THE EFFECT OF TERRORISM ON TOURISM: EVIDENCE FROM TURKEY

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Abstract

The aim of this study is to investigate the effects of terrorism and other factors on Turkey's tourism sector using unit root tests for known structural break points. We found that the tourist arrivals series is trend stationary with known structural break points. For the case of Turkey, there are two separate periods of terrorism which statistically have a meaningful negative effect on tourist arrivals. However, considering the trend stationarity, these effects are transitory rather than being permanent.

Key words: Temporal Effects, Turkey, Tourism, Unit Root, Structural Breaks.

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Introduction

Terrorism, whether carried out individually or collectively, imposes a serious threat to international peace and security. Among others, terrorism strikes economic and social development and tourism meanwhile. In these regards, Turkey has deeply felt the effects of terrorism. The terrorist attacks perpetrated against the United States on September 11, 2001, have demonstrated the severity of the threat that terrorism imposes to humankind. Since 1984, Turkey has experienced the terrorism perpetrated by the PKK, an internationally recognized terrorist organization.

Tourism is one of the most important economic pillars of the Turkish economy. It contributed around 5 % to Turkey's GDP over the last decade. However, in a span of 30 years or so, Turkey, together with other external events, struggled with many crises, with the terrorism coming first. In this regard, tourism studies can play an important role in shaping the micro- and macro level tourism policies.

Concepts of terrorism, political turmoil, and war appear unrelated to tourism. Closer examination of their points of convergence and impacts on tourism reveals otherwise. Sonmez (1998) examines literature focusing on the relationships between these phenomena. Research themes which emerge from available studies include impacts of terrorism and political instability on tourist demand, motives of terrorists in targeting tourists, using tourism as a political tool, the effects of political violence on destination image, crisis management, and recovery marketing efforts.

Halıcıoğlu (2004) empirically examined aggregate tourism demand function for Turkey using the time series data for the period 1960-2002. She related the total tourist arrivals

into Turkey to world income, relative prices and transportation cost. She employed bounds testing cointegration procedure to compute the short and long-run elasticities of income, price, and transportation cost variables.

Recently Karagoz et al (2007) assessed the temporal impacts on Turkey's tourist arrivals using quarterly number of tourist arrivals between 1993:1 and 2005:3. Their study finds that the data series contain deterministic trend and seasonality together with detected structural changes. Unfortunately their study being quarterly covers only a 12-years period and does not includes the effects of rampant twin periods of terrorism in late 1970s and 1980s.

This study aimed at evaluating the terror and other factors on Turkey's tourism in a fairly long span of time. To his end we have obtained a time series data on the numbers of annual tourist arrival to Turkey, covering 1961-2006. As the terror statistics are highly problematic both in terms of access and accuracy, we choose the way to test the effects of terror and other factors effect by unit root with structural break analysis. In determining the dates of breaks, we made use of matching visual inspection of structural breaks together with external information regarding the terrorist activities.

One approach to test for unit roots in the presence of a structural break can be splitting the sample into two parts and using DF test on each part. The problem here is that the degrees of freedom for each part will be diminished. Moreover, the timing of the break point cannot be detected from the visual inspection of the series. It is preferable to have a single test based on the full sample (Enders 2004, p. 252).

In case of structural breaks, the well-known Dickey-Fuller test statistics are biased towards the non-rejection of null unit root hypothesis. Perron (1989) confirmed this bias in the DF tests in a sequence of Monte Carlo experiments. However, a unit root process can also involve a structural break. In a unit root process, a single pulse in the dummy variable will have a permanent effect on the level of the series. The level of the process will take a discrete jump, never exhibiting any tendency to return to the pre-break level.

Perron (1989) developed a formal procedure to test for unit roots in the presence of a structural change to challenge the findings of Nelson and Plosser (1982). His results indicate that most macro economic variables are not characterized by unit root processes. Instead, the variables appear to be trend stationary (TS) processes coupled with structural breaks. The test statistics were constructed by adding dummy variables for different intercepts and slopes, extending the standard Dickey-Fuller procedure. The critical values of underlying asymptotic distribution obtained under different models assuming that the date of break points was known a priori.

