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The asymmetric impact of real exchange rate on tourism demand

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Abstract

Europe is a notable tourism region and so international tourist arrivals are getting more crucial day by day for attraction center countries. Besides many economic factors, exchange rate is also main economic determining factor of tourism demand. This paper investigates the asymmetric effects of the real exchange rate on tourism demand by utilizing asymmetric VAR methodology for 10 most popular destinations in Europe. According to empirical results, there is a negative relationship between the real exchange rate and tourism demand, with mixed effects for a few countries. The effect of the currency appreciation on the total number of tourist arrivals is more greatly than the currency depreciation for France, Netherlands, Poland and Turkey. Austria, Greece and Italy are also affected asymmetrically from the currency rate in the long term but not short term. The tourist arrivals in Spain, Germany and the UK are not asymmetrically sensitive to exchange rate. The results show that decrease in exchange rate have greater impact on the tourism demand compared to increase in the exchange rate in asymmetrically affected countries.

JEL Classification: Z32, C32, F3

Keywords: Real exchange rate, Tourism demand, Asymmetric effect, VAR

1. Introduction

Tourism is the fifth sector in the World's exports sector after petroleum, chemical, food, and automotive industries. International tourist arrivals grew by 5 percent in 2016 and more than half of it was welcomed in European countries (World Tourism Organization Annual Report, 2016). Tourism is one of the main income source of global economy. Therefore, the countries invest in this sector to get big portion of the global tourism income. Tourism has an important role in providing the capital required for the development of countries. The reason why tourism sector is considered important is its foreign currency earning feature. On the other hand, tourism income has an essential function in the balance of payments due to being foreign exchange source in tourism countries (Uguz ve Topbaş, 2011).

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Investigating the tourism economics is substantial for tourism countries. According to the researches results countries take precautions to prevent tourism demand. Undoubtedly, there are many economic or social factors that determine the demand for tourism. One of the main economic factors affecting the international tourism is exchange rate and its volatility. Although there are many studies on the impacts of exchange rate and its volatility on tourism demand, there are varying results. A large part of studies has found that the exchange rate is statistically significant for tourism demand. However, according to some empirical studies, the exchange rate has no effect on tourism demand (Vanegas and Croes, 2000; Croes and Vanegas, 2005; Quadri and Zheng, 2011). The reason for these varying results is that different countries and different time periods have been used in these studies.

The exchange rate may affect both the choice of destination for international tourists and the length of stay and expenses (Webber, 2001; Wang, et al., 2008; Crouch, 1993). According to several findings, an increase in destination country's exchange rate causes a decrease in total number of tourists. Therefore, the exchange rate is an important indicator for international tourists as the cost of living (Martin and Witt, 1988).

Previous studies focus on the symmetric impact of the exchange rate on the tourism demand but there is no consensus on the effect of real exchange rate on tourism demand. Asymmetric effect means that the increases and decreases in real exchange rate may not have same magnitude on the number of tourist arrivals. One of the reasons for conflict results may be that the effect of exchange rate on tourism demand is not symmetric. There is no example that have examined the asymmetry in terms of dynamic structure in the literature. To fill this gap, in this study the asymmetric VAR and nonlinear impulse-responses are used. This paper aims to investigate the asymmetric effects of the changes in real exchange rate on tourism demand by using asymmetric VAR proposed by Kilian and Vigfusson's (2011) model for 10 most popular destinations in Europe using monthly data.

Our study has three main contributions. First, this is the first article to investigate the asymmetric effect of the currency depreciation and appreciation on tourism demand by using nonlinear impulse responses unlike the literature. Second, it captures how the negative shock and the positive shock in currency affect the tourism demand in both

short and long run. Third, it is also the first study to examine how the tourism demands in top ten destinations in the Europe are affected by their currency rate.

This paper proceeds as follows: Section 2 presents methodology. In Section 3, the data set and empirical results are discussed, and conclusions are given in Section 4.

