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Araştırma Makalesi

Is Tourism Convergence Valid in Turkey? Evidence from Furuoka Unit Root Test

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Abstract
The positive effects of tourism on the economy are gradually increasing. Turkey has a critical position in the tourism sector, and its main policy in this area is to increase its income. This study purpose of testing the validity of the convergence hypothesis for the countries located in different continents of the world in Turkey's international tourism market. The study covering the years 2000-2020 analyzed eight groups (Africa, America, Asia, Europe, Independent States, OECD, Oceania and non-national) with the data created by the Turkish Statistical Institute (TUIK). The unit root test developed by Furuoka (2017) is used to test the validity of the convergence hypothesis. As a result of this study found model D to be the most appropriate method among the four proposed alternatives. Accordingly, it is seen that the convergence is not valid for Asia, Europe, and Oceania. It is also concluded that convergence is valid for America, OECD, Non-National, Independent States and Africa.
Keywords: Tourism, Turkish Economy, Furuoka Unit Root Test
JEL Classification Codes: Z3, N0, C1

Turizm Yakınsaması Türkiye'de Geçerli mi? Fourier Adf Birim Kök Testinden Kanıtlar

Öz
Turizmin ekonomide gösterdiği olumlu etkiler giderek artmaktadır. Turizm sektöründe önemli bir konumda olan Türkiye, bu sektörden elde ettiği gelirleri giderek artırmayı amaçlamaktadır. Bu amaçla çalışmada, Türkiye'nin uluslararası turizm piyasasında dünyanın farklı kıtalarında yer alan ülkeler için yakınsama hipotezinin geçerliliği sınanmıştır. 2000-2020 yıllarını kapsayan çalışmada TUİK tarafından oluşturulan 8 grup (Afrika, Amerika, Asya, Avrupa, Bağımsız Devletler, OECD, Okyanusya ve Milliyetsiz) üzerinden analiz gerçekleştirilmiştir. Yakınsama hipotezinin geçerliliğini test etmek için Furuoka (2017) tarafından geliştirilen birim kök testi kullanılmıştır. Bu çalışmanın sonucunda önerilen dört alternatif arasından D modeli en uygun yöntem olarak bulunmuştur. Buna göre yakınsamanın Asya, Avrupa ve Okyanusya için geçerli olmadığı görülmüştür. Yakınsamanın Amerika, OECD, Ulusal Olmayan, Bağımsız Devletler ve Afrika için de geçerli olduğu sonucuna varılmıştır.
Anahtar Kelimeler: Turizm, Türkiye Ekonomisi, Furuoka Birim Kök Testi
JEL Sınıflandırma Kodları: Z3, N0, C1

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1. Introduction

The tourism sector is vital in the development of countries. It is an essential development component for developed and developing countries and has an important place for Turkey. Turkey's location and environmental factors put it in a critical position in tourism. Also, the positive reflections of seasonal effects have made Turkey a favorite for both winter and summer tourism

Countries develop some measures and policies to eliminate the differences between regions. Turkey aims to eliminate these differences, especially with its development policies. Programs are created for this purpose and trying to be developed in sectors other than agriculture. Tourism is seen as an important sector for economic development. Tourism contributes to the development of the country's economy thanks to the employment and investment increase it provides and foreign exchange inflows (Gülbahar, 2009, s. 42).

In many nations, tourism activity is considered more substantial economically and socially than production. Tourism has excellent potential as a catalyst for economic growth. Besides, it is a crucial sector at the macroeconomic level (Xhiliola Agaraj, 2009, s. 83). The World Travel and Tourism Council (WTTC) are classified the economic contribution criteria of tourism under four main headings in its report on the Comparison of the Economic Effects of Travel and Tourism. These are formed as; direct economic effects (Direct Travel & Tourism contribution), indirect economic effects (Indirect Travel & Tourism contribution), derived economic effects induced contribution (spending of direct and indirect employees) and total economic effects (Total Travel & Tourism contribution). Its direct economic effects cover areas such as accommodation, transportation, entertainment and transportation. Indirect economic effects; travel and tourism investment expenditures cover the impact of purchases from suppliers. It is seen as the direct and indirect economic contribution derived from the expenses made by the total employment, in other words, caused by all these expenditures. Finally, their total economic contribution is directed to Gross National Product and employment (WTTC Methodology Report, 2020, 3). The benefaction of the tourism sector to GDP for 2019 in Turkey was 10.3%. In the last five years, one out of every four net new jobs has been created by Travel and Tourism. While it has contributed 9.4% to employment, 17.5% of total exports were made up of the expenditures of those coming for tourism (WTTC, 2020).

1.1. Tourism Convergence and Characteristics of the Tourism Sector in Turkey

A convergence analysis reveals the effectiveness of the performance of countries in the tourism sector. The first study on tourism convergence was presented by Narayan (2006). In the study examining whether the tourism markets converge or not, it has been revealed that effective policies applied will increase the volume of tourists coming to the country. The equation for the study is formed as follows:

$$D_{it} = \ln (VA_{t,Turkey}/VA_{it})$$

VA_{it} denotes the visitor arrivals from country i to Turkey at time t. $\ln VA_{t,Turkey}$ shows the total number of visitors coming to Turkey. D_{it} symbolizes the difference observed in the diary of tourist arrivals to the country at time t. With this equation, the convergence characteristics of the tourism sector can be revealed (Narayan, 2006, s. 1155). In his study, Narayan (2006) stated that examining the convergence characteristics of a country's tourism markets would be necessary in two ways. Firstly, the convergence of tourism markets is an essential indicator of the effectiveness of policies to be implemented in tourism markets where there is convergence. Policies to be implemented in markets with convergence may be effective. Therefore, it will be helpful to examine the data of the convergence hypothesis in the selection of countries where policies will be implemented. Secondly, it is crucial to know whether the number of tourists coming from small-volume tourism markets complies with the convergence hypothesis of increasing the number of international tourists by targeting these small-volume markets (Alper and Demiral, 2017, ss. 206-207).

