The Contribution of Tourism to the Long-Run Turkish Economic Growth

*Serdar ONGAN – Dündar M. DEMIRÖZ**

Abstract

This paper empirically investigates the impact of international tourism receipts on the long-run economic growth of Turkey. For this purpose, tourism-led growth hypothesis is tested by using cointegration and Granger causality testing. The causal relationship between international tourism receipts and GDP is examined for the period 1980Q1 – 2004Q2. Johansen technique is used and vector error correction modeling (VECM) is incorporated into the Granger causality tests. The empirical results suggest that there are bidirectional causal relationships between the two variables in both the short and the long-run. In other words, it can be said that economic growth contributes to the sectoral development of tourism while tourism contributes to the economic growth.

Keywords: *tourism-led growth hypothesis, cointegration, granger causality, Turkey*

JEL Classification: L83, O40, O53, C32

1. Introduction

Tourism is one of the most flourishing sectors in the world. Between 1980 – 2003 the worldwide international tourism receipts have risen impressively from 105.3 billion USD to 514.4 billion USD (WTO, 2004, p. 2). Furthermore, it is estimated that in 2004, world tourism has generated approximately 5,490.4 billion USD of economic activity, whereas forecasts predict that it will generate 9,557.5 billion USD (10.9 per cent of world GDP) of economic activity (Total Demand) by the year 2014 (WTTC, 2004, p. 10).

As a fast growing industry, tourism might be accepted as an industry that contributes to the economic growth significantly. Thus, one may expect that the researchers should focus on the dynamic relationship between tourism and

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economic growth in the long-run. Excluding a small number of studies (Copeland, 1991; Lanza and Pigliaru, 1994; Hazari and Sgro, 1995; Hazari at al., 2003; and Luzzi and Fluckiger, 2003) it cannot be said that there is sufficient amount of research on this subject with regard to the increasing importance of the sector in the world economy.

In general, the contribution of tourism to a country's economy is assessed by its contribution to the GDP, employment and total foreign exchange earnings. However, taking into account the externalities and multiplier effects, the importance of the industry may be considerably higher. For instance, especially for developing countries, international tourism receipts can be considered as the main factor that improves the balance of payments (Pearce, 1989; and Sinclair, 1998). According to Sinclair and Bote Gomez (1996), international tourism receipts have played a key role in financing the imports of capital goods necessary for Spanish economic development and industrialisation since the early sixties. Similarly, some of the emerging East Asian countries, such as Singapore, Hong Kong and Korea, have financed their imports of capital goods for economic growth mostly via international tourism receipts as implied in Pye and Lin (1983).

Turkey, among the middle-income developing countries, has an impressive stake in the tourism sector. The share of the Turkish tourism sector in GDP has risen from 0.6 per cent in 1980 to 6.6 per cent in 2003. The rising importance of the sector may draw one's attention on the contribution of tourism to the balance of payments (BOP) in Turkey. The table below presents the *trade balance deficits* and *tourism balance surpluses* in cumulative values for selected sub-periods.

Table 1

Trade Balance Deficits and Tourism Balance Surpluses

Subperiods	Trade Balance Deficit (billion USD)	Tourism Balance Surplus (billion USD)
1980 – 1985	–20.3	2.7
1986 – 1990	–21.8	8.3
1991 – 1995	–47.1	15.5
1996 – 2003	–140.5	45.3

Source: DPT: Basic Economic Indicators. Several Years.

It is apparent in Table I that the Turkish tourism sector contributes strongly to the BOP improvement. While the trade deficits increase at an increasing rate, the tourism surpluses also increase at increasing rates, implying that the tourism sector remains and exerts an ever increasing beneficial impact on the BOP.

A similar problem arises in the case of research on the contribution of tourism to the economic growth of Turkey. The main purpose of this paper, therefore, is to focus on the magnitude and the direction of the long-term causal relationship between international tourism and GDP in Turkey within the sample period 1980

– 2004. In this manner, similar to *export-led growth* hypothesis which questions and examines the interrelationship between exports and GDP, the *tourism-led growth* hypothesis will be tested.