2. Literature

There are many studies on the impacts of the exchange rate and its volatility on tourism demand. Our literature review focuses on the studies investigate the effect of exchange rate on tourism demand. Vita and Kyaw (2013) found that the exchange rate and its volatility are important determinants on Turkey's tourist arrivals from Germany by using GARCH model for the period 1996-2009. Falk (2015) showed that the impact of the exchange rate on tourism demand with Swiss application. According to his results, after the 2008 global crisis, the appreciation of the Swiss franc led Swiss tourists to go to neighboring Austria. Demir (2004) found that the appreciation of foreign currency via the high inflation rate decreased in the number of tourist. Moreover, Akar (2012) showed that the exchange rate has significantly affected Turkish tourism demand from the Eurozone and the US. Pavlic, et.al (2015) concluded that there is a long-run relationship between tourist arrivals and real effective exchange rate for Croatia. Martins et.al (2017) investigated the world tourism demand by using 218 countries' income per capita, the nominal exchange rate and relative price for the period 1995-2012. According to their findings, arrivals in Europe are sensitive to the exchange rate and tourism demand in Africa is the most affected by macroeconomic variables. Lim and Zhu (2017) analyzed the determinants of the tourism demand growth for Singapore by using heterogeneous dynamic panel. They concluded that the Singapore tourism is not sensitive to the real exchange rate. Chi (2015) examined the impact of income and exchange rate on the US tourism for the period 1960-2011. According to findings that the real exchange rate has a significant role on tourism balance for both long and short run. Croes and Vanegas (2005) examined that the effect of price and exchange rate on the tourist arrivals to Aruba from the US, Netherlands and Venezuela by using Box-Cox transformation. They found that the effects of price and exchange rate depend on the country from which the tourists come from. Chang and Mcaleer (2012) investigated the same relationship for the tourist arrivals from the world, the US and Japan to Taiwan.

According to their results, the exchange rate has a negative impact on tourist arrivals to Taiwan. According to Quadri and Zheng (2011)'s results, the exchange rate has no impact on Italian tourism demand.

Reason for conflict results on the effect of exchange rate on tourism demand may be that the effect is not symmetric. Asymmetric effect means that the increases and decreases in real exchange rate may not have same magnitude on the number of tourist arrivals. Previous studies assume that the magnitude of these effects are same. In the literature, generally, the asymmetric impact of exchange rate volatility has been examined instead of the exchange rate. Also, these studies have used EGARCH or GJR-GARCH models for asymmetry (Chang and McAleer, 2009; Daniel and Rodrigues, 2010; Demirel et al, 2013).

There are limited articles, Wang, et al. (2008) and Tang, et al. (2016), investigating the asymmetric relationship between the currency rate and tourism demand and they used copula-GARCH model. However, neither these nor other studies have examined the asymmetry in terms of dynamic structure.

3. Methodology

Hypothesis of this study is the increases and decreases in real exchange rate have not same magnitude on the number of tourist arrivals. In order to investigate to presence of an asymmetric effect of exchange rate on tourism demand, the asymmetric VAR model, developed by Kilian and Vigfusson (2009 and 2011) is employed. In the asymmetric VAR model, the first equation is identical to the first equation of the standard linear VAR model.

$$REER_t = \alpha_{10} + \sum_{i=1}^{p} \alpha_{1i} TNT_{t-i} + \sum_{i=1}^{p} \alpha_{2i} REER_{t-i} + \varepsilon_{1t} \quad (1)$$

where REER is real effective exchange rate and TNT is total number of tourist arrivals. However, the asymmetric VAR model differs from standard linear VAR model in that the second equation includes both $REER_t$ and $REER_t^+$, in other words, both exchange rate increases, and decreases affect tourism demand. Therefore, the second equation is given as follows

$$TNT_t = \beta_{10} + \sum_{i=1}^{p} \beta_{1i} TNT_{t-i} + \sum_{i=1}^{p} \beta_{2i} REER_{t-i} + \sum_{i=1}^{p} g_{2i} REER^{+}_{t-i} + \varepsilon_{2t} \quad (2)$$

where ε_{it} (i=1,2) are error terms with uncorrelated white noise $(0, \Sigma)$. Here $REER_t^+$ is a censored variable under given threshold value. The threshold value can be estimated by using Chan (1993) or can be taken as zero. α_{ji} *and* β_{ji} (*j=1,2; i=1,…,p*) are the coefficients of REER and TNT and g_{2i} (*i=1,…,p*) are the coefficients of censored variable. Since the OLS residuals of equations (1) and (2) are uncorrelated, these coefficients are estimated by standard regression method. Although the parameter estimates are not efficient asymptotically, the advantage of this model is that the dynamics responses are estimated consistently without knowing the nature of the DGP (Kilian and Vigfusson, 2011).