Turkey displays an advantageous structure in terms of tourism. It attracts the attention of tourists due to its four seasons, its historical richness, and the natural structure it preserves. The purpose of the arrival of the tourists coming to Turkey is shown in Table 1.

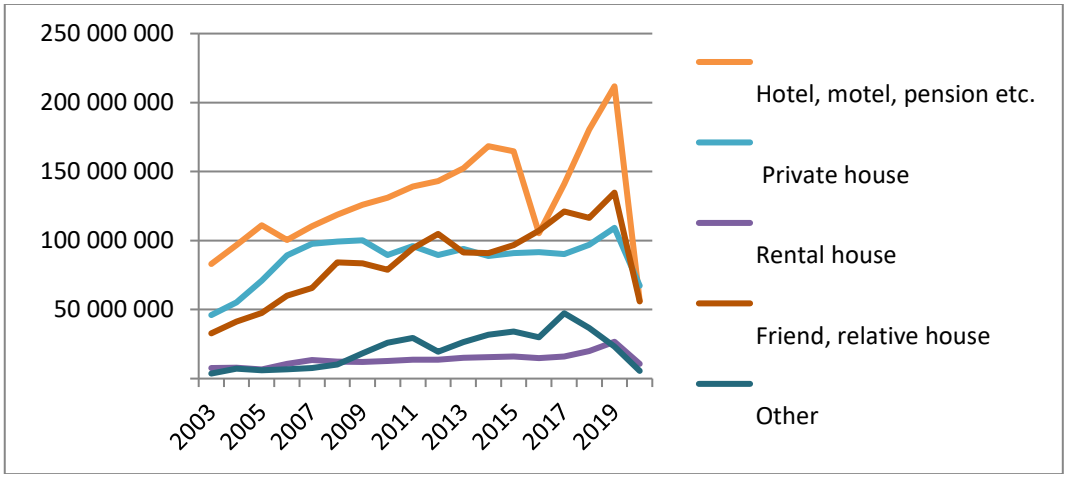
Table 1: Departing Visitors by Purpose of Visit

Years	Travel, entertainment, sportive or cultural activities	Visiting relatives and friends	Education, training (less than a year)	Health or medical reasons less than a year)	Religion / Pilgrimage	Shopping	Transit	Business conferences, meetings, assignments etc.)	Other
2003	8 445 416	2 101 732	79 021	139 971	64 548	997 479	246 648	1 604 905	503 870
2004	10 076 732	2 469 907	144 277	171 994	65 778	1 068 949	168 329	1 928 860	694 943
2005	12 024 521	3 281 111	99 957	220 338	112 308	1 111 088	404 941	2 068 954	757 119
2006	10 328 750	3 836 601	106 250	193 728	125 503	1 166 756	322 343	2 462 609	959 990
2007	13 002 599	4 319 515	149 430	198 554	143 969	1 126 186	38 133	2 347 545	1 299 360
2008	15 031 984	4 864 747	157 464	224 654	99 041	1 074 853	232 571	2 367 268	1 197 768
2009	16 407 366	5 380 786	217 665	201 222	127 815	1 175 900	637 144	1 577 508	1 087 840
2010	17 448 324	5 194 790	176 975	163 252	114 340	1 062 808	769 814	1 723 940	1 130 648
2011	18 602 663	6 058 787	240 583	187 363	106 743	1 101 744	795 916	2 134 624	1 166 273
2012	20 331 030	5 436 739	222 442	216 229	66 401	877 687	38 548	2 158 204	956 250
2013	21 680 347	5 757 757	190 272	267 461	59 076	952 204	36 429	2 333 144	1 154 085
2014	23 904 039	5 979 016	176 324	414 658	83 180	1 058 365	38 698	2 315 225	1 061 792
2015	24 215 399	6 403 696	144 093	360 180	75 908	1 149 973	43 535	2 212 327	1 239 374
2016	15 287 344	7 031 921	101 142	377 384	47 329	1 237 627	29 529	1 810 536	1 231 626
2017	19 389 968	8 436 850	104 904	433 292	27 005	1 505 756	20 591	1 780 820	1 337 588
2018	25 355 412	8 050 784	114 036	551 748	29 072	1 433 776	55 154	1 902 089	1 218 028
2019	29 965 670	8 712 806	135 930	662 087	80 643	1 632 818	94 272	1 850 208	1 074 452
2020	8 244 388	3 867 887	36 370	388 150	11 412	763 999	17 180	625 979	129 207

Source: Turk Stat Departing Visitors Survey

Most of the tourists coming to Turkey have entered due to visits and cultural activities. Under this heading, the highest number of entries was recorded in 2018 with 25 million. The second place was the visit of friends and relatives, and the highest number of entries in this title was in 2019. There was a severe decrease in all titles in 2020 due to the pandemic. However, there has not been a significant change in the reasons for coming to Turkey for foreigners.

In addition to the purpose of their arrival, foreigners, coming to Turkey, also have an important place in their stay preferences. Accommodation options have an impact on employment and investments in the economy. The accommodation preferences of the tourists lead to the determination of the preferences formed by the countries. This situation is visualized in Graph 1.