Although there are an enormous number of studies examining the *export-led growth* hypothesis (see for example Bahmani-Oskooee et al., 1991; Sharma et al., 1991; Bahmani-Oskooee and Alse, 1993; Sharma and Dhakal, 1994; Xu, 1996; Shan and Shun, 1998), in the relevant literature dealing with *tourism-led growth* hypothesis, there are a relatively small amount of studies. In a recent study for Spain, a country, which is one of the most prominent tourist destinations, Balaguer and Contavella-Jorda (2002) confirm *tourism-led growth* hypothesis by proving the existence of a long-term relationship between tourism and economic growth. Conversely, Oh (2005) has noted for Korea that there is no long-run relationship but there is a short-run relationship with the opposite direction of causality from economic growth to tourism and this implies that the "growth-led tourism" hypothesis is confirmed for Korea only in the short run.

Consequently, in this paper, we try to apply the test of *tourism-led growth* hypothesis to the Turkish economy, in a way similar to that done in the above mentioned study for the Spanish economy. The existence of such a relationship in the long-run may be taken into account when the targets of strategic investment and industrial policies are set by the relevant authorities.

2. Data Management and Methodology

The data set we examine in this paper consists of quarterly *GDP* and *international tourism receipts* series within the period 1980Q1 – 2004Q2 in Turkey.[1] The GDP series are real series supplied by the State Institute of Statistics and the International Monetary Fund (IMF). However, the tourism series given by the Ministry of Tourism of Turkey, are presented in terms of American Dollar (USD). In order to have realistic tourism series we multiply the series with quarterly average price of USD in terms of Turkish Liras (TL), in the first step. In the second step, we deflate the series with quarterly series of the Turkish Whole Price Index (WPI). In this manner, the *international tourism receipts* and the *GDP* series are measured in fixed 1980 prices. Nevertheless, it is a convention in

[1] In empirical time series analysis the data specification process is crucially important. The main purpose of this study is to focus on the long-run dynamic relationship between *GDP* and *international tourism receipts*, so that we include only these two variables in our sample data set. While increasing the number of explanatory variables in cointegration analysis may increase the explanatory power of the model, there may be more than one cointegrating equation which can be seen as somewhat confusing from an economic point of view. Therefore, it is intended to restrict the data set to these two variables only.

time series studies to work with the natural logarithmic values. The logarithmic scale offers the researcher the opportunity to offset any exponential trends and maintain smoothed linear series. Therefore, taking into consideration these facts, we take the natural logarithmic values of the relevant series.

The economic time series we are dealing with have strong seasonal components, especially the tourism series. In order to filter those seasonal effects we apply the *U.S. Census Bureau's X12 Seasonal Adjustment Program.*[2] The seasonally adjusted series of *international tourism receipts* (*TUR_SA*) and *GDP* (*Y_SA*) are then used in the empirical analysis. In order to see the basic relationship between these two variables, it may be useful to present the scatter diagram for TUR_SA and Y_SA in Figure I.

Figure 1

Scatter Diagram for *Y_SA* and *TUR_SA* (1980Q1 – 2004Q2)

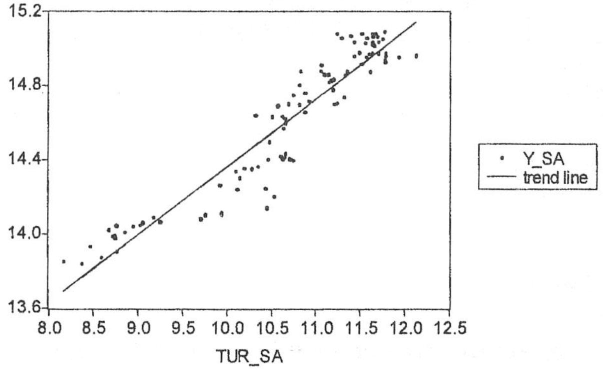

Figure 1 shows that seasonally adjusted logarithmic series for international tourism receipts and GDP are directly proportional. The trend line confirms that there is a positively sloped relationship between these two variables. The relevant trend line is obtained from the results of a basic OLS regression where the dependent variable is *Y_SA* and the independent variable is *TUR_SA*. Table 2 summarises the results of the trend line regression estimation.

Table 2 confirms that international tourism receipts and GDP grow together. Neverteheless, this simple regression can not be sufficient to understand the dynamic response of GDP to tourism receipts in the short and long-runs. In order to see the causality relationship it is necessary to test the stationarity of series and possible cointegration relationship between the relevant time series. Therefore, our empirical methodology evolves as follows:

[2] EViews provides a convenient front-end for accessing the U.S. Census Bureau's X12 seasonal adjustment program from within EViews. The X12 seasonal adjustment program X12A.EXE is publicly provided by the Census and is installed in the researchers' EViews Directory.

