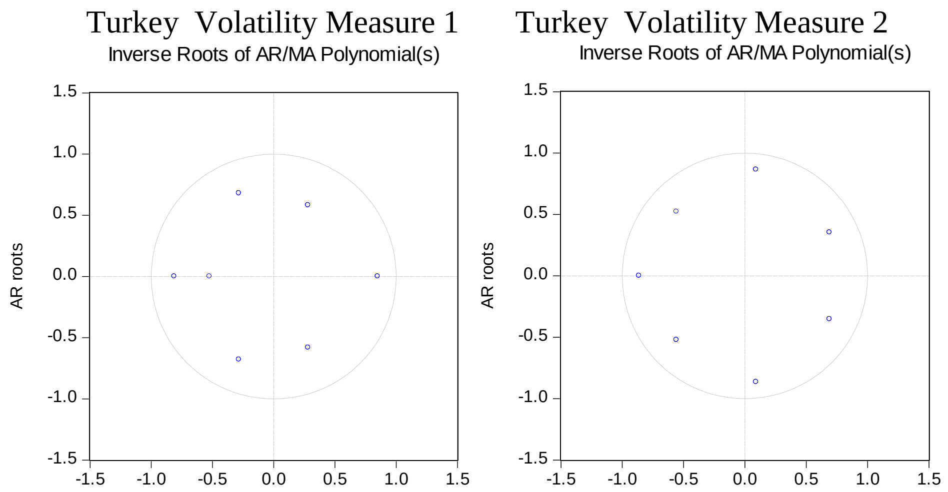
The Breusch-Pagan-Godfrey heteroskedasticity test was also performed (column 6 of the Table in the Appendix); the F-statistic had a value of 0.736037, for measure 1; 1.447288 for measure 2, it was not statistically significant signifying that the null hypothesis of homoschedasticity was failed to be rejected.

A further test was performed to examine the structural stability of the coefficients of the two models. The variables included 73 observations and the Chow test was perform for a structural break in the coefficients for the middle of the sample period, i.e. the 36th observation. The F-statistic for the Chow test for the model with volatility measure 1 had a value of 0.99412 and it was not statistically significant signifying that there is no structural break in the coefficients. The same results were obtained for the model with volatility measure 2; the F-statistic for the Chow test had a value of 0.97274 and it was not statistically significant signifying also, that there is no structural break in the coefficients.

Dynamic stability

The next step was to establish the dynamic stability of the model. When a model has AR terms it will be dynamically stable when the roots of the AR polynomials lie strictly outside the unit circle or the inverse roots of the AR polynomials lie strictly inside the unit circle. In our case, the plot of the inverse roots of the AR polynomial was made and it is seen in Figure 1, below:

Figure 1: Dynamic stability test



All the inverse roots of the AR polynomials lie strictly inside the unit circle therefore, the model is dynamically stable (stationary).

Long-run relationship

The next step was to test for the existence of long-run relationship between the dependent and the explanatory variables. The Wald 'bounds test', described in the fourth step above, was performed and its results are reported in Table 2. According to the computed F-statistic which is higher than the appropriate upper bound of the critical value (column 4 of Table 2), the null hypothesis of no-cointegration is rejected and the alternative is adopted and it is concluded that there is a long run relationship between the variables. In other words, the computed F-statistic values using measure 1 is 10.38 and using measure 2 is 10.91.

Table 2: Wald 'bounds test' for the existence of co-integration

	ARDL order	F-statistic, Wald bound test	Critical values for the F-statistic, lower and upper bound (from Perasan 2001)
Volatility measure 1	(7,6,0,2)	10.3802	4,066 -5,119
Volatility measure 2	(7,6,0,2)	10.9142	4,066 -5,119

Note: All tests are performed using the 5% level of significance

After establishing, by the Wald test, that there is a cointegrating relationship, the coefficient of the Error Correction Term (ECT) and its statistical significance was estimated and they are presented in Table 3. The coefficient of the ECT, *e-hat*, should be negative and statistically significant meaning that there is a co-integration between the dependent and the explanatory variables. The value of this coefficient shows the percentage change of any disequilibrium between the dependent and the explanatory variables is corrected within one period (one quarter). In our case the sign of the ECT coefficient is of the expected value, it is negative, and it is statistically significant. Its value ranges from -0.54 for volatility measure 1 to – 0.6 for volatility measure 2 and shows that any disequilibrium between the dependent and the explanatory variables is corrected in less than a year (note, that when the value of the *e-hat* is larger than |-1| the correction takes place in less than one quarter, in our case a disequilibrium is corrected within three quarters time).