If there is an asymmetric effect the coefficients of $REER_t^+$ should be zero or the impulse responses should be equal for two regimes. Therefore, there are two ways which are *slope-based test* and *impulse response-based test* to test whether there is an asymmetric effect or not. If increases and decreases in real exchange rate have same magnitude effects on tourism demand, the slope coefficients or slope line must be symmetry. For testing symmetry in the changes of real exchange rate, the null hypothesis can be defined as follows

$$H_0: g_{21,0} = \ldots = g_{21,p} = 0 \quad (3)$$

For testing this hypothesis, without require any properties Wald test is used and it has an asymptotic χ^2_{p+1} distribution. If the null hypothesis is rejected, it means that the impulse responses are asymmetry. However, rejecting this hypothesis does not give any idea about the direction of deviation from symmetry and level of the asymmetry. Since the impulse responses of this model are non-linear, the degree of asymmetry and presence of deviation from symmetry is statistically significant can be tested by *impulse response-based test*. Because of nonlinear VAR model, the impulse responses are obtained by history dependent method which is called generalized impulse responses (Gallant, et al., 1993 and Koop, et al., 1996). For testing of symmetric responses to positive and negative exchange rate shocks to *H* period, the null hypothesis is given as follows

H_0: $I_y(h, \delta) = -I_y(h, -\delta)$ (4)

where $I_y(h, \delta)$ and $I_y(h, -\delta)$ are responses of TNT_t at horizon $h=0,1,2,\ldots,H$ to a shock of positive or negative real exchange rate shocks. Wald test of this hypothesis has an asymptotic χ^2_{H+1} distribution.

4. Data and Empirical Results

In this study to examine asymmetric effects of exchange rate on tourism demand, total number of tourist and real effective exchange rate are collected from Eurostat and World Bank for the 10 most popular destinations in Europe. These countries and their availability periods are shown in Table 1.

Table 1: The 10 Most Popular EU Countries* and Data Periods

Variables	From	To
Austria	1990.1	2017.6
France	2011.1	2017.5
Germany	1990.1	2017.5
Greece	1995.1	2017.4
Italy	1990.1	2017.4
Netherlands	1990.1	2017.6
Poland	2003.1	2017.6
Spain	1990.1	2017.6
Turkey	2003.1	2017.3
UK	1994.1	2016.12

**According to UNWTO Tourism Highlights, 2016 Edition*

Since the total number of tourism series have seasonal pattern, they are adjusted with Tramo Seats method. All variables are used in logarithm form. In order to check that variables are stationary, Augmented Dickey-Fuller (ADF, 1981) and Phillips Perron (PP, 1988) unit root tests are used. The ADF and PP tests results for the model with constant and constant and trend are given in Table 2.

Table 2: Unit Root Tests Results

Data	Country	ADF			PP		
		Level		First Difference	Level		First Difference
		Constant	Constant and	Constant	Constant	Constant and Trend	Constant
Number of Tourist	Austria	2.577	-1.533	-5.376***	-1.411	-10.870***	78.599***
	France	-1.045	-4.057**	-8.779***	-6.041***	-8.610***	-40.308***
	Germany	1.135	-2.195	-15.462***	1.536	-2.222	-26.486***
	Greece	-0.081	-2.426	-15.632***	-0.065	-3.754**	-32.901***
	Italy	0.118	-3.680**	-19.908***	-0.240	-12.721***	-59.034***
	Netherlands	1.271	-0.728	-19.650***	0.707	-4.064***	-41.328***
	Poland	-0.270	-1.524	-15.855***	-0.918	-3.991**	-32.173***
	Spain	0.650	-1.921	-25.024***	0.604	-2.319	-25.323***
	Turkey	-2.012	-2.403	-7.680***	-1.927	-2.149	-14.519***
	UK	-0.453	-1.980	-12.284***	-2.305	-4.871***	-30.310***
REER	Austria	-2.330	-2.354	-14.926***	-1.919	-1.915	-14.844***
	France	-1.073	-1.669	-7.268***	-1.135	-1.914	-7.237***
	Germany	-1.442	-2.494	-14.078***	-1.219	-2.204	-13.901***
	Greece	-1.375	-0.956	-14.057***	-1.475	-1.096	-13.968***
	Italy	-3.010**	-2.890	-8.461***	-2.423	-2.319	-13.416***
	Netherlands	-2.528	-2.555	-13.610***	-2.141	-1.866	-13.380***
	Poland	-2.664*	-2.606	-9.285***	-2.411	-2.350	-9.264***
	Spain	-1.484	-1.702	-13.653***	-1.299	-1.527	-13.837***
	Turkey	-2.431	-3.209*	-9.918***	-2.611	-3.125	-9.750***
	UK	-2.070	-1.905	-13.124***	-2.019	-1.837	-13.134***