1st step: Test the existence of unit roots in individual series.

2nd step: Test the existence of possible cointegrated vector.

3rd step: Test the short-run *Granger causality* between international tourism receipts and GDP.

4th step: Test the long-run causality between international tourism receipts and GDP through *vector error correction model* (VECM) estimation process.

Table 2

Trend Line Estimation Results (1980Q1 – 2004Q2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.69651	0.141485	75.60160	0.0000
TUR_SA	0.366416	0.013216	27.72443	0.0000
R-squared	0.888972	Mean dependent var		14.60200
Adjusted R-squared	0.887815	S.D. dependent var		0.390207
S.E. of regression	0.130696	Akaike info criterion		−1.211687
Sum squared resid	1.639821	Schwarz criterion		−1.158932
Log likelihood	61.37265	F-statistic		768.6442
Durbin-Watson stat	0.354348	Prob (F-statistic)		0.000000

Notes: Dependent Variable: Y_SA
Method: Least Squares
Date: 11/21/04
Time: 16:37
Sample: 1980Q1 – 2004Q2
Included observations: 98

3. Unit Root Tests

If the time series are to have common trends in the long-run, there have to be unit roots in the individual series. Furthermore, it should be statistically confirmed that the relevant series have a linear relationship in the long-run. For the first step in our empirical study, it is necessary to find unit roots in the levels of tourism receipts and GDP. To achieve this purpose, we apply augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests.

It is necessary to explain the evolution of ADF tests briefly.[3] Consider a simple AR(1) process:

$$x_t = \rho x_{t-1} + z_t\delta + \varepsilon_t; \qquad x_t = TUR\_SA,\ Y\_SA \qquad (1)$$

where

z_t – the transpose of the matrix of optional exogenous regressors which may consist of a constant, or a constant and trend,

ρ and δ – parameters to be estimated,

ε_t – assumed to be white noise.

[3] Interested readers who require detail should consult the original sources and standard references in Davidson and MacKinnon (1993) and Hamilton (1994).

If, $|\rho| \geq 1$ x_t is a nonstationary series and the variance of x_t increases with time and approaches infinity. If, $|\rho| < 1$ x_t is a (trend-)stationary series. Thus, the hypothesis of (trend-) stationarity can be evaluated by testing whether the absolute value of ρ is strictly less than one.

The unit root tests generally test the null hypothesis $\mathbf{H_0} : \rho = 1$ against the one-sided alternative $\mathbf{H_1} : \rho < 1$. This is the standard Dickey-Fuller (DF) test procedure. The standard DF test is carried out by estimating equation (1) after subtracting x_t from both sides of the equation:

$$\Delta x_t = \alpha x_{t-1} + z_t\delta + \varepsilon_t \qquad x_t = TUR\_SA,\ Y\_SA \tag{2}$$

where $\alpha = \rho - 1$. The null and alternative hypotheses may be written as,

$$\begin{aligned} H_0 &: \alpha = 0 \\ H_0 &: \alpha < 0 \end{aligned} \tag{3}$$

and evaluated using the conventional t-ratio for:

$$t = a/se(a) \tag{4}$$

where

a – the estimate of α,

$se(a)$ – the coefficient standard error.

Dickey and Fuller (1979) shows that under the null hypothesis of a unit root, this statistic does not follow the conventional Student's t-distribution, and they derive asymptotic results and simulate critical values for various test and sample sizes. More recently, MacKinnon (1991; 1996) implements a much larger set of simulations than those tabulated by Dickey and Fuller. In addition, MacKinnon estimates response surfaces for the simulation results, permitting the calculation of Dickey-Fuller critical values and t-values for arbitrary sample sizes. The more recent MacKinnon critical value calculations are used by EViews in constructing test output.

The simple Dickey-Fuller unit root test described above is valid only if the series is an AR(1) process. If the series is correlated at higher order lags, the assumption of white noise disturbances is violated.