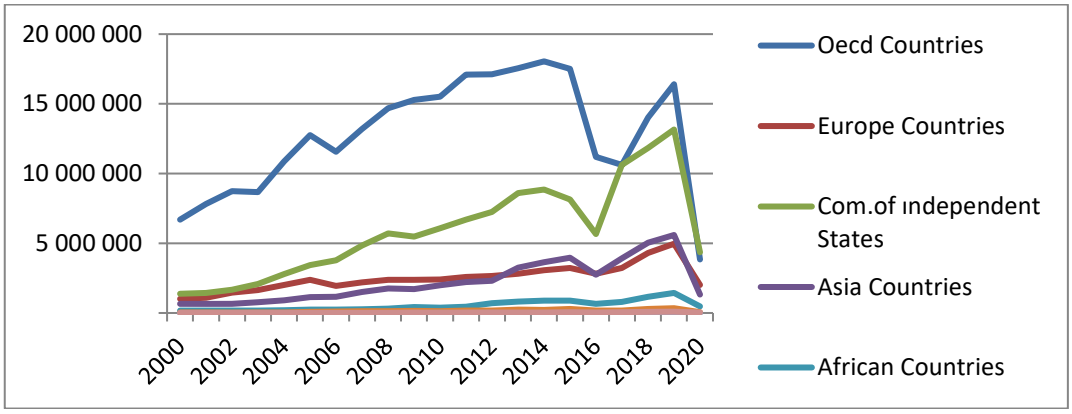


Source: Turk Stat Departing Visitors Survey data were visualized by the authors.

Graph 1: Departing Visitors by Type of Accommodation

Most of the visitors coming to Turkey have chosen hotels and hostels as their accommodation preference. While personal houses are second, this is ranked by rented houses, close and friends' houses. In the last row, the other accommodation title took place. There was a decrease in the hotel title in 2016, but an increase was seen until the 2020 pandemic. While private homes have decreased in the last few years, there has been an increase in rented homes. There has been a proportional increase in the homes of relatives and friends over the years. There was no severe change in the other accommodation options.

The qualifications of foreigners and citizens coming to Turkey have varied over the years. The change in foreigners coming to Turkey from many nationalities and country groups over the years is shown in Graph 2.



Source: General Directorate of Security data were visualized by the authors.

Graph 2: Arriving Foreigners and Citizens

OECD countries took first place among foreigners and citizens coming to Turkey. Until 2015, there was a continuous increase, and although it decreased for a short time afterward, this period was short-term. In this decline, our neighbor developments in Syria led to a decrease in trust in Turkey. Among the foreigners and citizens coming to Turkey, European countries ranked second, Independent States ranked third, and Asian countries ranked fourth. The nationless group took place in the last place.

Source: TUIK data were visualized by the authors.

Graph 3: Travel Revenues (Million$)

Turkey's travel revenues followed a course until 2016, when the Syrian Civil War began. The war's trust problem reduced the number of tourists visiting the country and decreased incomes. As a result of the measures taken after 2017, revenues increased, but this was valid until the 2020 pandemic period.

Purpose and importance of the study:

1.) The main objective of this study: Turkey's effectiveness in the tourism sector's policies investigated.
2.) The importance and up-to-dateness of the subject necessitate the research and examination of this subject.
3.) In terms of economic contribution, tourism is an essential sector in countries with high environmental impacts, such as Turkey.
4.) Sample of the study: The study was conducted by considering all country groups for tourists coming to Turkey without discrimination or restriction.
5.) The up-to-dateness of the data and analysis methods.

In this study on Turkey, we tested the validity of the convergence hypothesis. The convergence hypothesis for Turkey has been examined through the Fourier-based Furuoka (2017) Unit Root Test. In order to reflect the purpose and importance of the study correctly, the rest of the study is structured as follows. The following section consists of relevant literature. Chapter 3 presents the econometric methodology. Chapter 4 presents the empirical findings, and the last chapter presents the result.

2. Related Literature

Since the 20th century, many studies examining the importance of tourism on the economy have taken place in the literature. Narayan (2006) developed the convergence hypothesis of tourism markets and pioneered in this field among these studies. Narayan (2006) tested whether there is convergence regarding the number of visitors from Australia's 13 tourist resource markets to Australia. Univariate Lagrange Multiplier (LM) and Panel LM unit root test was performed for the monthly data of the 1991-2003 periods. According to the findings, Narayan (2006) concluded that Australia's tourism markets are converging. Narayan (2007) tested the convergence hypothesis by analyzing the total number of visitors to Fiji and the number of visitors coming to Fiji from eight tourist resource markets between 1970 and 2003 with unit root and cointegration tests. According to the analysis findings obtained in this study, the author concluded that the tourism markets of Fiji converge.

Hooi Lean and Smyth (2008) concluded that Malaysia's ten tourism markets are converging. Lee (2009) tested the convergence of Singapore's 12 main source tourism markets with 2004-2007 data. He concluded that other countries, except for the three countries, are stationary. Abbott, De Vita, and Altinay (2012) tested the stochastic convergence of twenty major tourism markets of Turkey with 1996-2009 data. Their findings from the study concluded that there is no long-term convergence between Turkey and the largest tourist sources. Yılancı and Eris (2012) examined whether they are stationary with the Fourier KPSS unit root test with 1996-2010 data from Turkey's largest 14 tourism markets. According to the

study's findings, the authors concluded that there is convergence in 10 of the 14 markets and no convergence in the other four markets.

Bozkurt and Bahar (2015) conducted a convergence test with Panel unit root analysis with data from the world's most developed nine tourism economies, including Turkey, from 1995-2009. According to the findings they obtained from the study, they concluded that Turkey is in the process of convergence with the USA, France, Spain, and China. Alper and Demiral (2017) aimed to test the convergence hypothesis for Turkey's tourism markets for the 1996-2015 period. The findings obtained from this study concluded that the convergence hypothesis is valid for 6 of the 14 countries considered and that the convergence hypothesis is not valid for 8. Özcan and Erdoğan (2017) concluded that Turkey's 14 largest tourist source markets converged with monthly data for the 1996-2012 period, and 10 of the 14 markets converged, that is, the tourism policies and strategies for these markets were successful. Kaplan, Ozturk, and Gungor (2017) rejected the full convergence null hypothesis according to the data of Turkey's 28 major tourist resource markets for the period 1996-2014 and the club convergence results developed by Phillips and Sul (2007). Katrakilidis et al. (2017) tested whether Greece's 18 tourist resource markets convergence using Panel unit root tests for 1995-2015. According to the findings from the study, they found that the countries (except for Russia) showed signs of convergence at the interruption time points corresponding to the recent crisis years and the Olympic Games.