,,*** statistically significant at the 10% , 5%, 1% level, respectively*

The results show that, two variables for all countries are nonstationary at 5% significance level. Therefore, the asymmetric VAR model, equations (1) and (2) has been built up for each country's real exchange rate and tourism demand with first differences, separately. Since tourism demand has no impact on REER determination, lags of REER have excluded from equation (1). So the estimation model is given as follows:

$$\Delta \mathrm{REER}_t = \alpha_{10} + \sum_{i=1}^{p} \alpha_{2i} \Delta \mathrm{REER}_{t-i} + \varepsilon_{1t}$$

$$\Delta \mathrm{TNT}_t = \beta_{10} + \sum_{i=1}^{p} \beta_{1i} \Delta \mathrm{TNT}_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta \mathrm{REER}_{t-i} + \sum_{i=0}^{p} g_{2i} \Delta REER^{+}_{t-i} + \varepsilon_{2t} \quad (5)$$

where the lag length of the model, p, is determined by Akaike Information criteria (AIC) as 6. In here, the censored variable is:

$$\Delta \mathrm{REER}_t^{+} = \begin{cases} \Delta \mathrm{REER}_t \,, & \Delta \mathrm{REER}_t > 0 \\ 0 \,, & \Delta \mathrm{REER}_t \leq 0 \end{cases} \quad (6)$$

Since *the slope based test* does not give any idea about the direction of deviation from symmetry and level of the asymmetry, *the impulse-response-based test* is used for testing whether there is an asymmetric effect of exchange rate on tourism demand. After estimating model (3.1) for each country, the generalized impulse responses are gathered by using Kilian and Vigfussion (2011) algorithm for structural analysis. The impulse responses of each country tourism demand when one standard deviation positive and negative shock is given for REER are plotted out. Figure 1 reports the history dependent impulse responses for eight periods for ten most popular destinations in Europe. In order to make some statistical inference for the impulse response analysis, confidence intervals at 95% level based on the bootstrap simulation with 500 trials are calculated. In each graph, the red straight line is for the response of TNT to a negative exchange rate shock (depreciation in exchange rate), the black straight line is for the response of TNT to a positive exchange rate shock (appreciation in exchange rate). To compare the impulse responses to both positive and negative shocks, the negative shock's impulse responses are drawn in absolute (mirror images). The dotted lines represent the confidence bands.