The augmented Dickey-Fuller test constructs a parametric correction for higher-order correlation by assuming that the series follows an AR(p) process and adding p lagged difference terms of the dependent variable x to the right-hand side of the test regression:

$$\Delta x_t = \alpha x_{t-1} + z_t\delta + \beta 1\Delta x_{t-1} + \beta 2\Delta x_{t-2} + \beta 3\Delta x_{t-3} + \ldots + \beta p\Delta x_{t-p} + \varepsilon t \tag{5}$$

This augmented specification is then used to test Equation (3) using the t-ratio Equation (4). An important result obtained by Fuller is that the asymptotic distribution of the t-ratio for α is independent of the number of lagged first differences included in the ADF regression. Moreover, while the assumption that x_t follows an *autoregressive* (AR) process may seem restrictive, Said and Dickey (1984) demonstrate that the ADF test is asymptotically valid in the presence of a *moving average* (MA) component, provided that sufficient lagged difference terms are included in the test regression.

In ADF tests, the critical point is that the test regression should have an optimal lag structure. We have to specify the number of lagged difference terms (which we will term the „lag length") to be added to the test regression. The usual (though not particularly useful) advice is to include a number of lags sufficient to remove serial correlation in the residuals. In order to sellect the optimal lag structure we take the Schwartz Information Criterion (SIC) as reference.

Phillips and Peron (1988) propose an alternative (non-parametric) method of controlling for serial correlation when testing for a unit root. The Phillips-Peron (PP) test method estimates the non-augmented DF test Equation (2), and modifies the t-ratio of the coefficient so that serial correlation does not affect the asymptotic distribution of the test statistic. We compute the relevant statistic by using the estimators for residual spectrum at frequency zero based on kernel-based sum-of-covariances In this manner, we will have to choose a method for optimal bandwidth selection. For the kernel estimators, EViews 5.0 provides us with the option of using the Newey-West (1994) or the Andrews (1991) data-based automatic bandwidth parameter methods. We prefer to use the Newey-West methodology, since it maintains us a non-parametric estimation procedure for optimal bandwidth parameters.[4]

We compute the unit root test results for ADF and PP according to three different models:

ADF00 – ADF statistic without constant and trend
ADF01 – ADF statistic with constant
ADF02 – ADF statistic with constant and trend
PP00 – PP statistic without constant and trend
PP00 – PP statistic with constant
PP00 – PP statistic with constant and trend

In Table 3, the PP and ADF test results can be seen for three different models in the levels, first and second differences of *TUR_SA* and *Y_SA*.

[4] The asymptotic distribution of the PP modified t-ratio in Newey-West methodology is the same as that of the ADF statistic. EViews 5.0 reports MacKinnon lower-tail critical and p-values for this test.

Table 3

Unit Root Tests (1980Q1 – 2004Q2)

	TUR_SA								
	LEVEL	l/bw	1ST DIF.	l/bw		2ND DIF.	l/bw	
ADF00	1.9138	9	–2.5795	8	***	–5.7794	7	***
ADF01	3.0976	8	–1.3912	0	***	–1.0192	3	***
ADF02	–2.0821	8	–5.4758	7	***	–5.7069	7	***
PP00	2.0571	5	–1.3353	0	***	–8.3072	36	***
PP01	–1.8609	6	–1.4416	4	***	–8.4681	36	***
PP02	–2.4331	1	–1.6336	8	***	–8.8438	35	***

Y_SA							
LEVEL	l/bw	1ST DIF.	l/bw		2ND DIF.	l/bw	
2.5714	5	–3.6723	4	***	–5.0936	12	***
–1.9287	4	–6.4137	3	***	–5.0564	12	***
–0.7344	4	–6.7350	3	***	–5.0410	12	***
2.8773	2	–8.4108	2	***	–5.3042	33	***
–1.6564	4	–9.1039	3	***	–5.3539	33	***
–1.5783	2	–9.2621	4	***	–5.2980	33	***

Notes: l/bw is the optimal lag / bandwidth parameters for ADF / PP tests.
***, ** and * indicate significance at the 1 per cent, 5 per cent and 10 per cent levels, respectively.
Bandwidth parameter is selected by Newey – West Method using Bartlett Kernel.
Optimal lag is chosen according to the Scwartz Information Criterion.
The critical values are based on MacKinnon (1996).

According to the results in Table 3, the seasonally adjusted series for naturally logarithmic international tourism receipts and GDP both have unit roots in levels, but they are stationary in the first and second differences. From these results, it can be inferred that both series *TUR_SA* and *Y_SA* are I(1) processes.