Table 3: Long-run impact of exchange rate volatility on tourist flows

Country-exchange rate volatility measure	$\hat{e}$	$\hat{\gamma}_i$	confidence intervals for $\hat{\gamma}_i$
volatility measure 1	-0.543	lnP: -0.144*	**[-0.227 -0.061]**
		lnGDP: 11.402*	**[6.125 16.680]**
		V1: -6.304*	**[-12.366 -0.242]**
volatility measure 2	-0.598	lnP: -0.1736*	**[-0.237 -0.110]**
		lnGDP: 12.401*	**[7.000 17.820]**
		V2: -7.241*	**[-14.326 -0.156]**

Notes: lnP represents the long run value of the ratio of the relative CPIs, lnGDP represents the logarithm of a weighted index composed of the sums of each country's real gross domestic per-capita product in PPP multiplied by the equivalent percentage of tourist arrivals of each country to Turkey, V1 represents the long run value of volatility measured as a moving average and V2 is the volatility capturing values above and below 6% of the average value of the moving average and P is the logarithm of the country's CPI to world's CPI; the asterisk indicates statistical significant coefficients at 5% level of statistical significance, the relevant confidence intervals are indicated in bold.

Finally, the long-run impact of the explanatory variables to the dependent variable is calculated using the expression given in (5). The $\hat{\gamma}_i$s show how the dependent variable, in our case the logarithm of tourist arrivals, responds in the long-run, to any change in the explanatory variables *i.e.* the logarithm of per-capita GDP of the countries of tourists origin, the logarithm of relative prices and the logarithm of the measure of exchange rate volatility. The statistical significance of the long-run coefficients are shown by the bootstrap confidence intervals (column 5). The results from the examination of the effects of exchange rate volatility (measure 1 and 2) on tourist arrivals indicate that exchange rate volatility has a strong negative effect for Turkey for both measures of volatility, i.e. when both moving average measure is used (measure 1) and measure 2 that captures high and low fluctuation of more that 6% above and below the moving average of the exchange rate. The latter measure has a higher effect than the former (the coefficient in absolute terms is higher) indicating that high volatility affects more the decisions of tourists and tour operators. Smaller changes of the exchange rate have less effect on tourist flows.

The relative price variable, is negative and significant. This finding is in line with Garin-Mynoz T and Amaral T.P., (2000) and suggests that an increase in the consumer price index of Turkey relative to the ROW reduces tourism arrivals irrespectively of what measures of volatility.

The per-capita GDP variable was included because tourism services is a part of consumption which depends heavily on consumer income. The coefficient for the per-capita GDP of the tourists' countries of origin was positive, statistically significant and of high value confirming the predictions of the theory that income is an imports factor in consumption. The estimated income elasticity is very high in both models of the different measure of exchange rate volatility indicating that the touristic product of Turkey is a *luxury good*.

6. Conclusions and policy implications

In this study, the relationship between tourist inflows, measured by tourist arrivals, and exchange rate volatility has been examined for an eastern Mediterranean country, Turkey. Our empirical methodology relies upon the theory of cointegration, error correction representation of the cointegrated variables and different volatility measurements of the exchange rate. Our results can be summarised as follows. First, exchange rate volatility, using both measures of ERV has indeed a significant negative effect on tourist inflows into Turkey. By both measures, the coefficient of ERV is considerably high, more than six, indicating that a one per cent change in the exchange rate reduces tourist flows into Turkey by more than 6 per cent. Furthermore, a comparison of ERV elasticities in the two specifications of our model shows that higher values of ERV have a larger negative impact on tourist arrivals into Turkey. Indeed, as the second specification captures high and low fluctuations (more that 6% above and below the moving average of the exchange rate) the estimated coefficient of the ERV is larger than the one found when the ERV is measured by the moving average of the exchange rate. This signifies that there is an escalating effect in the negative influence of the ERV on tourist flows: *increased volatility reduces tourists' arrivals increasingly more*. Potential travelers, as well as, their tour operators are affected more on the choice of travel destination by the extreme values of exchange rate rather than by a smooth measure of them.