Figure1: Impulse Response Graphs

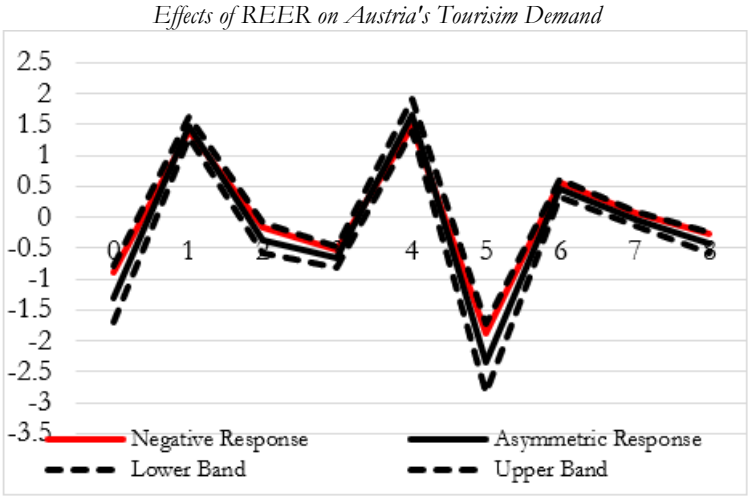
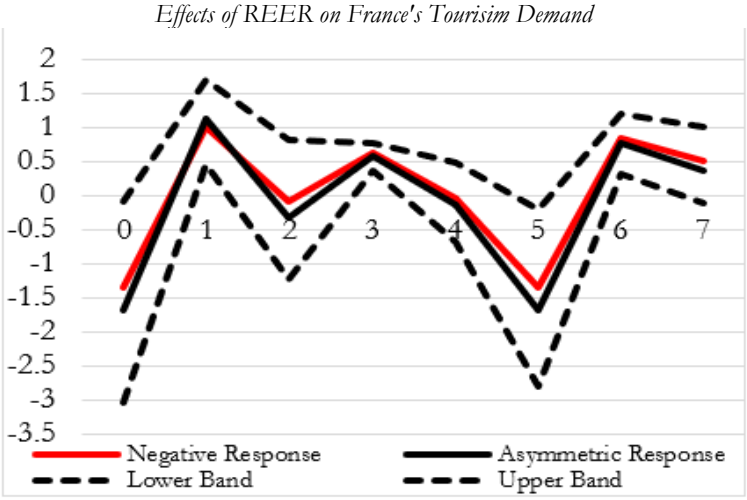
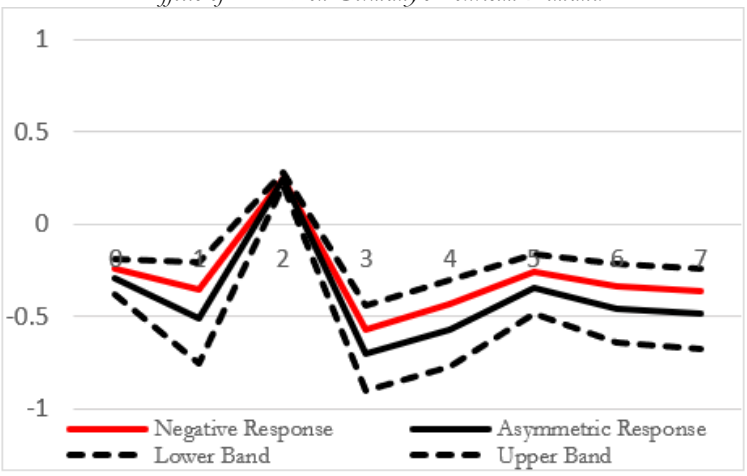


Figure1: Impulse Response Graphs (Continued)