4. Cointegration Tests

In the previous section, the results of the unit root tests are presented. Both variables are I(1) but there is no evidence of a long-run common trend between these two variables. Theoretically, in a matrix of a dynamic system, the existence of at least one or more linearly dependent vectors may be interpreted as an evidence of common trend in long-run. Engle and Granger (1987) pointed out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are said to be cointegrated. The stationary linear combination is called the cointegrating equation and may be interpreted as a long-run equilibrium relationship among the variables. To test for the existence of such a cointegrated vector, it is necessary to examine the rank and the trace values of the *Vector Auto Regression* (VAR) matrix. Johansen cointegration test (Johansen, 1988) achieves this purpose, Table 4 gives us the results of Johansen test at lag 8. The optimal lag structure is maintained according to SIC. Furthermore, it is assumed that there is no trend but intercept component in cointegrating equation and there is an intercept in the VAR system. This VAR model in first differences augmented with cointegrating equation(s) in levels is called VECM. The results of the both trace and maximum eigenvalue statistics confirm that there is at most 1 cointegrating equation at the 5 per cent significance level.

Table 4

Johansen Cointegration Tests at Lag 8

TRACE TEST **No. of CE(s)**	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.**
None At most 1	0.139970 0.083916	21.2208 7.8006	15.4947 3.8415	0.0061 0.0052
MAX. EIGEN. TEST Hypothesized No. of CE(s)	Eigenvalue	Max-Eigenvalue Statistic	0.05 Critical Value	Prob.
None At most 1	0.139970 0.083916	13.4201 7.8006	14.2646 3.8415	0.0677 0.0052
Parameter Estimates (normalized)				
	Variables	Cointegration Vector		
	Y_SA(-1) TUR_SA(-1) C	1.000000 –0.715097 –22.40427		

Notes: Trace and Max-Eigenvalue statistics are Likelihood ratio statistics for the number of cointegrating vectors.
Estimation has been performed with EViews 5.0.
Critical values are based on Osterwald- Lenum (1992).

5. Granger Causality Relationship in the Short and Long-Runs

In the relevant literature, the Granger causality test proposed by Granger (1969) is one of the main procedures in analysing the causality relationship between two variables. Nevertheless, this test can not capture the dynamics of a system in steady state. Consequently, in this study, standard Granger causality test presents the short-run causal relationship between international tourism receipts and GDP in Turkey. Table 5 shows the standard Granger causality test results. The reported F-statistics are the Wald statistics for the joint hypothesis for Granger test.

As it is presented in Table 5, *growth-led tourism* hypothesis is confirmed in the first lag. In the second lag, conversely, *tourism-led growth* hypothesis is confirmed. Both F-statistics are significant at 5 per cent level of significance. Basically, these facts can be interpreted as the evidence of a bidirectional causal relationship between the two variables in the short-run.

Table 5

Short-run Causality Tests: Granger Causality Test Results (1980Q1 – 2004Q2)

LAGS	1		2		3		4	
Null Hypothesis	F	Prob.	F	Prob.	F	Prob.	F	Prob.
TUR_SA does not Granger Cause Y_SA	0.6487	0.4226	**3.5540**	**0.0327**	2.3454	0.0783	1.4391	0.2281
Y_SA does not Granger Cause TUR_SA	**5.9654**	**0.0165**	1.6425	0.1992	0.8774	0.4561	1.1538	0.3371

Note: Significant tests are printed in bold characters.

In order to see the causality relationship between two variables in the long--run, the cointegrating equation should be taken into consideration. Therefore, a VECM, where TUR_SA and Y_SA are the relevant variables, is estimated with 8 lags and the existence of intercept without trend components in both cointegrating equation and VAR is assumed.[5] The error correction coefficients are then interpreted as the long-run causality test coefficients. The estimated coefficients should be negative. This implies that the variables converge to their long-run common trends. In Table 6, estimated coefficients and their t-values are presented.