Topyıldız (2019) used non-linear unit root tests of Leybourne, Newbold, and Vougas (1998), Kapetanios, Shin, and Snell (2003), Sollis (2004), Sollis (2009) and Omay, Emirmahmutoglu, and Hasanov (2017) to compile the convergence hypothesis in Turkey's tourism sector with monthly data from 2008-2018 examined and aimed to determine whether there is any convergence among the 25 countries it deals with in the international tourism sector. According to the findings of this study, in the non-linear unit root tests, the number of tourists from Germany, Belgium, and China is not stationary, and there is no stochastic convergence with these countries, 4 of the 25 countries considered according to the ADF test, which is the linear unit root test and (Austria, China, Saudi Arabia, and Greece), but not with the other 21 countries.

Fendoğlu and Gökçe (2019) examined the stagnation of Turkey's monthly tourism income series covering the period 2012-2019. The findings obtained as a result of the Fourier unit root test show that the monthly data of Turkey for the period of 2012-2019 are stationary. Yalçınkaya and Yazgan (2020) examined the convergence hypothesis with the Fourier unit root tests within the scope of time series analysis by considering the 1996 -2018 period for 97 international tourism markets of Turkey. In line with the study's findings, they concluded that Turkey converges to 53 of the international tourism markets and not to 44 of them.

Pshenichnykh, Yakimenko, and Zhertovskaja (2020) examined the convergence hypothesis for the main countries with tourist flows to Russia. They followed the existing documentation by applying a unit root test between the total number of international tourist arrivals and international tourists from a particular starting market to test the convergence hypothesis. As a result of the study, it is seen that Russia converges in the tourism market in the long term. Konat et al. (2021) examined whether there is convergence for tourism revenues by using the two-regime autoregressive (TAR) model in the test conducted with the non-linear panel unit root test with the annual data of MINT countries for the period 1995-2019. According to the findings obtained from the study, they concluded that the analyzed series was non-linear, and according to the TAR panel unit root test, Mexico was the transition country between the two regimes. The series has been stationary both in the first and the second regimes and in the regimes taken together. While there is relative convergence in the first regime and the regime discussed together, there is absolute convergence in the second regime.

When the studies in the literature are evaluated in aggregate, a country or group of countries are discussed. In this study, unlike the literature, the convergence hypothesis for eight groups (Africa, America, Asia, Europe, Independent States, OECD, Oceania, and Non-Nationals) determined by TUIK according to the nationalities of the individuals was tested with the Furuoka unit root test. The Fourier-based Furuoka unit root test examines the series with four alternative methods. In this context, it is thought that the analysis of eight groups determined by TUIK according to the nationalities of individuals with the Furuoka unit root test will contribute to the literature.

3. Methodology and Data Set

In the study, the validity of the convergence hypothesis was tested for foreigners and citizens entering Turkey. The data of foreigners and citizens who enter covers the period 2000-2020 annually and have been obtained from the official database of TURKSTAT. In this context, analyzes were carried out over eight groups determined by TUIK according to the nationalities of individuals. For the analysis, first, the logarithm of the data belonging to the country groups was taken. Taking the logarithm process, the growth becomes linear when the logarithm of the series exhibiting an exponential growth in level is taken. By taking the logarithm, the variance stabilizes, and the effects of outlier observations decrease (Türe and Akdi, 2005, s. 6). After taking the logarithm of the variables, the Fourier-based unit root test developed by Furuoka (2017) was used to validate the tourism convergence hypothesis. This test examines the quality of the series using four alternative methods. We also present the time paths of the series with the Fourier approximations in Appendix I.

Table 2: Descriptive Statistics

	Africa	America	Asia	Europe	Independent States	OECD	Oceania	Non-National
Mean	12.94	11.66	14.40	14.66	15.39	16.30	6.19	10.22
Median	12.96	11.81	14.37	14.68	15.55	16.39	6.05	10.17
Maximum	14.17	12.74	15.53	15.41	16.39	16.70	8.45	11.47
Minimum	12.05	10.26	13.38	13.82	14.13	15.16	5.14	9.27
Std. Dev.	0.69	0.76	0.68	0.389	0.67	0.39	0.82	0.61
Skewness	0.16	-0.52	-0.00	-0.37	-0.51	-1.29	1.30	0.28
Kurtosis	1.67	2.05	1.83	3.17	2.25	4.47	4.47	2.45
Jarque-Bera	1.63	1.74	1.18	0.52	1.41	7.79	7.87	0.54
Probability	0.44	0.41	0.55	0.77	0.49	0.02**	0.01**	0.76

Descriptive statistics of the variables are given in Table 3. The standard deviation in the table represents the volatility value of the variables. This value has been found most often in America. The skewness value expresses the asymmetric distribution of variables, and this value is found to be skewed to the right for Africa, Oceania, and the Non-Nationals, while it is skewed to the left for America, Asia, Europe, the Independent States, and the OECD. The kurtosis value indicates the tail distribution for variables. While this value is flat for Africa, America, Asia, the Independent States, and non-nationals, it is flat for Europe, the OECD and Oceania. In Jarque-Bera normality analysis, the null hypothesis states that the series has a normal distribution, while the alternative hypothesis states that the series is not normally distributed. Considering the probability values for country groups, it is seen that the null hypothesis is rejected because OECD and Oceania are lower than the significance level, and these country groups do not have a normal distribution. Other country groups were found to have a normal distribution.