Effects of REER on France's Tourisim Demand



Effects of REER on Germany's Tourisim Demand



Effects of REER on Greece's Tourisim Demand

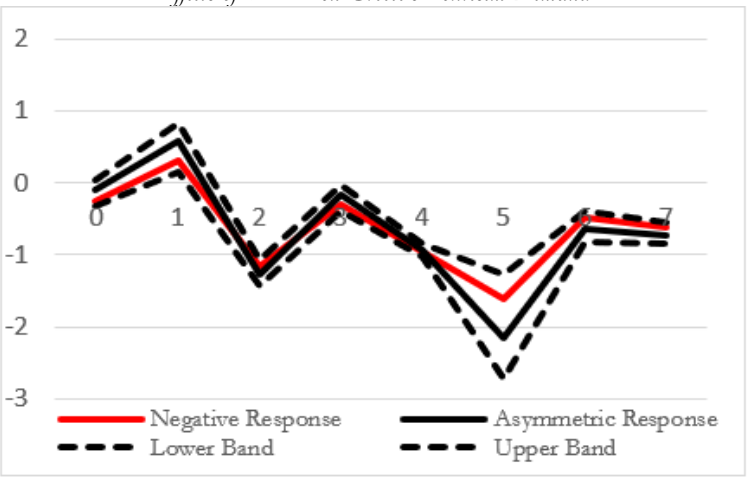
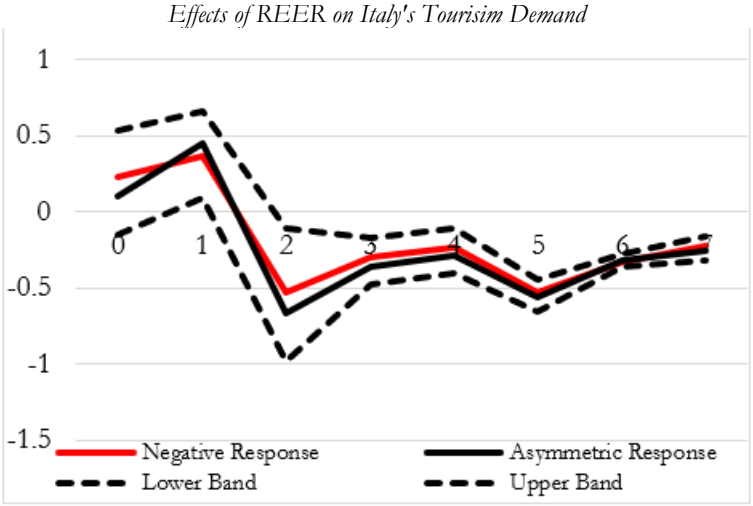
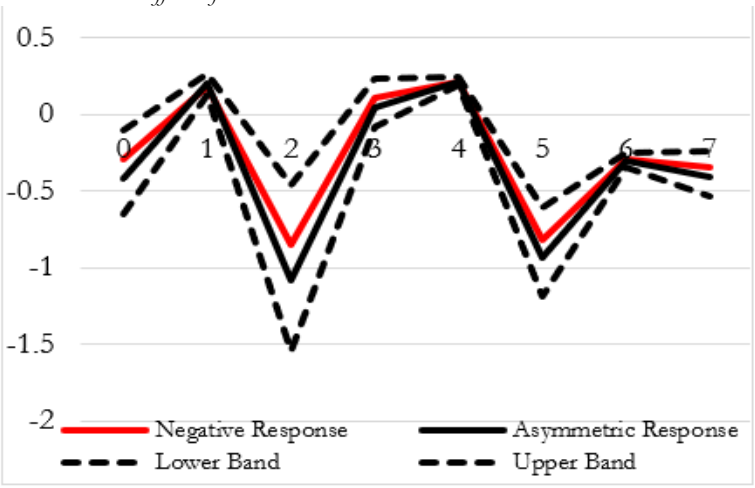


Figure1: Impulse Response Graphs (Continued)