Table 6

Long-run Causality Tests: Error Correction Analysis (1980Q1 – 004Q2)

Null Hypothesis:	COEFFICIENT	T-STATISTIC	T-VALUE: 5 %	T-VALUE: 1 %
TUR_SA does not Cause Y_SA	–0.009137	–1.7433	1.6580	1.9800
Y_SA does not Cause TUR_SA	–0.066643	–2.7826	1.6580	1.9800

It can be interpreted that the results in Table 6 confirm the *tourism-led growth* hypothesis at the 5 per cent level of significance. On the other hand, *growth-led tourism* hypothesis is confirmed at 1 per cent level of significance, too. In other words, the results may be accepted as an evidence of a bidirectional causal relationship between the international tourism receipts and GDP in the long-run.

Table 6 enlightens us about the direction of the long-run relationship. Nevertheless, the magnitude of the effects of the variables on each other can be maintained by using the coefficients of cointegrating equation. From the coefficient estimates of cointegrating equation in Table 6, it can be inferred that the presence of multiplier effects in GDP is really important. As the coefficient estimate of TUR_SA is 0.715097, the long-run steady state effect of tourism on GDP may be read as follows: a 5 per cent of a permanent increase in the rate of growth of

[5] The estimated coefficients of VECM and relevant impulse-response functions can be seen in Appendix Table A1 and Figure A1.

international tourism receipts would imply an estimated permanent increase of 3.5 per cent in GDP. Comparatively, the above mentioned study by Balaguer and Contavella-Jorda for the Spanish tourism sector, determines the relevant multiplier effect as 1.5 per cent. This ratio is significantly lower than the 3.5 per cent ratio for Turkey computed in this study. Therefore it is apparent that the tourism sector contributes to the economic growth in Turkey relatively more than that in Spain. In the case of the long-run effect of GDP on international tourism receipts, the inverse of the cointegration coefficient of TUR_SA gives the researcher the relevant multiplier effect $\left(\frac{1}{0.715097} \cong 1.4\right)$. This value implies that a 5 per cent permanent increase in the rate of growth of GDP causes aproximately 7 per cent permanent increase in the rate of growth of international tourism receipts.

The long-run relationship can also be seen in Impulse-Response graphs of estimated VECM in Figure A1. It is apparent that after 30 lags the effects of shocks remain positive. It can be inferred that there is a bidirectional causal relationship at least after 30 lags.

Conclusion

International tourism may play a key role in most of the developing countries' economic development processes with its rapid growth trend and contribution to general economic activity. Nevertheless, there are relatively small number of empirical studies, which focus on the sectoral contribution of tourism to long-run economic growth. Within this perspective, turkey, as a typical developing and tourist destination country, is a good example for estimating the long-run contribution of tourism to the economic growth, since the share of Turkish tourism industry in GDP increases continously. Therefore, such an empirical study for Turkey is considered to be necessary. Thus this paper attempts to investigate whether *tourism led-growth* hypothesis is valid for Turkey. To achieve this purpose, the quarterly seassonally adjusted series for *international tourism receipts* and *GDP* have been tested for Unit Roots through ADF and PP tests in the first step. The results confirm that the series are I(1).

As a second step, the possible existence of cointegration between tourism receipts and GDP has been tested through trace and maximum eigenvalue tests. The results present that there is at most one cointegrating equation. Furthermore, as a third step the short-run causality relationship between the two variables has been examined using Granger causality tests. From the results, it can be inferred that in the first lag the GDP Granger causes tourism and in the second lag tourism Granger causes GDP at the 5 per cent significance level. Finally, the error correction parameters obtained from the VECM estimation were presented. The results confirm *growth-led tourism* hypothesis at the 1 per cent level of significance and *tourism-led growth* hypothesis at the 5 per cent level of significance in the long-run. The above analysis allows us to claim that there is a bidirectional causal relationship between GDP and international tourism receipts in both the short and the long runs. As concluding remarks, it can be said that the tourism sector contributes strongly and significantly to the Turkish economic growth. This result can be interpreted in such a way that for a faster economic growth, tourism presents a viable alternative in Turkey. Taking into account this fact, certain industrial policies, including public infrastructure investments and promotion of entrepreneurial initiative via specific financial supports in the tourism sector may contribute to the country's growth performance. Furthermore, the bidirectional causal relationship confirms that economic growth contributes to the sectoral development of tourism, and, also, that tourism contributes to the economic growth. This fact may be explained by the increasing share of tourism in the allocation of economic resources within the sample period. This may also be the consequence of an increasing number of private and governmental authorities that have recognised the relative importance of the sector in Turkish economy. Future studies may address this fact and can focus on the exploration of the evolution of the share of resources allocated in the Turkish tourism sector.

