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The Impact of Tourism Revenues in Turkey on Productivity Per Worker: ARDL Approach[1]

Türkiye'de Turizm Gelirlerinin İşgücü Verimliliği Üzerine Etkisi: ARDL Yaklaşımı

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Abstract: The short-run and long-run effects of tourism revenues on productivity per worker is examined for the Turkish economy during 1988-2018. The first step is to test the order of integration of the variables. The results of Augmented Dickey–Fuller (ADF) test indicated that the series of trade openness has not a unit root on the level I (0) the other series has not a unit root first differences level I (1). Therefore, this study investigates the effects of tourism revenues on productivity per worker by using ARDL bounds testing approach developed by Pesaran et al. (2001). The F-statistic estimated for the models were found to be greater than the critical values of Narayan (2005) at the significance level of 5%, thus the presence of cointegration between the variables was confirmed. After the cointegration relationship between the variables was determined, the long-run coefficients were estimated by using ARDL model. The results obtained from ARDL (3,2,1,2,1) estimations indicate that tourism revenues have a positive and statistically significant effect on productivity per worker in the short-run. The significance of this empirical results is that tourism sector can be considered as an effective economic policy instrument increasing productivity per worker.

Keywords: Tourism Revenues, Productivity Per Worker, ARDL Approach
JEL Classification: E20,C22,Z30

Öz: Turizm gelirlerinin işgücü verimliliği üzerindeki kısa ve uzun dönemli etkileri Türkiye ekonomisi için 1988-2018 döneminde araştırılmıştır. İlk adım değişkenlerin bütünleşme derecesini test etmektir. Augmented Dickey–Fuller (ADF) testi sonuçları ticari açıklık değişkenin seviyesinde I(0) durağan diğer değişkenlerin ise farkında I(1) durağan olduklarını göstermektedir. Dolayısıyla bu çalışma Pesaran ve diğerleri (2001) tarafından geliştirilen ARDL sınır testi ile turizm gelirlerinin işgücü verimliliği üzerindeki etkisini araştırmaktadır. Modelin tahmininden elde edilen F istatistiği Narayan (2005) %5 anlamlılık seviyesi kritik değerinden büyük olarak bulunduğundan değişkenler arasında eşbütünleşme ilişkisinin var olduğu bulgusuna ulaşılmıştır. Değişkenler arasında eşbütünleşme ilişkisi belirlendikten sonra ARDL modeli kullanılarak uzun dönem katsayıları tahmin edilmiştir. ARDL (3,2,1,2,1) modelinin tahminlerinden elde edilen bulgular turizm gelirlerinin işgücü verimliliğini istatistiksel olarak anlamlı ve pozitif yönde kısa dönemde etkilediğini göstermektedir. Bu ampirik sonuçların önemi işgücü verimliliğinin artırılmasında etkin ekonomik politika aracı olarak turizm sektörünün düşünülebilmesidir.

Anahtar Kelimeler: Turizm Gelirleri, İşgücü Verimliliği, ARDL Yaklaşımı
JEL Sınıflandırması: E20,C22,Z30

1. Introduction

Beginning in the 1980s, the world economy began to develop in ways favorable to tourism. Developing countries that abandoned import substitution industrialization policies have attempted to integrate into a multilateral trade system with an open industrialization approach. Developing countries, which lag behind developed countries in terms of capital accumulation, have failed to demonstrate a sufficient development in the export of industrial products, except in the case of East Asia. Thus, tourism has become an important policy tool in meeting the export targets, especially in developing countries. Developing countries, which want to close the gap with developed countries, plan to increase the foreign exchange input provided by the tourism sector in order to gain the capital required to meet employment and growth targets.

For countries aiming to grow above the growth target, they can achieve this with domestic resources, as well as attracting foreign resources into the country. Thus, countries have become competitive with each other in the tourism sector. Developing countries, including Turkey, have attempted to obtain economically useful investment in tourism as a service sector. Thus, it is desirable to contribute to the saving deficit and to achieve growth and employment targets.