Effects of REER on Italy's Tourisim Demand



Effects of REER on Netherlands' Tourisim Demand



Effects of REER on Poland's Tourisim Demand

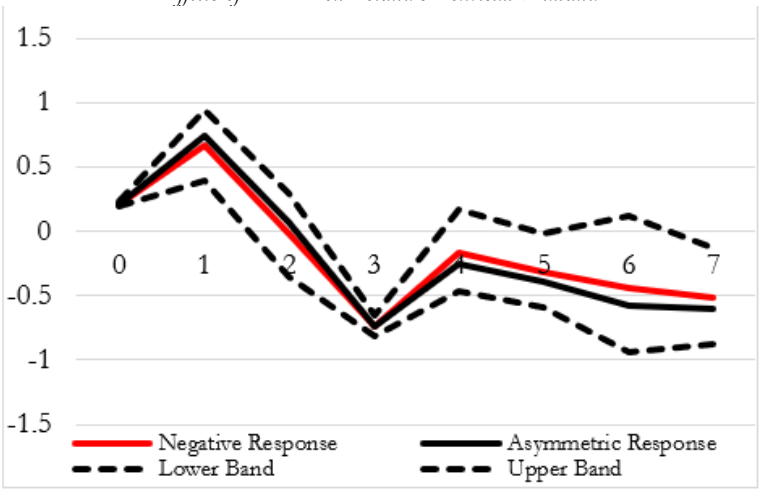
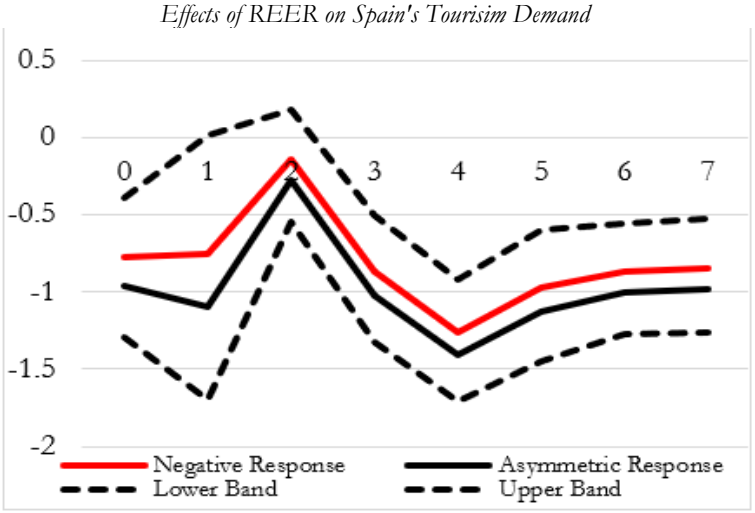
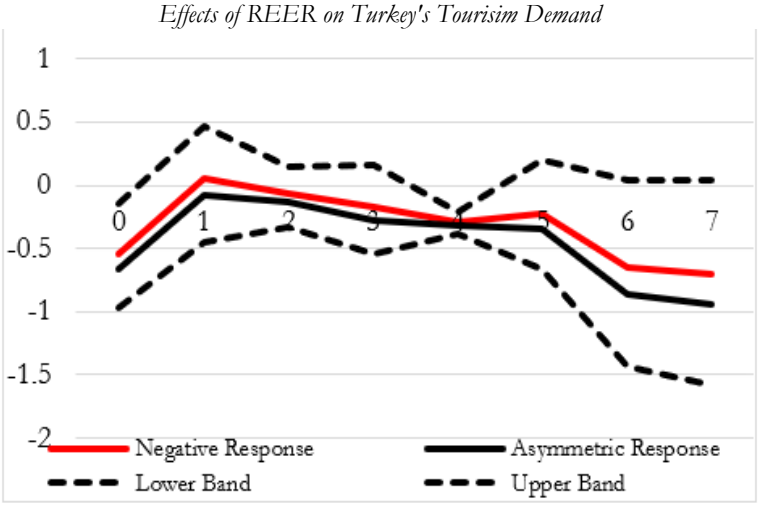


Figure1: Impulse Response Graphs (Continued)

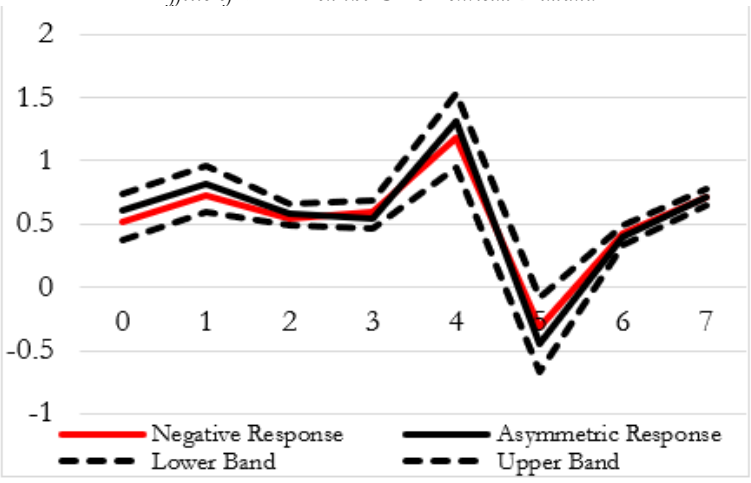
Effects of REER on Spain's Tourisim Demand



Effects of REER on Turkey's Tourisim Demand



Effects of REER on the UK's Tourisim Demand



According to Figure 1, one positive standard deviation shock to REER decreases the total number of tourist arrivals except for Italy, Poland and the UK. On the other hand, a stronger local currency tends to reduce the number of tourist arrivals to this country and vice versa. Figure 1 also shows that the asymmetric effects of REER on tourism demand. The responses to negative shocks are nearly invisible for some countries i.e. Germany, the UK. It means that the responses are for these countries are symmetric. For testing these responses are symmetric, it is useful to apply *impulse-response-based test*. The p-values of the test of H_0: $I_y(h, \delta) = -I_y(h, -\delta)$ for $h=0,1,2,\ldots,7$ are given in Table 3.