3.1. Fourier Based Furuoka (2017) Unit Root Test

Four different econometric methods to analyze data, namely Augmented Dickey-Fuller (ADF) test, Fourier Augmented Dickey-Fuller (FADF) test, Augmented Dickey-Fuller Structural Break (ADF-SB) test, and Fourier Augmented Dickey-Fuller Structural Break (FADF-SB) test has been applied. The first applied test is the ADF test, a standard linear unit root test proposed by Dickey and Fuller (1979). The ADF test takes into account neither non-linear structures nor structural breaks. The second test applied is the FADF test, and it is a non-linear unit root test proposed by Enders and Lee (2012). This test is an improved version of the ADF test. The significance of this test is that it takes into account nonlinearity using the Fourier approximation. The third method is the ADF-SB test, and Perron and Vogelsang (1992). The ADF-SB test takes into account a structural break. The fourth and last statistical method used in this study is the FADF-SB test. This test is an extended version of the FADF test. The significant advantage of this test is that it takes both non-linear structures into account and

structural breakage into account. The null hypothesis for these four tests is defined as follows:

$$y_t = \alpha + y_{t-1} + \varepsilon_t \quad (1)$$

where α is the deterministic term and ε_t is the error term. Furuoka (2017) considered the following four alternative hypotheses in his study:

$$y_t = \alpha + \beta t + \varepsilon_t \quad (2)$$

$$y_t = \alpha + \beta t + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + \varepsilon_t \quad (3)$$

$$y_t = \alpha + \beta t + \delta DU_t + \theta D(T_B)_t + \varepsilon_t \quad (4)$$

$$y_t = \alpha + \beta t + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + \delta DU_t + \theta D(T_B)_t + \varepsilon_t \quad (5)$$

Where t is the time trend. β represents the slope parameter for the trend, T is the sample size, γ_1 and γ_2 are the slope parameter (i.e., the Fourier coefficients) for the trigonometric terms, and $\pi = 3.1416$ and k represents the frequency value for the Fourier approximation. δ is the slope parameter of the dummy variable with a structural break, where $t > T_B$, $DU_t = 1$, otherwise 0. When a structural break occurs, the breakpoint is T_B. θ is the slope parameter for $D(T_B)_t$. If $t = T_B$, then takes the value of $D(T_B)_t = 1$, otherwise, it is 0.

As can be seen from all four equations, only the deterministic term and the deterministic trend are added to the ADF test called Model A. In addition to deterministic components, non-linear trigonometric terms are included in the FADF test, called Model B. Dummy variables for structural breaks and a dummy variable for the one-time break are included in the ADF-SB test, called Model C. Finally, these four deterministic components, called Model D, were included in the FADF-SB test. The estimation of these four equations is as follows:

Model A:

$$\Delta y_t = \alpha + \beta t + \rho y_{t-1} + \sum_{i=1}^{p} c_i \Delta y_{t-i} + \varepsilon_t \quad (6)$$

Model B:

$$\Delta y_t = \alpha + \beta t + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + \rho y_{t-1} + \sum_{i=1}^{p} c_i \Delta y_{t-i} + \varepsilon_t \quad (7)$$

Model C:

$$\Delta y_t = \alpha + \beta t + \delta DU_t + \theta D(T_B)_t + \rho y_{t-1} + \sum_{i=1}^{p} c_i \Delta y_{t-i} + \varepsilon_t \quad (8)$$

Model D:

$$\Delta y_t = \alpha + \beta t + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + \delta DU_t + \theta D(T_B)_t + \rho y_{t-1} + \sum_{i=1}^{p} c_i \Delta y_{t-i} + \varepsilon_t \quad (9)$$

where ρ is the slope parameter for the dependent variable with lag, c is the slope parameter for the first lagged difference of the dependent variable and p is the lag length.

In these four models, the null hypothesis using the t statistic for $\rho = 0$ is tested. Under the null hypothesis, y_t is a random walk model, so if $\rho = 0$, the series is not stationary if the null hypothesis cannot be rejected. For ease of calculation, the optimal lag length ($\tilde{p}$) is taken as one for the four models, and the maximum frequency (k_{max}) for Model B and Model D is taken as two. The FADF test method selected the optimal frequency ($\tilde{k}$) in Model B by minimizing the residual sum of squares in the equation (Enders and Lee, 2012, 196-199). The optimal break position ($\tilde{\lambda}$) in Model C has been chosen by minimizing the ADF-SB statistic τ_{DFS}. The breaking position is calculated as follows:

$$\lambda = \frac{T_B}{T} \quad (10)$$

The optimal breaking position is chosen endogenously. Model D represents the FADF-SB procedure. In the FADF-SB procedure, it is crucial to consider the FADF-SB statistic (τ_{FDFS}). It is sensitive to both breaking position (λ) and frequency (k). Furuoka (2017) uses the standard F test proposed by Enders and Lee (2012) to select the most suitable model among four alternative models. F-statistic is as follows:

$$F = \frac{(SSR_0 - SSR_1)/q}{SSR_1/(T-s)} \quad (11)$$

where SSR_1 represents the residual sum of squares from the unrestricted model, SSR_0 represents the residual sum of squares from the restricted model, q is the number of restrictions, and s is the number of parameters in the unrestricted model.

4. Empirical Results

The validity of the convergence hypothesis for foreigners and citizens entering Turkey has been tested with the unit root test proposed by Furuoka (2017). The fact that the studied variable is stationary indicates that the convergence hypothesis is valid; the unit root indicates that the convergence hypothesis is not valid. Fourier-based unit root test results are presented in the tables below.