On the other hand, the positive developments in the multilateral trade system have also been reflected in the production of the countries productivity per worker. As the free trade order is maintained throughout the world, the production levels of countries productivity per worker will converge. Therefore, multilateral liberalization processes will

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increase competition in tourism and productivity per worker will be affected positively or negatively as tourism developments. As a result, investments in tourism will contribute positively to the development of productivity per worker.

Especially after World War II, the positive contributions of tourism to the economy due to the worldwide developments in the field of tourism have been examined by numerous researchers. Similarly, the impact of tourism on economic growth has also been discussed extensively in a wide ranging literature on Turkish developments (Bahar (2006), Aslan (2008), Kızılgöl and Erbaykal (2008), Balıkçıoğlu and Oktay (2015), Kanca (2015), Çetintaş and Bektaş (2008), Kızılkaya et al. (2016), Topallı (2015), Özdemir and Öksüzler (2006), Yamak et al. (2012), Samırkaş and Samırkaş (2014), Çoban and Özcan (2013), Çil Yavuz (2006), Yenisu (2018), Kızılkaya (2018)). Moreover, the relationship between tourism and employment, balance of payments and savings deficit is also studied by Ünlüönen and Şahin (2011), Tutar vd. (2013), Sarı and Uçar (2010), Paksoy et al. (2018).

However, there is very limited literature on how tourism affects productivity per worker. Kumar (2014) investigated the effect of tourism revenues on productivity per worker by using the ARDL method for the Vietnamese economy in the 1980-2010 period. The long-term findings from the ARDL estimate suggest that tourism revenues positively affect productivity per worker, but this effect is statistically insignificant. On the other hand, the findings from the ARDL estimate showed that tourism revenues increased the productivity per worker in the short term. When the studies in the literature are examined, there hasn't been any work examining the impact of tourism on productivity per worker for Turkey. Therefore, this study is important because it will fill this gap in the literature. The purpose of the study is to put forth the impact of tourism revenues on productivity per worker. With this in mind, the model and data-set, and method of the study, are presented in the second chapter. In the third section, the findings obtained from the method are determined and in the conclusion the findings are evaluated.

2. Model

The model focuses on four variables: output (Y), capital stock (K), labour (L) and technology accumulation (A). In this study The Cobb-Douglas production functions obtained from Kumar is specified as follows

$$Y_t=A_tK_t^{\alpha}L_t^{1-\alpha} \quad (1)$$

in the equation (1) Y_t; Real GDP ($ 2010), K_t; Real Gross Fixed Capital Formation, L_t; Employment, α; It represents the share of capital in production which takes value in the range of $0 <\alpha<1$.

Cobb Douglas production function in equation (1) was converted to intensive form of the production function, divide by L as in equation (2).

$$y_t=A_tk_t^{\alpha} \quad (2)$$

In equation (2), $y_t = Y_t / L_t$; real GDP per worker, $k_t = K_t / L_t$; It refers to the real gross fixed capital formation per worker.In equation (2), A_t represents technology accumulation. In Solow model, technology accumulation is formed as in equation (3).

$$A_t=A_0e^{gt} \quad (3)$$

A_0= In initial level of knowledge accumulation t indicates time. At this stage; technology accumulation, tourism, finance and trade openness can be expressed as in equation (4).

$$A_t=f(\text{Tourism,Finance, Trade openness}) \quad (4)$$

Thus, equation (2) can be expressed as in equation (5).

$$y_t=(A_0e^{gt}\text{Tourism}t^{\varphi t}\text{Finance}^{\sigma t}\text{Tradeopenness}^{\eta t})k^{\alpha t} \quad (5)$$

When the logarithm of equation number (5) is first derived from time, then equation (6) is obtained.

$$\Delta ly^*=g+\varphi\Delta lTorism+\sigma\Delta lFinance+\eta\Delta lTrade\ Openness+\alpha\Delta lk \quad (6)$$

In equation 6, the term g = constant refers to Total Factor Productivity Δly * = Growth Rate of Productivity Per Worker, ΔItourism = Tourism Development, ΔIFinance = Financial Development, ΔITrade Openness = Trade Openness Variable.

In addition, real GDP ($ 2010), nominal GDP, Gross Fixed Capital Formation (realized by GDP deflator) used in the calculation of these variables are obtained from World Bank Development Indicators. Employment was obtained from TURKSTAT Statistical Indicators.