Table 3: The Impulse Response Based Tests Results

Country / Period	0	1	2	3	4	5	6	7
Austria	0.039**	0.108	0.189	0.082*	0.062*	0.047**	0.072*	0.108
France	0.046**	0.019**	0.024**	0.049**	0.001***	0.001***	0.002***	0.002***
Germany	0.334	0.599	0.295	0.249	0.345	0.365	0.456	0.564
Greece	0.543	0.815	0.932	0.957	0.363	0.000***	0.000***	0.000***
Italy	0.060*	0.169	0.262	0.206	0.001***	0.002***	0.001***	0.002***
Netherlands	0.041**	0.091*	0.002***	0.002***	0.001***	0.002***	0.002***	0.004***
Poland	0.008***	0.028***	0.052**	0.009***	0.019**	0.036**	0.051*	0.054*
Spain	0.191	0.314	0.477	0.38	0.448	0.572	0.445	0.530
Turkey	0.015**	0.047**	0.063*	0.062*	0.109	0.051*	0.028**	0.038**
UK	0.898	0.571	0.724	0.475	0.607	0.328	0.336	0.277

,,*** statistically significant at the 10% , 5%, 1% level, respectively*

The first column shows the p-values for instantaneously asymmetric effects. Tourism demand in Germany, Greece, Spain and the UK are not sensitive to the REER asymmetrically and instantaneously. When considering one standard deviation shock, the symmetry null hypothesis can be rejected at 10% significance level for all the periods except first, second and seventh periods for Austria. In other words, the impacts of REER changes on Austria tourism demand are instantaneously asymmetric. The impacts of REER changes on France, Netherlands, Poland tourism demand at all periods, on Turkish tourism demand at all periods except the fourth period are asymmetric at conventional significance levels. The impacts of REER change on Greece tourism demand at last 3 periods, on Italy tourism demand at last 4 periods are

asymmetric at 1% significance. Also there are no asymmetric effects of REER change on Germany, Spain and the UK tourism demand at any periods.

5. Conclusion

If increases in currency have more or less sizable effects than decreases on tourism demand, presence of this asymmetric information will be very important for policy maker. The aim of this study to find out whether the real exchange rate has an asymmetrical effect on tourism demand for the ten most popular destinations in Europe.

To examine asymmetric effects, REER and seasonally adjusted tourism demand for each country have used for different periods according to data availability with monthly frequency. The results indicate that increasing/decreasing in REER decreases/increases tourism demand in the long term. However, the magnitude of this increasing and decreasing in tourism demand dose not be equal for France, Netherlands, Poland and Turkey for both short and long term. For these countries, the magnitude of asymmetry is bigger for tourism demand when the shock to REER is bigger. Therefore, such countries should use the exchange rate as a tool in tourism policies. This will increase the tourism income with more tourists to their countries, which will make an important contribution to the country's income.

The number of tourists for Austria, Greece and Italy is asymmetrically affected by the exchange rate changes after three or four periods. In other words, the impact of the currency changes on tourism demand is symmetric in the short term but it becomes asymmetric in the long term. For increasing tourism performance in these countries, the exchange rate should be used in the long run. In addition, rest of the other countries, Spain, Germany and the UK, in the first rank in TTCI, have no asymmetric effect. Since the effects of both depreciation and appreciation in the exchange rate on the number of tourist arrivals are the same, the impact of the changes in currency rate on tourism income remains the same. Therefore, the exchange rate may not be efficient policy tool to increase the number of tourist arrivals or tourism income for Spain, Germany and the UK.

Both endogenous and exogenous crises are initially observed in exchange rate. Since tourism demand is really sensitive to exchange rate, it affects tourism sector

immediately. The results show that some countries' tourism demand reacts exchange rate asymmetrically. It means that tourism demand in countries are effected differently from depreciation and appreciation. To hold out the piece of the tourism income pie, the countries should protect the external competitiveness of national currency to attract international tourists.

It is fact that tourism demand is related to tourist preference and disposable income on tourism. Moreover, the disposable income on tourism is closely associated with not only national but also destination country's exchange rates. In order to identify the most effected tourism country by exchange rate more detailed, the tourist portfolios of countries can be analyzed. The results can be a guide to determine country specific policies.

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