Perron's procedure and our analysis here assume that the date of structural break is known. If the date of the break is uncertain recourse should be made to Perron and Vogelsang (1992), Zivot and Andrews (2002), Perron (1997) or Vogelsang and Perron (1998). Perron (1997) considers various methods to select the break points and the asymptotic and finite sample distributions of the corresponding statistics. By allowing for the possibility of two unknown exogenous break points, Lumsdaine and Papell (1997) in analyzing Nelson Plosser (1982) series, find more evidence against the unit root hypothesis than Zivot and Andrews, but less than Perron.

Recently Narayan (2005) investigates whether shocks to Fiji's tourism industry have a permanent or transitory effect on tourist expenditure in Fiji. To accomplish this aim Narayan uses Zivot and Andrews (1992) one break test and Lumsdaine and Papell (1997) two break test. Test results rejectes the null hypothesis of unit root, leading to the conclusion that shocks to Fiji's tourism industry have a transitory effect on tourist expenditure in Fiji.

In the next section we have comparatively outlined the methodology of ADF, Perron and our approach in between. In section 3, the empirical findings are reported. The final section 4, is about the conclusions and implications of the study.

1. The Employed Methodology

ADF test regression for unit roots allowing for drift and deterministic time trend is

$$\Delta Y_t = a_0 + a_2\, t + g\, Y_{t-1} + \sum_{i=1}^{k} b_i \Delta Y_{t-i} + e_t \quad (1)$$

Here a_0 is a drift term and *t* is is the trend variable usually running from *1* up to *T*. While these two terms form the deterministic components of the unit root regression, γ is the test statistic for the unit root hypothesis. If the coefficients of a_0 and/or a_2 are not significant, the related term should be dropped from the regression. In the null hypothesis of $g = 0$ we have a unit root and the series non stationary. The alternative is $g < 0$ which requires a left-tailed t-test. The critical values are provided by MacKinnon (1996) which is larger in absolute terms than the standard t-test critical values. The lagged terms of dependent variable up to order *k* is optional, designed to exhaust the autocorrelation structure in the error term.

According to Perron (1989) exogenous shocks have permanent effects on unit root processes. In order to entertain various hypotheses concerning the effect of an external factor realized at period $t = t$, Perron considers the following regression equation:

$$Y_t = a_0 + m_1 D_L + m_2 D_p + a_2\, t + a_1 Y_{t-1} + \sum_{i=1}^{k} b_i \Delta Y_{t-i} + e_t \quad (2)$$

Here D_p is the pulse variable taking the value 1 for the period $t = t + 1$ and 0 otherwise. D_L is the level dummy variable taking the value 1 for $t = t + 1, \mathrm{K}, T$ and 0 otherwise. The differences between models (1) and (2), lay in the form of dependent variables, inclusion of dummies in the model (2) and specification of the unit root coefficient.

Our approach is a reconciliation of ADF and Perron's Test. To make allowance for several structural brakes concerning the effects of external factors on tourism we consider the unit root regression with two structural breaks:

$$\Delta Y_t = a_0 + d_1 D_t + d_2 DT_t + a_2\, t + g\, Y_{t-1} + \sum_{i=1}^{k} b_i \Delta Y_{t-i} + e_t \quad (3)$$

Here D_t represents level dummy variables taking the value 1 for the structural period represented by this dummy variable, and 0, outside of this period. While the dummy D_t allows for the intercept change by an amount of d_1, the dummy $DT_t = D_t \cdot t$ allows for the structural change in trend slope by an amount of d_2. This regression is the same with ADF unit root regression except that the dummy variables for breaks. In Perron's regression, subtracting the lagged value of dependent variable from each side will give us the equation (3), disregarding the contents of dummies.