3. Data Set

The impact of tourism revenues on productivity per worker in Turkey was investigated using variables for the 1988-2018 period. The variables used in the study are presented in Table 1.

Table 1. The Explanation of Variables

Variables	*Explation*	*Source*
Δlny= Growth Rate of productivity Per Worker	Real GDP growth of per worker	It is calculated by the authors.
lnrtr= Real Tourism Revenues	Real tourism revenues is realized by GDP deflator.	Turkish Statistical Institute
lnpsc= Private Sector Credit	Domestic credit to private sector (% of GDP)	World Bank Development Indicators
lnto= Trade Openness	Exports of goods and services + imports of goods and services / GDP	World Bank Development Indicators
Δlnk= growth rate of capital accumulation per worker	Growth rate of real fixed capital stock per worker	World Bank Development Indicators

Notes: "ln" that takes place at the beginning of the variables states logarithmic transformation.

4. ARDL Approach

In order to determine the effect of tourism revenues on productivity per worker, firstly, Fourier ADF (FADF) and ADF unit root tests are used and the results are presented in Table 2.

Table 2. FADF and ADF Unit Root Tests Results

Variables	*FADF*				*ADF*
	MIN SSR	*k*	*F(k)*	*Test Statistic*	*Test Statistic*
lny	0.735695	1	31.30822[a]	-1.071641 (1)	-2.585476 (0)
lnk	1.549786	1	24.04701[a]	-1.748142 (0)	-2.577566 (0)
lnrtr	3.728172	1	18.43826[a]	-1.809840 (0)	-3.003698 (0)
lnpsc	3.131033	1	26.58628[a]	-2.019161 (1)	-1.689317 (0)
lnto	0.554565	1	10.09618[a]	-2.073010 (0)	-3.271334[c] (1)
Δlny	0.064795	4	2.098550	-5.553070[a] (0)	-3.812116[b] (5)
Δlnk	0.430330	3	2.761610	-6.710754[a] (0)	-5.369971[a] (0)
Δlnrtr	1.482882	4	2.566891	-4.778228[a] (3)	-4.878299[a] (3)
Δlnpsc	0.465706	1	2.779538	-4.924097[a] (0)	-4.308013[a] (0)
Δlnto	0.243739	4	3.575882	-5.642382[a] (1)	-4.124757[b] (3)

Notes: a, b and c denote statistically significant at the 1%, 5% and 10% levels of significance, respectively. The values in the parenthesis show optimal lag length.

As can be seen from Table 2, lny, lnk, lnrtr and lnpsc are stationary at their first difference level. lnto variable is stationary at its level. In other words, it is seen that the variables are stationary in different degrees. Variables are stationary at different degrees Pesaran et al. (2001) developed by ARDL (Autogressive Distributed Lag) approach allows the determination of short and long-term relationships. Consequently, Pesaran et al. (2001) bound test approach will be used. The cointegration relationship was investigated on the unrestricted error correction model presented in equation (7).

$$\Delta lny_t = \beta_0 + \beta_1 + \sum_{i=1}^{n} \beta_{21i} \Delta lny_{t-i} + \sum_{i=0}^{n} \beta_{22i} \Delta lnrtr_{t-i} + \sum_{i=0}^{n} \beta_{23i} \Delta lnpsc_{t-i} + \sum_{i=0}^{n} \beta_{24i} \Delta lnto_{t-i} + \sum_{i=0}^{n} \beta_{25i} \Delta lnk_{t-i} + \beta_3\, lny_{t-1} + \beta_4 lnrtr_{t-1} + \beta_5 lnpsc_{t-1} + \beta_6 lnto_{t-1} + \beta_7 lnk_{t-1} + \varepsilon_t \quad (7)$$

where the β_0 is constant term ε is the white noise error term and Δ is the first difference operator n is optimal lag length. In determining the cointegration relationship, the null hypothesis of no cointegration $\beta_1 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$ and tested with F test. F statistic were presented in Table 3.