Table 3: Furuoka (2017) Unit Root Test Results

Africa		**Critical Values**		
		%1	**%5**	**%10**
ADF (ADF test Model A, τ_{DF} statistics)	-2.73	-4.17	-3.48	-3.19
FADF (Fourier ADF test Model B, τ_{FDF} statistics)	-2.59[1]	-5.13	-4.44	-4.10
F1 statistics (Model A versus Model B)	2.14	14.05	10.21	8.81
ADF-Structural Break (ADF-SB) test: Model C τ_{DFS} statistics	-4.22** (2011,0.57)	-4.51	-3.74	-3.42
F2 statistic (Model A versus Model C)	4.67*	8.29	5.23	4.10
Fourier ADF-Structural Break (FADF-SB) test: Model D τ_{FDFS} statistics	-5.29[1]** (2019,0.95)	-5.45	-4.70	-4.32
F3 statistic (Model A versus Model D)	6.91	9.56	6.49	5.71
F4 statistic (Model B versus Model D)	9.31	8.18	5.32	4.09
F5 statistic (Model C versus Model D)	13.7	10.90	7.79	6.36
America		**Critical Values**		
		%1	**%5**	**%10**
ADF (ADF test Model A, τ_{DF} statistics)	-2.73	-4.17	-3.48	-3.19
FADF (Fourier ADF test Model B, τ_{FDF} statistics)	-4.62[1]**	-5.13	-4.44	-4.10
F1 statistics (Model A versus Model B)	7.41	14.05	10.21	8.81
ADF-Structural Break (ADF-SB) test: Model C τ_{DFS} statistics	-4.84*** (2005,0.28)	-4.56	-3.86	-3.51
F2 statistic (Model A versus Model C)	17.9	8.69	5.74	4.39
Fourier ADF-Structural Break (FADF-SB) test: Model D τ_{FDFS} statistics	-7.03[1]*** (2005,0.28)	-5.45	-4.70	-4.36
F3 statistic (Model A versus Model D)	19.2***	9.39	6.91	5.66
F4 statistic (Model B versus Model D)	16.1***	8.15	5.14	3.88
F5 statistic (Model C versus Model D)	21.3***	10.76	7.41	6.03
Asia		**Critical Values**		
		%1	**%5**	**%10**
ADF (ADF test Model A, τ_{DF} statistics)	-2.20	-4.17	-3.48	-3.19
FADF (Fourier ADF test Model B, τ_{FDF} statistics)	-3.02[2]	-4.85	-4.14	-3.75
F1 statistics (Model A versus Model B)	3.62	10.38	6.89	5.24
ADF-Structural Break (ADF-SB) test: Model C τ_{DFS} statistics	-3.51 (2012,0.61)	-4.55	-3.85	-3.51
F2 statistic (Model A versus Model C)	4.58*	8.41	5.50	4.24
Fourier ADF-Structural Break (FADF-SB) test: Model D τ_{FDFS} statistics	-3.71[2] (2019,0.95)	-5.24	-4.52	-4.15

Table 3: Furuoka (2017) Unit Root Test Results (Cont.)

F3 statistic (Model A versus Model D)	7.88**	8.14	5.71	4.71
F4 statistic (Model B versus Model D)	8.52**	10.87	6.91	5.44
F5 statistic (Model C versus Model D)	3.27	9.24	6.29	5.00
Europe		**Critical Values**		
		%1	**%5**	**%10**
ADF (ADF test Model A, τ_{DF} statistics)	0.005	-4.17	-3.48	-3.19
FADF (Fourier ADF test Model B, τ_{FDF} statistics)	-3.77[1]	-5.13	-4.44	-4.10
F1 statistics (Model A versus Model B)	17.3***	14.05	10.21	8.81
ADF-Structural Break (ADF-SB) test: Model C τ_{DFS} statistics	-1.55 (2015,0.76)	-4.55	-3.85	-3.42
F2 statistic (Model A versus Model C)	3.65	8.41	5.50	4.24
Fourier ADF-Structural Break (FADF-SB) test: Model D τ_{FDFS} statistics	-3.86[1] (2015,0.76)	-5.39	-4.70	-4.36
F3 statistic (Model A versus Model D)	8.89**	9.27	6.92	5.79
F4 statistic (Model B versus Model D)	0.852	9.00	5.54	4.21
F5 statistic (Model C versus Model D)	7.03*	10.68	7.70	6.32
Independent States		**Critical Values**		
		%1	**%5**	**%10**
ADF (ADF test Model A, τ_{DF} statistics)	-2.88	-4.17	-3.48	-3.19
FADF (Fourier ADF test Model B, τ_{FDF} statistics)	-5.28[1]***	-5.13	-4.44	-4.10
F1 statistics (Model A versus Model B)	8.52	14.05	10.21	8.81
ADF-Structural Break (ADF-SB) test: Model C τ_{DFS} statistics	-3.68* (2005,0.28)	-4.56	-3.86	-3.51
F2 statistic (Model A versus Model C)	2.47	8.69	5.74	4.39
Fourier ADF-Structural Break (FADF-SB) test: Model D τ_{FDFS} statistics	-8.73[2]*** (2015,0.76)	-5.37	-4.49	-4.10
F3 statistic (Model A versus Model D)	18.1***	8.00	5.67	4.60
F4 statistic (Model B versus Model D)	13.5***	10.31	6.64	5.14
F5 statistic (Model C versus Model D)	34.6***	9.13	6.05	4.84
OECD		**Critical Values**		
		%1	**%5**	**%10**
ADF (ADF test Model A, τ_{DF} statistics)	-0.895	-4.17	-3.48	-3.19
FADF (Fourier ADF test Model B, τ_{FDF} statistics)	-5.49[1]***	-5.13	-4.44	-4.10
F1 statistics (Model A versus Model B)	17.7***	14.05	10.21	8.81
ADF-Structural Break (ADF-SB) test: Model C τ_{DFS} statistics	-5.77*** (2016,0.81)	-4.48	-3.85	-3.51

Table 3: Furuoka (2017) Unit Root Test Results (Cont.)