2. Empirical Findings

We have obtained the annual tourist arrivals of Turkey between 1961 and 2006 from Turkish Institute of Statistics (TURKSTAT), which are originally gathered by General Directory of Security. In processing the data we have used Eview 6. As a usual standard treatment and in order to have a clearer vision of trend structure we eliminate the variance structure by logarithmic transformation of the series. Figure 1 below reflects this idea of constant variance behavior.

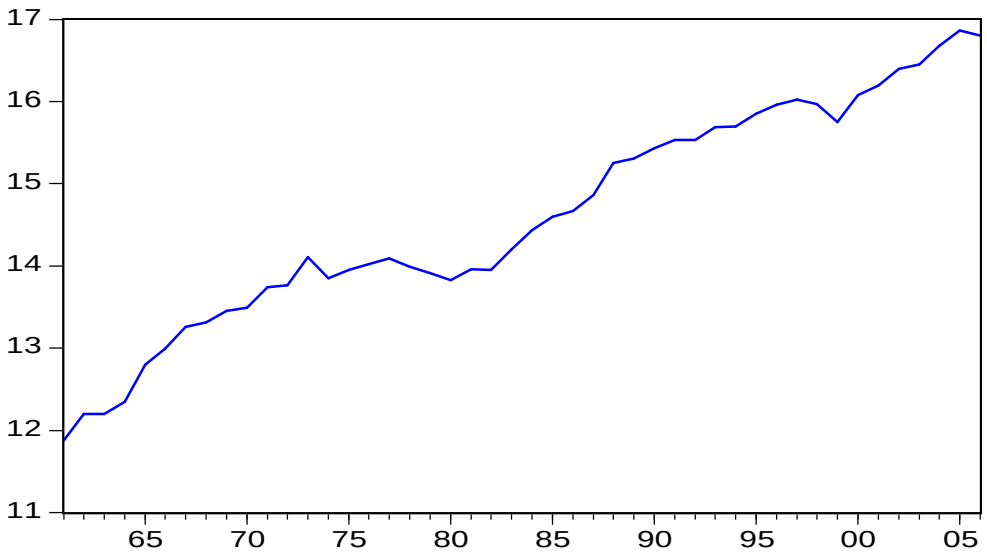

Figure 1. Logarithmic Annual Tourists Arrivals Data of Turkey 1961-2006.

Now we can make some objective comments about the stationarity of the series. There is an upward time trend. However, this trend picture may be misleading when in fact there exists a stochastic trend with drift. Therefore we need to carry out an analytical test procedure.

Table 1. Augmented Dickey-Fuller Test Equation.

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Prob.*
LNTUR(-1)	0.007277	0.001541	4.723630	0.0000	1.0000

NOTES: (1) Null Hypothesis: LNTUR has a unit root (2) Dependent Variable: D(LNTUR) (3) Akaike info criterion -0.922191 (4) Durbin-Watson stat 2.006840 (5) Lag Length: 0 (6) Exogenous: None (7) *MacKinnon (1996) one-sided p-values. (8) Test critical value: 5% level -1.948.

The results in Table 1 above indicate a unit root DGP. However here we have not made allowance for a drift constant and deterministic time trend. When a constant and/or a time trend is incorporated into the unit root equation, a diametrically different situation can arise. In Table 2 we have allowed for drift and trend terms.

Table 2. Augmented Dickey-Fuller Test Equation with Time Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Prob.*
LNTUR(-1)	-0.216749	0.083354	-2.600355	0.0128	0.2821
C	2.805238	1.024066	2.739313	0.0090	
TREND	0.019855	0.008380	2.369499	0.0225	

NOTES: (1) Null Hypothesis: LNTUR has a unit root (2) Dependent Variable: D(LNTUR) (3) Prob(F-statistic) 0.029522 (4) Akaike info criterion -1.031639 (5) Durbin-Watson stat 1.950041 (6) Lag Length: 0 (7) *MacKinnon (1996) one-sided p-values. (8) Test critical value: 5% level -3.513.