Second, the GDP variable is per capita GDP at the origin countries of tourists, measured in purchasing power parities (PPPs) and it is positive and statistically significant. The values of the coefficients, representing income elasticities of tourist arrivals, in the two estimated models are very high (with values more that 11) indicating that an one percent change in the per capita purchasing power at tourist origin affects positively and by more that 11 percent the number of tourist arrivals in Turkey. This means that the touristic product of Turkey is a luxury good for her international tourists.

Third, an increase in the consumer price index of Turkey relative to the rest of the world reduces tourism arrivals irrespectively of what measures of volatility are used. This is an expected result, showing that inflation affects negatively the attractiveness of the country as a tourist destination.

Our findings have some direct policy implications: policy makers should, in principle, consider the effects of exchange rate volatility in designing tourism economic policy, for example, countries that have substantial tourist inflows from a diversified range of international markets should avoid the opening up of markets that may be exposed to either real or monetary disturbances (say due to political instability as is the case in Ukraine currently) that could result an exchange rate volatility. By the same token, a country relying heavily on its tourism industry, should avoid exercising exchange rate policies in order to correct its international competiveness, as these policies may end up to an exchange rate volatility that could, in turn, reduce substantially its tourism inflows, this is especially true in the case of increasing ERV that escalates its negative influence on tourism flows.

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Appendix: ARDL regression results (depended variable ΔX_t)

	ARDL order	Regressor, coefficient	F-statistic, LM test	Dynamic stability	Heteroskedasticity Test, F-statistic
Volatility measure 1	(7,6,0,2)	lnV1(-1)*: -6.184516 ln GDP(-1)*: 11.18608 lnX(-1)*: -0.981042 ln P(-1)*: -0.140939 Δ(ln(X(-1))): 0.066462 Δ(ln(X(-2)))*: 0.268361 Δ(ln(X(-3))): 0.166415 Δ(ln(X(-4)))*: 0.228967 Δ(ln(X(-5)))*: 0.110172 Δ(ln(X(-6)))*: 0.123157 Δ(ln(X(-7)))*: 0.055153 Δ(ln(P)) 0.242515 Δ(ln(P(-1))) -0.582530 Δ(ln(P(-2))) -1.039797 Δ(ln(P(-3))) 0.793143 Δ(ln(P(-4))) 0.653836 Δ(ln(P(-5)))* -1.043365 Δ(ln(P(-6)))* -1.729556 Δ(ln(GDP))**: 6.604173 Δ(V1)*: -2.592830 Δ(V1(-1))*: 3.447636 Δ(V1(-2))*: 2.350685	1.108874	yes	0.736037
Volatility measure 2	(7,6,0,2)	lnV1(-1)*: -7.120401 ln GDP(-1)*: 12.20316 lnX(-1)*: -0.983344 ln P(-1)*: -0.170687 Δ(ln(X(-1))): 0.014169 Δ(ln(X(-2)))**: 0.224298 Δ(ln(X(-3))): 0.162253	0.5347	yes	1.447288

		Δ(ln(X(-4)))*: 0.219351 Δ(ln(X(-5))): 0.082561 Δ(ln(X(-6)))*: 0.118030 Δ(ln(X(-7)))*: 0.049320 Δ(ln(P)) -0.57560 Δ(ln(P(-1))) -0.924938** Δ(ln(P(-2)))* -0.529034 Δ(ln(P(-3)))** 0.701631 Δ(ln(P(-4)))* 0.083193 Δ(ln(P(-5)))* -0.823246 Δ(ln(P(-6)))* -1.018203 Δ(ln(GDP))*: 7.746792 Δ(V2): -1.151690 Δ(V2(-1))**: 2.157620 Δ(V2(-2))*: 2.333814			

Notes: X represents the number of tourist arrivals, P represents the ratio of the relative CPIs, lnGDP represents the logarithm of a weighted index composed of the sums of each countries real gross per-capita domestic product in PPP multiplied by the equivalent percentage of tourist arrivals of each country to Turkey. V1 represents volatility measured as a moving average and V2 is volatility depicting values above and below 6% of the average value of the moving average. V1, V2 is in logarithmic form, as it can be seen from (2).The single asterisk denotes up to 5% and the double asterisk denotes up to 10% level of statistical significance. The plot of the inverse roots of the AR polynomials for examining the dynamic stability of the model are presented in Figure 1.