Table 3. Bound Test Results

Significance Levels	*F statistic k=5*	
	5.917729	
	Lower I(0)	Upper I(1)
%10	3.035	3.997
%5	3.578	4.668
%1	5.147	6.617

Note: Critical values are obtained from the table of unrestricted constant and restricted trend in Narayan (2005:1989)

The obtained F-statistic is compared with the lower critical value I (0) and the upper critical value I (1) in case 4 table in Narayan (2005). Accordingly, if the F-statistic I (1) is greater than the upper bound critical values in Narayan (2005), H_0 hypothesis is rejected and it is concluded that there is a cointegration relationship between the series. As can be seen from Table 3, the calculated F-statistic value was found to be greater than the upper bound critical values of the table at 5% and 10% significance levels. Therefore, the existence of the cointegration relationship between the series was determined.

After determining the cointegration relationship, long and short run relationships between variables are employed with the help of ARDL approach. Long run coefficients are estimated from the ARDL model presented in equation (8).

$$lny_t = \beta_0 + \beta_1 T + \sum_{i=1}^{k} \beta_{21i} lny_{t-i} + \sum_{i=0}^{l} \beta_{22i} lnrtg_{t-i} + \sum_{i=0}^{m} \beta_{23i} lnosk_{t-i} + \sum_{i=0}^{n} \beta_{24i} lnta_{t-i} + \sum_{i=0}^{p} \beta_{25i} lnk_{t-i} + \varepsilon_t \quad (8)$$

where the β_0 is constant term ε is the white noise error term and Δ is the first difference operatör k, l, m, n and p are optimal lag lengths. In order to analyze short and long run relationships, the model was determined as ARDL (3,2,1,2,1) model by using AIC information criterion. The results are presented in Table 4.

Table 4. ARDL (3,2,1,2,1) Model Results

Variables	Coefficient	Standard Error	t statistics	P value
lny(-1)	0.090636	0.193499	0.468406	0.6473
lny(-2)	-0.261280[b]	0.119351	-2.189166	0.0474
lny(-3)	0.175220[c]	0.093536	1.873275	0.0837
lnrtr	0.037720	0.046462	0.811859	0.4315
lnrtr(-1)	0.134813[a]	0.041848	3.221510	0.0067
lnrtr(-2)	-0.078102[b]	0.031769	-2.458463	0.0288
lnpsc	0.002558	0.044780	0.057114	0.9553
lnpsc(-1)	-0.094700[c]	0.049854	-1.899541	0.0799
lnto	-0.268623[b]	0.090145	-2.979901	0.0106
lnto(-1)	-0.091590	0.097472	-0.939655	0.3645
lnto(-2)	0.202701[b]	0.067553	3.000630	0.0102
lnk	0.285576[a]	0.052718	5.417028	0.0001
lnk(-1)	0.168238[c]	0.093848	1.792665	0.0963
c	3.859159[c]	2.054356	1.878525	0.0829
trend	0.015252[b]	0.006218	2.452822	0.0291
Diagnostic Tests				
Breusch-Godfrey LM Test Statistic = 0.355(0.562)				
Jarque-Bera Normality Test Statistic = 0.897 (0,638)				
Harvey Heteroscedasticity Test Statistic =0.794 (0.662)				
ARCH Heteroscedasticity Test Statistic = 1.368 (0.253)				

Breusch-Pagan-Godfrey Heteroscedasticity Test Statistic = 0.517 (0.882)
Ramsey-Reset Test Statistic = 0,49 (0,62)

Notes: a, b and c denote statistically significant at the 1%, 5%, and 10% levels of significance, respectively. Values in parenthesis indicate the levels of significance of related statistics.

As can be seen from Table 4, the coefficient of lnrtr is statistically insignificant, while the coefficients of the its lags are significant and positively affect lny. On the other hand, the diagnostic test results of the selected model show that there is no autocorrelation and heteroskedasticity, and the error terms have normal distribution. Long term coefficients of ARDL (3,2,1,2,1) model are presented in Table 5.

Table 5. Long Run Coefficients of ARDL (3,2,1,2,1)

Variables	Coefficient	Standard Error	t statistics	P value
lnrtr	0.09448653	0.06609235	1.43534506	0.174809
lnpsc	-0.092566[a]	0.02716866	-3.4070984	0.004678
lnto	-0.158236[c]	0.08351254	-1.89477588	0.080582
lnk	0.4559000	0.06402079	7.12112435	7.803317
trend	0.0153216[a]	0.00499051	3.07015514	0.008946

Note: a and c denote statistically significant at the 1% and 10% levels of significance, respectively.