It is interesting to note that this time the test results show us a paradoxical situation in that, the series have both significant deterministic time trend and a failure to reject the null hypothesis of unit root, that is, stochastic trend. This result together with the result of Table 1 implies that there might be some omitted components in the unit root equation. To detect the variables involved, let us have a look at the Figure 2 below.

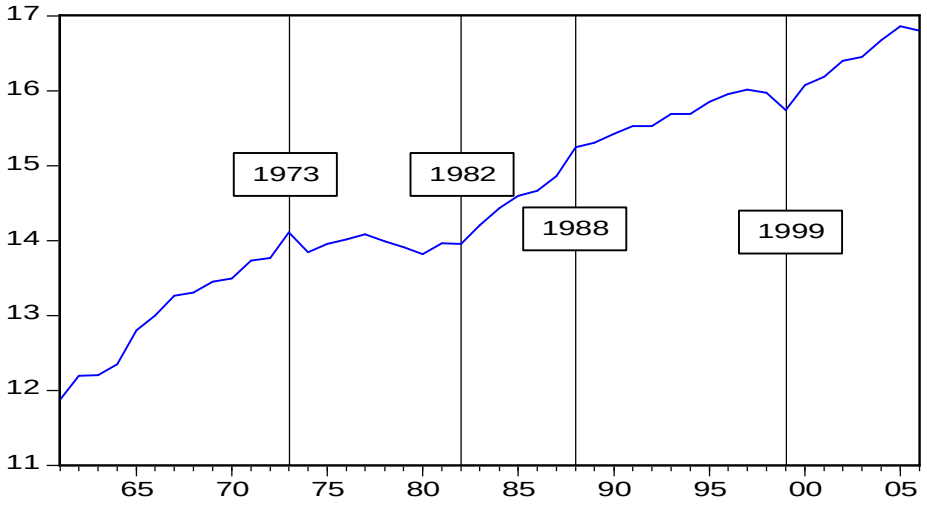

Figure 2. Log-Annual Tourists Arrivals Data of Turkey with Structural Breaks.

As it can be seen from the figure, there are four important breaks in the sequence. These are 1973, 1982, 1988 and 1999 respectively. The explanation for these breaks can be given as follows:

(1) The pre-1973 period and the period of 1983-1988 represent a relatively tranquil and stable one-party government's era. Outside of these two periods, there are more or less structural changes caused by several factors either terror or others.

(2) Beginning from 1973 up to and including 1982, we observe that both intercept and the slope of the time trend is changing. The interval of 1973-1982 was a period of political turmoil and social unrest in Turkey, characterized by a sequence of short-lived coalition governments, foreign embargos due to 1974-North Cyprus Peace Operation and finally ending up with a military intervention in 1980 which was lasted three years. Due to leftist-rightist terrorist activities some days even 20-30 killings were on the agenda.

In this period the terror in Turkey started with the extraordinary activities staged by the organizations such as THKP/C, THKO, TKP/ML and TİİKP which were adopted the Marxist-Leninist ideology (Alkan 2002, p.33). Particularly, in the aftermaths of March 12 military memorandum in 1971, the militants of these organizations were caught and put in prison. After the amnesty general of 1974, the elements of organization set free from prisons directed to illegal activities.

(3) In the period of 1988-1998, the separatist PKK terrorism was on the peak. In 1984, the organization indulged in armed propagation activities directed to countryside. It has gradually gained effect in the region and took the area under its dominance (Alkan 2002, p.91).

(4) In 1999 we have a drastic drop in the level of the series. There are several reasons that can be accounted for this drop in the series. First of all, beginning with a so-called post-modern military intervention in 1997, later on coined as February 28 process, the sequence of short-lived coalition governments was on the scene again. Besides, a serious earthquake took place in the midst of tourism season at 17th of August at this year, killing about 18 000 people, mainly in the Marmora region.

