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TOURISM-GROWTH NEXUS: an ARDL CAUSALITY ANALYSIS for TURKEY

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ABSTRACT

This paper aims to investigate whether tourism has been a vehicle of economic growth in Turkey. Using the ARDL approach to cointegration and error correction model, we find evidence of long-run uni-directional causality running from tourism and real exchange rates to economic growth, but not *vice versa*. The results indicate that the Turkish case supports the tourism-led growth hypothesis.

Keywords: Turkey, Tourism, Economic Growth, Causality

JEL Classification Codes: C12, C32, O16

1. Introduction

The tourism-led growth hypothesis suggests that international tourism plays an important role in economic growth. International tourism receipts are major source of foreign exchange together with export revenues that well compensate current account deficits as well due to the fact that tourism spending serves as an alternative form of exports contributing to ameliorated balance of payments in many countries. The tourism sector has been the key subject of a number of interesting works in the literature. Among the works in question are Gunduz and Hatemi-J (2005) for Turkey; Dritsakis (2004) for Greece; Balaguer, Cantavella-Jorda (2002) for Spain; Kim *et al*. (2006) for Taiwan; Louca (2006) for Cyprus, and Brida *et al*. (2008) for Mexico.

Since the beginning of the 1980s, Turkish authorities have given priority to the development of tourism industry as a part of the export-oriented economic growth strategy (see for example Samiloglu, 2002). Tourism sector has long been described by the authorities as "the industry without chimneys". Statistics reveals that the share of tourism receipts in GDP was only 0.5% in 1970, it rapidly increased 1.5% in 1980, 2.8% in 1990, and reached to 3.1% of GDP in 2007. While Turkey hosted 724,784 tourists in 1970 and earned around US$52 millions, the number of tourist arrivals increased to 23 millions and earned around US$19 billions in 2007.

The aim of this paper is to verify if there is and what is the relationship among economic growth, tourist arrivals and real exchange rates. The relative weight of tourism industry in the Turkish economy provides a good rationale to analyze the relationship between tourism and economic growth. We test for causality within a multivariate cointegration and error-correction framework and estimate the elasticities of the variables both in the short-run and long-run using recent advances in time series econometrics which is the bounds testing approach to cointegration, with an Autoregressive Distributive Lag (ARDL) framework, developed by Pesaran and others (see for example Pesaran and Pesaran, 1997; Pesaran *et*

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al., 2001). Following the introduction, we discuss data, and then present some results, finishing with the conclusions.

2. Data

Data set includes real GDP (Y_t), international tourist arrivals ($TOUR_t$), and real exchange rates (RER_t). The international tourist arrivals series are collected from *Statistical Indicators*: *1923-2006* and *Turkey's Statistical Yearbook 2007* of the Turkish Statistical Institute. The rest of the variables, namely real GDP (basis 2000) and the CPI-based trade-weighted real effective exchange rate index (2000=100) are obtained from *World Bank World Development Indicators* (2008). The annual data series span the time period 1969 to 2007 and are expressed in natural logarithms.

3. Empirical Results

A four-stage procedure was followed to test the direction of causality. In the first stage, the order of integration was tested using the Augmented Dickey-Fuller (ADF) unit root test. All the variables appear to be integrated at order one, i.e., $I(1)$. For brevity of representation the results are not reported here.

The second stage involves testing for the existence of a long-run equilibrium relationship between [Y_t, $TOUR_t$, RER_t] within a multivariate framework. To examine the long run relationship, we employ bound testing approach to cointegration within the framework of ARDL developed by Pesaran *et al*. (2001). The ARDL approach uses the following unrestricted error-correction models (UECM):

$$\Delta \ln Y_t = \alpha_{0Y} + \sum_{i=1}^{p} \alpha_{iY} \Delta \ln Y_{t-i} + \sum_{i=1}^{p} \alpha_{iY} \Delta \ln TOUR_{t-i} + \sum_{i=1}^{p} \alpha_{iY} \Delta \ln RER_{t-i} + \sigma_{1Y} \ln Y_{t-1} + \sigma_{2Y} \ln TOUR_{t-1} + \sigma_{3Y} \ln RER_{t-1} + \varepsilon_{1t} \quad (1)$$

$$\Delta \ln TOUR_t = \alpha_{0TOUR} + \sum_{i=1}^{p} \alpha_{iTOUR} \Delta \ln TOUR_{t-i} + \sum_{i=1}^{p} \alpha_{iTOUR} \Delta \ln Y_{t-i} + \sum_{i=1}^{p} \alpha_{iTOUR} \Delta \ln RER_{t-i} + \sigma_{1TOUR} \ln TOUR_{t-1} + \sigma_{2TOUR} \ln Y_{t-1} + \sigma_{3TOUR} \ln RER_{t-1} + \varepsilon_{1t} \quad (2)$$