As can be seen from Table 5, the coefficient of lnrtr was positive but statistically insignificant. This result reveals that tourism revenues do not affect productivity per worker in the long run. The short run relationships of the model are determined through the error correction model presented in equation (9) based on ARDL.

$$\Delta lny_t = \beta_0 + \beta_1 T + \sum_{i=1}^{k} \beta_{21i} \Delta lny_{t-i} + \sum_{i=0}^{l} \beta_{22i} \Delta lnrtr_{t-i} + \sum_{i=0}^{m} \beta_{23i} \Delta lnpsc_{t-i} + \sum_{i=0}^{n} \beta_{24i} \Delta lnto_{t-i} + \sum_{i=0}^{p} \beta_{25i} \Delta lnk_{t-i} + \beta_3 ECT + \epsilon t \quad (9)$$

where the β_0 is constant term ε is the white noise error term and Δ is the first difference operator k, l, m, n and p are optimal lag lengths and ECT is error correction term. The ECT is expected to take a value between 0 and -1. The results of the error correction model to be obtained from ARDL (3,2,1,2,1) model are presented in Table 6.

Table 6. The Results of ARDL (3,2,1,2,1) Error Correction Model

Variables	Coefficient	Standard Error	t statistics	P value
Δlny(-1)	0.086060	0.066051	1.302940	0.2152
Δlny(-2)	-0.175220[b]	0.062065	-2.823141	0.0144
Δlnrtr	0.037720[c]	0.020944	1.801027	0.0949
Δ lnrtr(-1)	0.078102[a]	0.022637	3.450227	0.0043
Δlnpsc	0.002558	0.026850	0.095251	0.9256
Δlnto	-0.26862[a]	0.055498	-4.840214	0.0003
Δlnto(-1)	-0.20270[a]	0.049022	-4.134864	0.0012
Δlnk	0.285576[a]	0.031174	9.160767	0.0000
c	3.874411[a]	0.549960	7.044900	0.0000
ECT	-0.995425[a]	0.141968	-7.011610	0.0000

Notes: a, b and c denote statistically significant at the 1%, 5%, and 10% levels of significance, respectively.

As shown in Table 6, the coefficient of ECT is between 0 and -1 and it is statistically significant. On the other hand, lrtg was found to be statistically positive and significant. The Cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) test results developed by Brown (1975), which are used to test the stability of the coefficients of ARDL (3,2,1,2,1) are presented in the Appendix. As can be seen from the graphs, it can be stated that the estimated coefficients of the ARDL error correction model is stable.

5. Conclusion

There is an intensive literature on the positive effects of tourism on economic growth. However, there are very few studies demonstrating their impact on productivity per worker. The impact of tourism on productivity per worker in this study was discussed in the 1988-2018 period for Turkey by means of the ARDL method. The results show that tourism affects productivity per worker positively but is statistically insignificant in the long run. On the other hand, the positive effect of tourism on productivity per worker was determined in the short run. The revenues to be generated as a result of the investments in the tourism sector will have a positive effect on the productivity per worker. Therefore, by using public sector tourism measures as a policy tool, productivity per worker can be increased.