F2 statistic (Model A versus Model C)	22.1***	8.42	5.20	4.03
Fourier ADF-Structural Break (FADF-SB) test: Model D τ_{FDFS} statistics	-10.9[1]*** (2016,0.81)	-5.45	-4.70	-4.32
F3 statistic (Model A versus Model D)	42.5***	9.56	6.49	5.71
F4 statistic (Model B versus Model D)	20.8***	8.18	5.32	4.09
F5 statistic (Model C versus Model D)	60.1***	10.90	7.79	6.36
Oceania		**Critical Values**		
		%1	**%5**	**%10**
ADF (ADF test Model A, τ_{DF} statistics)	-2.03	-4.17	-3.48	-3.19
FADF (Fourier ADF test Model B, τ_{FDF} statistics)	-2.87[2]	-4.85	-4.14	-3.75
F1 statistics (Model A versus Model B)	5.82**	8.29	5.23	4.10
ADF-Structural Break (ADF-SB) test: Model C τ_{DFS} statistics	-3.55* (2009,0.47)	-4.51	-3.85	-3.48
F2 statistic (Model A versus Model C)	5.65	10.38	6.89	5.24
Fourier ADF-Structural Break (FADF-SB) test: Model D τ_{FDFS} statistics	-4.19[1] (2009,0.47)	-5.44	-4.70	-4.36
F3 statistic (Model A versus Model D)	9.40**	9.41	6.89	5.80
F4 statistic (Model B versus Model D)	7.75**	8.77	5.49	4.11
F5 statistic (Model C versus Model D)	17.9***	10.84	7.90	6.57
Non-National		**Critical Values**		
		%1	**%5**	**%10**
ADF (ADF test Model A, τ_{DF} statistics)	-1.20	-4.17	-3.48	-3.19
FADF (Fourier ADF test Model B, τ_{FDF} statistics)	-4.26[1]*	-5.13	-4.44	-4.10
F1 statistics (Model A versus Model B)	10.3*	14.05	10.21	8.81
ADF-Structural Break (ADF-SB) test: Model C τ_{DFS} statistics	-3.04 (2006,0.33)	-4.56	-3.86	-3.51
F2 statistic (Model A versus Model C)	5.62*	8.69	5.74	4.39
Fourier ADF-Structural Break (FADF-SB) test: Model D τ_{FDFS} statistics	-6.77[1]*** (2014,0.71)	-5.39	-4.70	-4.36
F3 statistic (Model A versus Model D)	15.5***	9.27	6.92	5.79
F4 statistic (Model B versus Model D)	9.28***	9.00	5.54	4.21
F5 statistic (Model C versus Model D)	31.0***	10.68	7.70	6.32

Note: Numbers in square brackets indicate the optimum frequency. Numbers in parentheses indicate the breaking point (TB) and the break position (**λ**). ***, ** and * indicate the significance level at 1%, 5% and 10% levels, respectively.

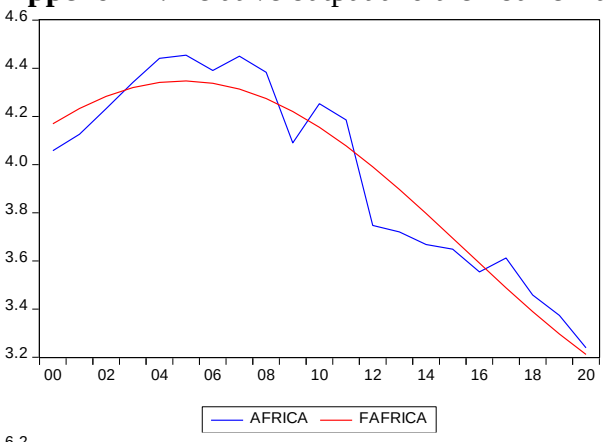
According to the results obtained from the traditional ADF unit root tests, it seems that there is no convergence. According to the FADF test, it is seen that the convergence is valid for America, the OECD, non-nationals and independent states. According to the ADF-SB test, it is seen that the convergence is valid for Africa, America, the Index states, the OECD, Oceania. For the FADF-SB test results, it is seen that the convergence is not valid for Asia, Europe, and Oceania. The F-test results showed that the FADF-SB test, in other words Model D, is the most suitable method among the four proposed alternatives.

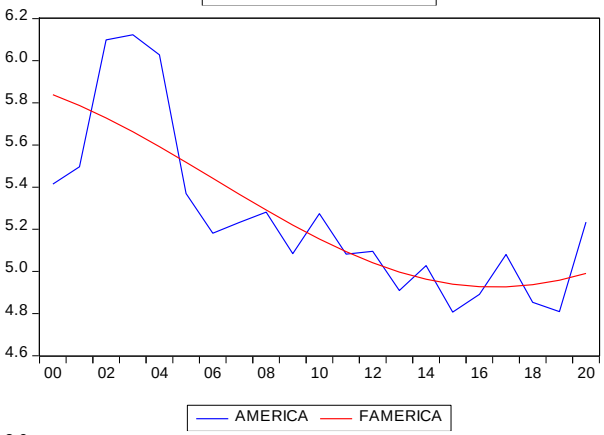
5. Conclusion

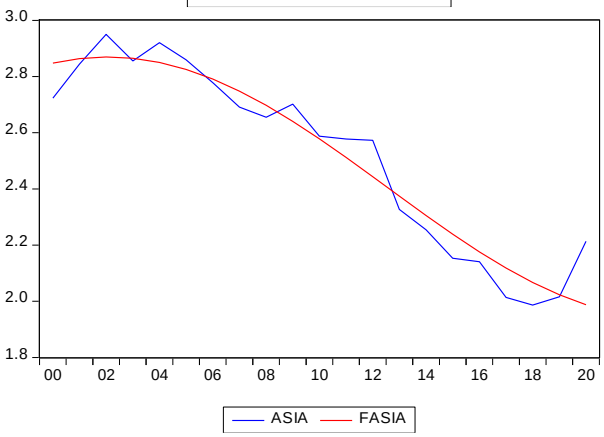
Developments in the tourism sector and increasing demand have made it necessary for countries to develop strategies to attract more tourists from the tourism markets. Turkey occupies an important position in the world in terms of tourism. Developments of the tourism sector in the country's development have made it necessary to examine this issue. In this study, the validity of the convergence hypothesis was tested for foreigners and citizens entering the country in Turkey, which has an important place in the world in tourism. The data of the foreigners and citizens who enter annually covers the period 2000-2020 and has been obtained from the official database of TUIK. In this context, analysis was carried out over eight groups (Africa, America, Asia, Europe, Independent States, OECD, Oceania, and Non-Nationality) determined by TUIK according to the nationalities of individuals. For the analysis, first, the logarithm of the data belonging to the country groups was taken. Taking the logarithm process, the growth becomes linear when the logarithm of the series exhibiting an exponential growth in level is taken. After taking the logarithm of the variables, the Fourier-based unit root test developed by Furuoka (2017) was used to validate the tourism convergence hypothesis. This test examines the quality of the series using four alternative methods. According to the result of the unit root test developed by Furuoka (2017), which was used to test the validity of the convergence hypothesis, it was found that Model D is the most suitable method among the four proposed alternatives. Accordingly, it is seen that convergence is not valid for Asia, Europe, and Oceania, while it is concluded that convergence is valid for America, the OECD, non-national, independent states and Africa. It reveals that the convergence of the policies implemented in Turkey and the current tourism policies followed in international tourism markets is relatively valid. In this context, Turkey needs to keep up with meeting the changing demand in the world. Tourism should be transformed into a structure that covers not only certain periods but also all areas. It is expected that incentives and investments to be provided to tourism will contribute to the development of this sector. For this purpose, policies that will contribute to the development of the tourism sector should be implemented. Turkey displays an advantageous structure in terms of tourism. It attracts the attention of tourists due to its four seasons, its historical richness, and the natural structure it preserves. Tourism should be developed to