$$\Delta \ln RER_t = \alpha_{0RER} + \sum_{i=1}^{p} \alpha_{iRER} \Delta \ln RER_{t-i} + \sum_{i=1}^{p} \alpha_{iRER} \Delta \ln Y_{t-i} + \sum_{i=1}^{p} \alpha_{iRER} \Delta \ln TOUR_{t-i} + \sigma_{1RER} \ln RER_{t-1} + \sigma_{2RER} \ln Y_{t-1} + \sigma_{3RER} \ln TOUR_{t-1} + \varepsilon_{1t} \quad (3)$$

where Δ is the first difference operator, *lnY* is the log of rate of growth of real GDP, and *lnTOUR* is the log of real tourist expenditures, and *lnRER* is the log of real exchange rate. The *F* test is used to determine whether a long-run relationship exists among the variables through testing the significance of the lagged levels of variables. The order of lags on the first-differenced variables was obtained from unrestricted VAR by means of SBC, whilst ensuring there was no evidence of serial correlation (see for example Pesaran *et al*., 2001).

Table 1. *F*-statistics for cointegration relationship

Critical value bounds of the *F*-statistic						
k	**10% level**		**5% level**		**1% level**	
	***I*(0)**	***I*(1)**	***I*(0)**	***I*(1)**	***I*(0)**	***I*(1)**
2	2.63	3.35	3.10	3.87	4.13	5.00
Calculated *F*-statistics for different lag lengths						
$F_Y(Y_t \mid TOUR_t, RER_t)$ **= 8.1031*** [0.000]						
$F_{TOUR}(TOUR_t \mid Y_t, RER_t)$ **=** 2.5189 [0.091]						
$F_{RER}(RER_t \mid Y_t, TOUR_t)$ = 0.4072 [0.749]						

Notes: Critical values are obtained from Pesaran *et al*. (2001: 565), Table CI (ii) Case II: Restricted intercept and no trend. *k* denotes the number of regressors. Probability values are in square brackets.

* Significance at the 1% level.

The calculated F-statistics are reported in Table 1. There is a long-run relationship among the variables when real income is the dependent variable since its F-statistic (8.1031) is higher than the upper bound critical value of 5.000 at the 1% significance level. However, for Eq. (2) and Eq. (3) the null hypothesis of no cointegration is accepted. Evidence of cointegration relationships among the variables in Eq. (1) also rules out the possibility of estimated relationship being 'spurious'.

Given the existence of a long-run relationship when the economic growth is dependent variable, in this stage the ARDL cointegration and error correction procedure is implemented. Eq. (1) is estimated using the following ARDL (*m*,*n*,*r*) specification:

$$\ln Y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_1 \ln Y_{t-i} + \sum_{i=0}^{n} \alpha_2 \ln TOUR_{t-i} + \sum_{i=0}^{r} \alpha_3 \ln RER_{t-i} + \varepsilon_t \quad (4)$$

This stage involves estimating the long-run and short-run coefficients of Eq. (4). The long run results obtained through normalizing on ln*Y* and the short run results together with standard diagnostic tests are reported in Table 3. The error-correction coefficient is –0.3, which means that once shocked convergence to equilibrium is very slow with about 30 per cent of the adjustment occurring in the first year. As expected, the elasticity of tourism is much larger in the long run than the short run, which suggests that tourism promoting policies have stronger effects over time. The long-run elasticity of real GDP with respect to tourism indicates that increasing the number of tourist arrivals by 100% produces an increment of almost 37% of the Turkish real product.

Table 2. Estimated long-run coefficients and ECM representation using the ARDL approach for ln*Y*: ARDL (0,0,0) selected based on the SBC, 1971–2007

Estimated long-run coefficients			
Regressor	**Coefficient**	**Standard Error**	***t*-ratio [prob.]**
ln*TOUR*	**0.3659**	0.0587	**6.2330*** [0.000]
ln*RER*	0.2057	0.2203	0.9337 [0.364]
Constant	**20.0278**	0.8815	**22.7183*** [0.000]

Table 2 continued

	Estimated short-run coefficients		
Δln*TOUR*	**0.1099**	0.0517	**2.1255**** [0.048]
Δln*RER*	**0.2411**	0.0728	**3.3083*** [0.004]
Constant	**6.0199**	2.5246	**2.3845**** [0.029]
ECT_{t-1}	**-0.3005**	0.1272	**-2.3613**** [0.030]
	Diagnostic Tests		
LM (1)	0.3751 [0.540]	R^2	0.6367
Heteroscedasticity (1)	2.2736 [0.132]	R^{-2}	0.5459
RESET (1)	0.1892 [0.664]	***S.E. of Regression***	0.0339
Normality (2)	1.9050 [0.386]	***DW***	1.9868