As noted in section 2, structural changes unaccounted for in a model can cause to diminish the power of the unit root tests. That is, the test results will be biased towards the non-rejection of unit root hypothesis when in fact there is no unit root in the DGP. These structural breaks in the time series can be imported in to the equation by some dummy variables corresponding to these dates. To this end, we have defined four dummy variables, the first one for the period 1974-1982, another one just for 1983-1988, the third one for 1989-1998, and the last one for 1999-2006 as follows:

$$D_{1t} = \begin{cases} 1, & t = 1974,\text{K},1982 \\ 0, & otherwise \end{cases} \qquad D_{2t} = \begin{cases} 1, & t = 1983,\text{K},1988 \\ 0, & otherwise \end{cases}$$

$$D_{3t} = \begin{cases} 1, & t = 1989,\text{K},1998 \\ 0, & otherwise \end{cases} \qquad D_{4t} = \begin{cases} 1, & t = 1999,\text{K},2006 \\ 0, & otherwise \end{cases}$$

From the visual inspection of the series, and from the structural change point of view, following important comments can be made. The periods represented by dummy variables D1 and D3 are the intervals especially affected and dominated by the leftist and the separatist terrorism respectively. This comment is stressed with the shaded area in Figure 3.

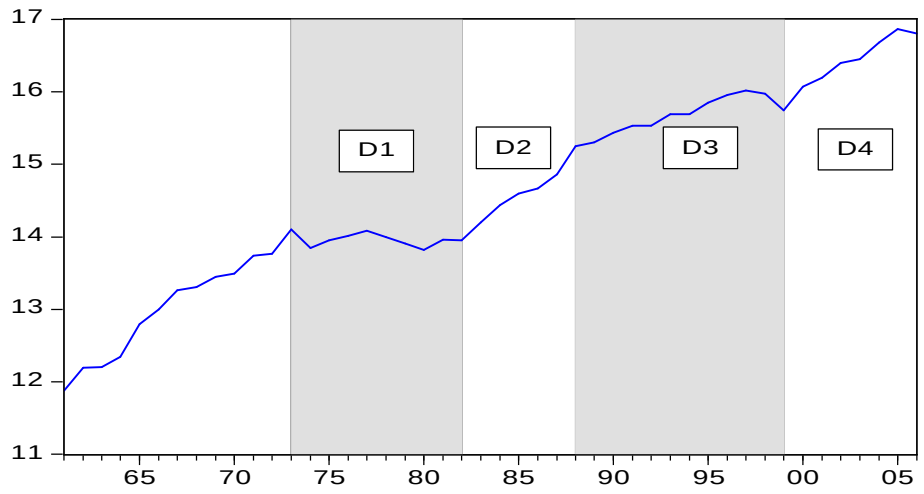

Figure 3. Tourists Arrivals Data of Turkey with Structural Breaks Due to Terrorism.

In these periods both intercept and slope of the deterministic trend components are changed. Nevertheless, in the periods immediately aftermaths of these periods, while slope coefficient recovers itself to its pre-terror period, only the intercept component of the model is being structurally changed. In order to account for these hypotheses, the unit root regression with structural change model of Table 3 is estimated.

Table 3. Unit Root Regression Model with Structural Change.

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Prob.*
C	11.10179	1.867479	5.944800	0.0000	
TREND	0.157457	0.027869	5.649882	0.0000	
D1	1.770038	0.431239	4.104542	0.0002	
D1TREND	-0.158310	0.032350	-4.893682	0.0000	
D2	-1.420896	0.282659	-5.026898	0.0000	
D3	0.983743	0.385477	2.552013	0.0151	
D3TREND	-0.083895	0.018436	-4.550625	0.0001	
D4	-2.509360	0.483967	-5.184985	0.0000	
LNTUR(-1)	-0.921772	0.157673	-5.846110	0.0000	0.0000

NOTES: (1) Dependent Variable: d(LNTUR) (2) Prob(F-statistic) 0.000003 (3) Akaike info criterion -1.642068 (4) Adjusted R-squared: 0.570086. (5) Durbin-Watson statistic: 1.669682. (6) *MacKinnon (1996) one-sided p-values. (7) Test critical value: 5% level -3.513075.