APPENDIX

Figure A1

Impulse-Response Function

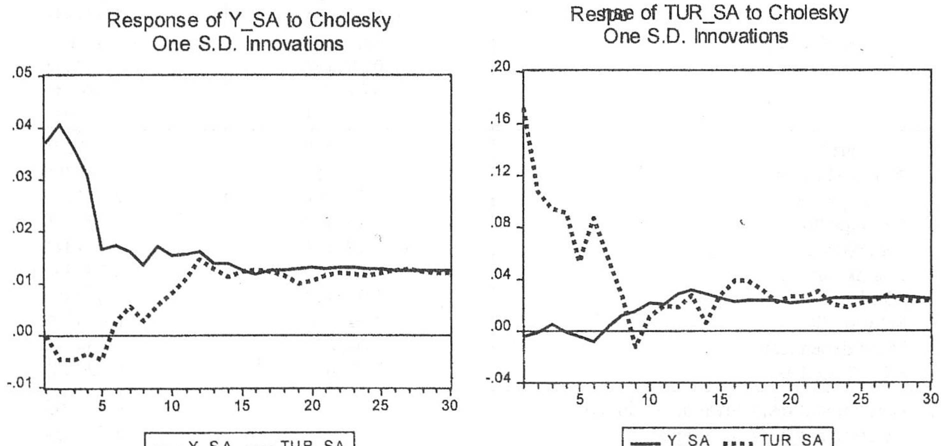

Table A1
Estimated Coefficients for VECM

Cointegrating Eq	CointEq1	
Y_SA(−1)	1.000000	
TUR_SA(−1)	−0.715097	
	[−2.21427]	
C	−22.40427	
Error Correction	**D(Y_SA)**	**D(TUR_SA)**
CointEq1	−0.009137	−0.066643
	[−1.74329]	[−2.78262]
D(Y_SA(−1))	0.155799	−0.092608
	[1.32381]	[−0.17221]
D(Y_SA(−2))	−0.073479	0.075218
	[−0.63104]	[0.14137]
D(Y_SA(−3))	−0.040996	−0.257058
	[−0.35832]	[−0.49171]
D(Y_SA(−4))	−0.315682	−0.202731
	[−2.76936]	[−0.38922]
D(Y_SA(−5))	0.131463	−0.301869
	[1.15002]	[−0.57792]
D(Y_SA(−6))	−0.089167	0.143514
	[−0.80149]	[0.28232]
D(Y_SA(−7))	−0.063446	−0.046964
	[−0.57149]	[−0.09258]
D(Y_SA(−8))	0.035438	0.000407
	[0.32689]	[0.00082]
D(TUR_SA(−1))	−0.033393	−0.290702
	[−1.44515]	[−2.75326]
D(TUR_SA(−2))	−0.015417	−0.129680
	[−0.64149]	[−1.18093]
D(TUR_SA(−3))	−0.008869	−0.033965
	[−0.36608]	[−0.30680]
D(TUR_SA(−4))	−0.019064	−0.202782
	[−0.78892]	[−1.83655]
D(TUR_SA(−5))	0.014371	0.081304
	[0.58791]	[0.72793]
D(TUR_SA(−6))	0.016207	−0.095661
	[0.67128]	[−0.86712]
D(TUR_SA(−7))	−0.021521	−0.203356
	[−0.90507]	[−1.87163]
D(TUR_SA(−8))	−0.006673	−0.382602
	[−0.29917]	[−3.75391]
C	0.017560	0.086346
	[2.51751]	[2.70907]
R-squared	0.222378	0.327278
Adj. R-squared	0.036187	0.166204
Sum sq. resids	0.102198	2.133785
S.E. equation	0.037939	0.173359
F-statistic	1.194351	2.031844
Log likelihood	174.9565	39.73237
Akaike AIC	−3.527112	−0.488368
Schwarz SC	−3.023793	0.014952
Mean dependent	0.012028	0.034127
S.D. dependent	0.038645	0.189852
Determinant resid covariance (dof adj.)		4.30E-05
Determinant resid covariance		2.74E-05

Vector Error Correction Estimates; Date: 12/01/04, Time: 12:18; Sample (adjusted): 1982Q2 2004Q2; Included observations: 89 after adjustments; t-statistics in [ ].

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