Notes: LM is the Lagrange Multiplier test of residual serial correlation. Heteroscedasticity test is based on the regression of squared residuals on squared fitted values. Ramsey's RESET test uses the square of the fitted values. Normality test is based on a test of skewness and kurtosis of residuals. Critical values of χ^2 (1) and of χ^2 (2) are 3.8414 and 5.9914 at the 5% significance level, respectively. Critical values of *t*-test are 2.042 and 2.750 at the 5% and 1% significance levels, respectively. Probability values are in square brackets.

* Significance at the 1% level.
** Significance at the 5% level.

The fourth stage involves constructing standard Granger-type causality tests augmented with a lagged error-correction term where the series are cointegrated. We augment the Granger-type causality test when Y_t is the dependent variables with a lagged error-correction term. Thus, the Granger causality test involves specifying a multivariate *p*th order vector error correction model (VECM) as follows:

$$\begin{bmatrix} \Delta \ln Y_t \\ \Delta \ln TOUR_t \\ \Delta \ln RER_t \end{bmatrix} = \begin{bmatrix} \sigma_1 \\ \sigma_2 \\ \sigma_3 \end{bmatrix} + \sum_{i=1}^{p} \begin{bmatrix} \gamma_{11}\gamma_{12}\gamma_{13} \\ \gamma_{21}\gamma_{22}\gamma_{23} \\ \gamma_{31}\gamma_{32}\gamma_{33} \end{bmatrix} \begin{bmatrix} \Delta \ln Y_{t-i} \\ \Delta \ln TOUR_{t-i} \\ \Delta \ln RER_{t-i} \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ 0 \\ 0 \end{bmatrix} \left[ECT_{t-1}\right] + \begin{bmatrix} \nu_{1t} \\ \nu_{2t} \\ \nu_{3t} \end{bmatrix} \quad (5)$$

In addition to the variables defined above, Δ is the lag operator; ECT_{t-1} is the lagged error-correction term derived from the long-run cointegrating relationship. We examine both short-run and long-run Granger causality. The short-run causal effects can be obtained by the *F*-statistics of the lagged explanatory variables in each of the three equations. In the equation when real GDP is the dependent variable, the *t*-statistics on the coefficient of the lagged error-correction term indicates the significance of the long-run causal effect. Table 4 summarizes the results of the long-run and short-run Granger causality.

Table 3. Results of Granger Causality

Dependent Variable	ΔlnY_t	$\Delta lnTOUR_t$	$\Delta lnRER_t$	ECT_{t-1} ***[t-stat.]***
ΔlnY_t	—	0.2901	0.0458	**-0.7091***
		(0.750)	(0.955)	[-4.3110]

Table 3 continued

$\Delta lnTOUR_t$	0.1286 (0.722)	—	0.4089 (0.527)	—
$\Delta lnRER_t$	0.1467 (0.704)	0.0182 (0.893)	—	—

Notes: Critical value of *t*-test is 2.750 at the 1% significance level. Critical value of *F*-statistics is 4.17 at the 5% significance levels. Probability values are in brackets. *t*-statistics of ECT_{t-1} is in square bracket.

* Significance at the 1% level.

Beginning with the results for the long-run, the coefficient on the lagged error-correction term is significant with the expected sign and plausible magnitude in the real GDP equation at more than 1% significance level. This confirms the result of the bounds test for cointegration. In the long run both tourism and real exchange rates Granger-cause real GDP, meaning that causality runs interactively through the error-correction term from tourism and real exchange rates to real GDP. The coefficient of -0.71 suggests that convergence to equilibrium after a shock to real GDP in Turkey takes more than one year. As for the short-run, the *F*-statistics on none of the lagged differences of the explanatory variables are significant, indicating little evidence of any short-run causality, this is not surprising given the usual assumption that economic growth interacts with other macroeconomic factors in the long run rather than the short run.

3. Conclusions

This paper provides evidence to support long-run uni-directional causality running interactively through the error correction term from tourism and real exchange rates to real product, but not *vice versa*. Evidently, the volume of tourism positively impacts Turkish economic growth. The tourism-led growth hypothesis applies to the Turkish economy suggesting that tourism is an important factor of overall long-run economic growth. The analysis of the results indicates that in the long-run economic growth in Turkey is strongly influenced from the tourism-expansion policies of the respective governments. At this point, further research is required into this relationship for generalization of these findings in the developing countries, especially by applying these new advancements in time series methodology.

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