Table 3 reports an excellent quality of unit root regression with several structural breaks. All the coefficients are statistically/significantly different from zero. The regression is as a whole statistically significant according to the p-value of F-test. The lower and upper Durbin-Watson critical values for 1 and 5 % significance levels are 1.11-1.58 and 1.29-1.78. That is, the DW statistic is only 5 % significance level in the indeterminate region however it is close to no-autocorrelation region.

When compared with first test, we now have a quite opposite decision that the trend is not stochastic, on the contrary, there is a deterministic trend. The present state of art in Perron's unit root test with known structural change points does not permit for four breaks. However, considering the fact that, the maximum value between two statistics occurs when the proportion of observations occurring prior to break $l = t / T$ is 1/2, in a multi-break situation, the critical value should be much smaller in absolute terms. For the ADF test the critical value is -3.51. For $l = 1/2$ the critical value of the Perron's t-statistic is -3.76. We found a t-statistic value of -5.84 which is much lager in absolute terms than the critical values of both tests. It is quite safe to reject the null hypothesis of unit root.

3. Concluding Remarks

The unit root test is a useful devise for detecting whether shocks to a particular series have a permanent effect or a transitory effect. The presence of a unit root is indicative of the fact that random shocks to a series will have a permanent effect and there will be no

tendency to revert to its equilibrium value or stable path. The rejection of the unit root hypothesis would imply that shocks to a series will only have a transitory effect. The knowledge of whether shocks to a series are permanent or transitory has important policy implications. Furthermore, the unit root test coupled with structural break analysis can detect the effects of external events such as terrorism and other nuisances.

Tourism is an important ingredient of Turkish economy. Tourism sector quite closely related with political stability. In this paper we examined the unit root behavior of tourist arrivals of Turkey. In Turkey historically two important sequence of terrorism have been experienced. First one took place in the second half of the 1970s which was mainly leftist terrorism. The second surge of terror took place in the second half of 1980s, which was this time a Kurdish/separatist terror.

Given these shocks it was interesting to investigate whether they have had a permanent effect or a transitory effect on tourist arrivals in Turkey. Choosing a strategy in between augmented Dickey-Fuller (1978) and Perron's (1989) exogenous structural break test we have found overwhelming evidence in favor of the hypotheses:

(1) There is no-unit root behavior in the series.
(2) Tourist arrival to Turkey is deterministic trend stationary.
(3) Thus, any external shock will have a temporary effect on the tourist arrival series.
(4) Terrorism of late 1970s and 1980s have had temporary negative effects on the growth rate of tourist arrivals (slope of time trend).
(5) Unfortunately terrorism of late 1970s and 1980s have had permanent negative effects on the constant level of tourist arrivals (intercept of time trend).

There are several important policy implications of our results. First, these results imply that promotion expenditure for Turkey's tourism will have a temporary effect. Therefore, the efforts in this field should be permanent. Negative shocks on Turkey's tourism industry will not be harmful for ever; however the policy of recovery process should be immediate and drastic.

Second, the fact that shocks have a transitory effect on tourist arrivals in Turkey is likely to be a valuable piece of information for current and potential investors in the tourism sector of Turkey. On the basis of the results it is clear that the long run return of tourism investment in Turkey is sustainable.

In this study we have not indulged into the accountancy of terror economy. Using the log trend function of this study, the exact cost of twin terror periods to Turkish economy can be calculated. At this point it might be interesting to test the hysterisis effects, that is, the asymmetric effects of negative and positive shocks, in tourist arrivals series of Turkey.

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