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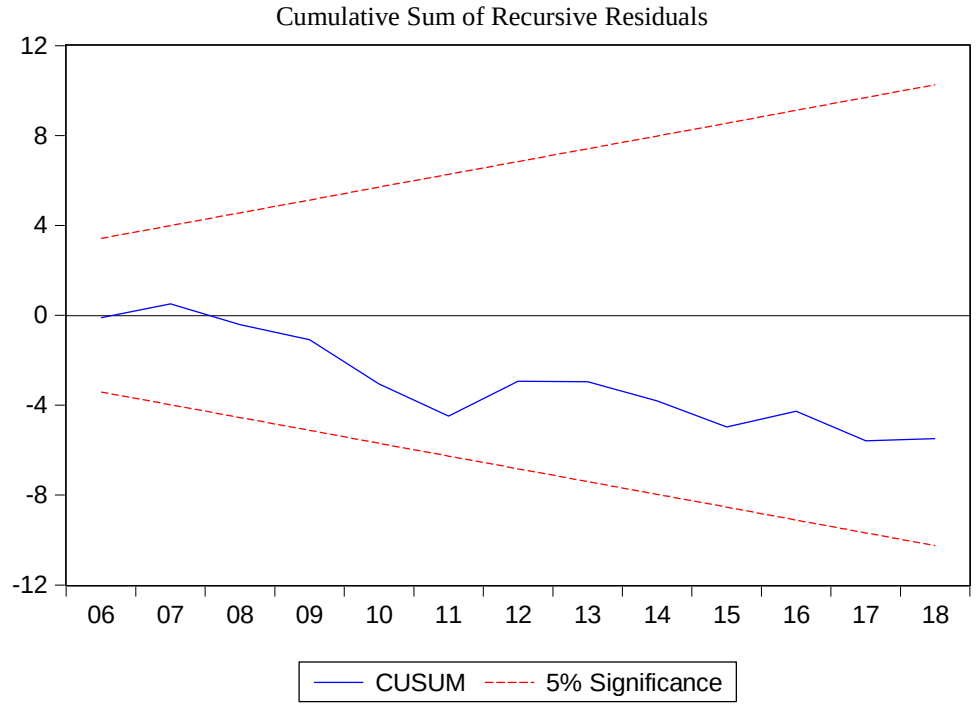
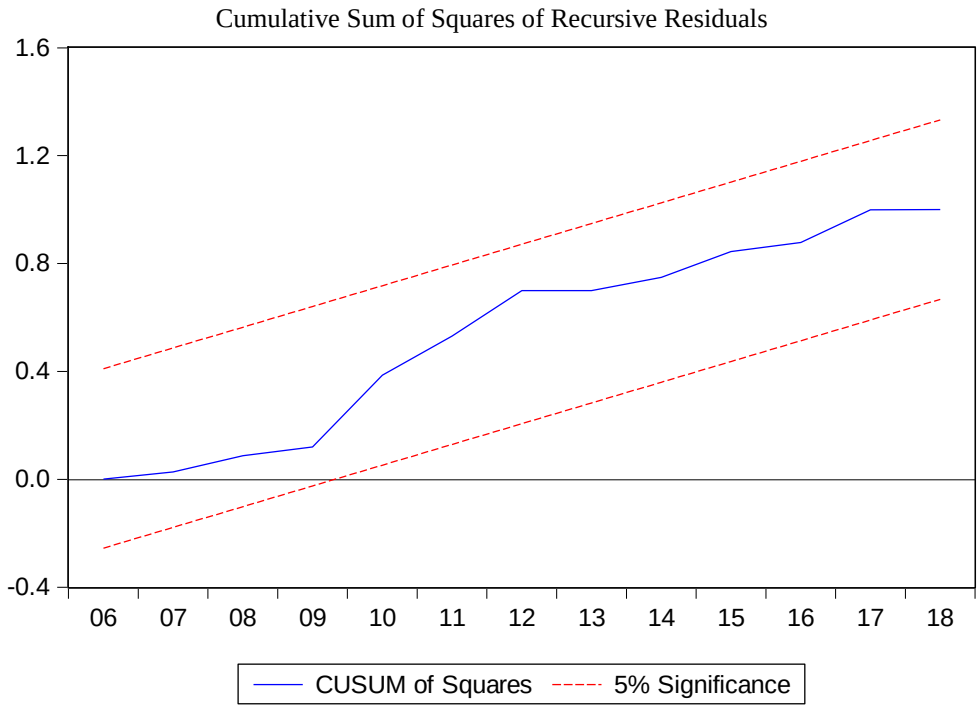
APPENDIX


Cumulative Sum of Recursive Residuals
12
8
4
0
-4
-8
-12
06
07
08
09
10
11
12
13
14
15
16
17
18
CUSUM
5% Significance


Cumulative Sum of Squares of Recursive Residuals
1.6
1.2
0.8
0.4
0.0
-0.4
06
07
08
09
10
11
12
13
14
15
16
17
18
CUSUM of Squares
5% Significance