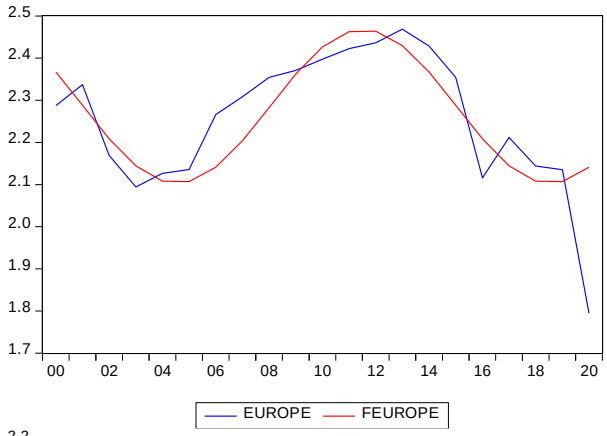
cover many areas. Also, tourists should be encouraged to come to Turkey, and holiday programs should be made attractive. In this context, the promotion of Turkey should be created within the framework of the right policies.

Appendix I: Relative output and the Fourier functions








2.5
2.4
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2.2
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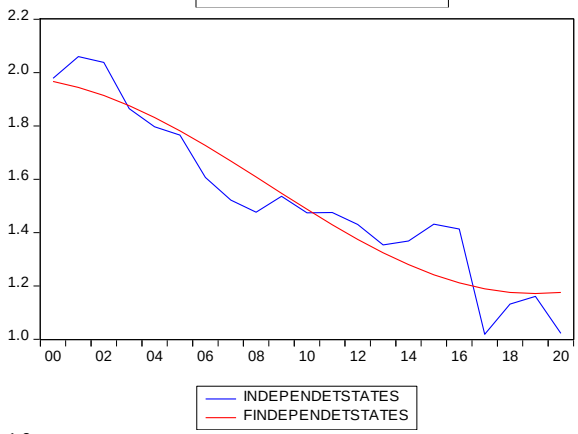
EUROPE
FEUROPE


2.2
2.0
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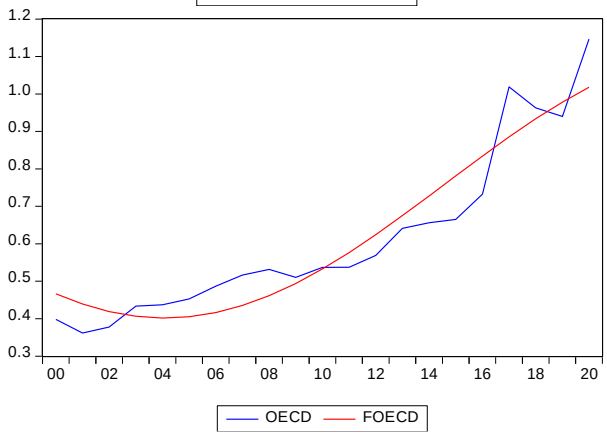
INDEPENDETSTATES
FINDEPENDETSTATES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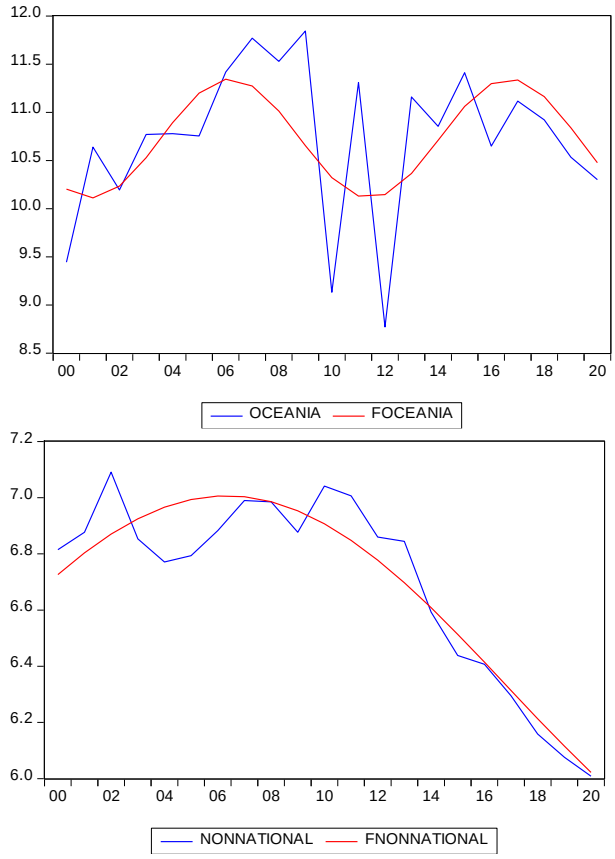

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