

-RESEARCH ARTICLE-

**CLIOMETRIC ANALYSIS OF SECTORAL EMPLOYMENT-FREE  
GROWTH IN TURKEY BEFORE 1980: FOURIER EVIDENCE**

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**Abstract**

*Cliometric analysis refers to the use of econometric analysis tools to study the connection between variables in a certain era, in addition to they have historical significance and seek to offer information about the period. The aim of the study is to examine the period that started after the proclamation of the Republic until the 1980 coup, which can be described as the crisis period. Therefore, the republican period between 1923 and 1980 will be subjected to cliometric analysis in this The variables to be analysed in the study are sectoral employment data taking into account agriculture, industry and services sectors and GDP data defining economic growth. By examining the relationship between variables, the existence of jobless growth will be tested on a sectoral basis, and the data sets will be examined in two separate analyses. The tests to be applied in the study will be carried out by applying both traditional analysis methods and new generation analysis methods. The first of the tests to be applied in the study can be expressed as the traditional Augmented Dickey Fuller (ADF) unit root test and the Fourier Granger Causality test to determine the causality relationship between variables. The use of the Fourier analysis method, which is among the new generation analysis methods, in the applied tests shows that the study will contribute to the literature. When the Augmented Dickey Fuller test results are examined, it is seen that the independent variables consisting of agriculture, industry and service sectors and the dependent variable consisting of the growth rate each contain unit roots at their level values but are purified from the unit root as a result of taking the first order difference. The results obtained from the Fourier Granger causality test of the study show that growth without employment was valid in the service sector between 1923 and 1980, while growth without employment was invalid in the agricultural and industrial sectors.*

**Keywords:** *Growth Without Employment, Cliometric Analysis, Fourier, Türkiye.*

**JEL Codes:** *E24, O47.*

**Başyuru:** 23.10.2023      **Kabul:** 26.01.2024

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## 1980 ÖNCESİ TÜRKİYE'DE SEKTÖREL İSTİHDAMSIZ BÜYÜMENİN KLİOMETRİK ANALİZİ: FOURIER KANITLARI<sup>4</sup>

### Öz

*Tarihi öneme sahip olmakla birlikte belirli bir dönemde değişkenler arası ilişkiyi inceleyen ve dönem hakkında bilgi verme amacı güden çalışmalarda ilgili değişkenlerin, ekonometrik analiz yöntemlerinden yararlanılarak analiz edilmesine kliometrik analiz denilmektedir. Çalışmada Cumhuriyetin ilanı sonrası başlayan ve kriz dönemi olarak ifade edilebilecek 1980 darbesine kadar olan sürecin incelenmesi amaçlanmaktadır. Bu doğrultuda çalışmada, 1923-1980 dönemi arası cumhuriyet dönemi kliometrik analize tabii tutulacaktır. Çalışmada incelenecek değişkenler tarım, sanayi ve hizmet sektörlerini dikkate almak suretiyle sektörel istihdam verileri ve ekonomik büyümeyi tanımlamakta kullanılan GSYİH verileri olarak belirlenmiştir. Değişkenler arası ilişkinin incelenmesi ile istihdamsız büyümenin varlığı sektör bazında test edilecek olup veri setlerinin incelenmesi iki ayrı analize ile gerçekleştirilecektir. Çalışmada uygulanacak testler gerek geleneksel analiz yöntemleri gerekse yeni nesil analiz yöntemleri uygulanarak gerçekleştirilecektir. Çalışmada uygulanacak testlerden ilki geleneksel Augmented Dickey Fuller (ADF) birim kök testi ve değişkenler arası nedensellik ilişkisinin tespit edilmesi için Fourier Granger Nedensellik testi olarak ifade edilebilecektir. Uygulamaya tabii tutulan testlerde yeni nesil analiz yöntemleri arasında yer alan Fourier analiz yönteminden yararlanılması çalışmanın literatüre katkı sağlayacağını göstermektedir. Augmented Dickey Fuller test sonuçları incelendiğinde, tarım, sanayi ve hizmet sektörlerinden oluşan bağımsız değişkenler ile büyüme oranından oluşan bağımlı değişkenin her birinin düzey değerlerinde birim kök içerdiği ancak birinci dereceden farkın alınması sonucunda birim kökten arındırıldığı görülmektedir. Çalışmanın Fourier Granger nedensellik testi sonucunda elde edilen çıktılar ise; 1923-1980 yılları arasında hizmet sektöründe istihdamsız büyümenin geçerli olduğu, tarım ve sanayi sektörlerinde ise istihdamsız büyümenin geçersiz olduğunu göstermektedir.*

**Anahtar Kelimeler:** *İstihdamsız Büyüme, Kliometrik Analiz, Fourier, Türkiye.*

**JEL Kodları:** *E24, O47.*

“Bu çalışma Araştırma ve Yayın Etiğine uygun olarak hazırlanmıştır.”

### 1. INTRODUCTION

Economic growth is defined as an increase in a country's GDP due to increased production activity in its economy. Improving the country's production capacity and providing added value is expressed as economic growth. Increasing the amount of production is not enough for economic development, it is also important to ensure social welfare. There is a long-term and comprehensive development here. Therefore,

<sup>4</sup> Genişletilmiş Türkçe Özet, makalenin sonunda yer almaktadır.

high living standards, low unemployment rates, and a fair and regular increase in income levels for all segments of society are central to the economic goals of every country (Karataş & Ergül, 2023). In this view economic growth occurs with an increase in the production amount, both in the number of products and in the expansion of the product range, and it is expected to have an employment-increasing effect. With the realization of economic growth activity, the amount of production increased in the relevant year and after an increase in national income, a decrease in unemployment rates, an improvement in income distribution and an increase in general welfare are expected. The fact that economic growth has an important place for countries can be explained by the contribution of the increase in GDP to the decrease in unemployment rates. This can be explained by the fact that more goods and services production increases labour demand and reduces unemployment rates. At this point, the expectation can be expressed as an increase in the welfare of the country. The fact that economic growth does not have an impact on employment without providing the expected increase in employment creates the problem of growth without employment (Çaskurlu, 2014). The increase in the amount of production that provides economic growth increases employment in the workforce, positively affects existing working conditions and affects social development. Here, production does not have a positive impact on employment conditions. At this point, while all variables are constant, the impact of the workforce is within the expectation, and the impact levels can be determined by examining the issue within the economic order.necessitated its evaluation (Konukman & Tureli, 2010). If economic growth and production increase occur without any increase in the amount of labor - which can be expressed as productivity increase - employment will not be provided and growth without employment will occur.

The negative impact of growth without employment on economic development has enabled the subject to be addressed in many studies in the literature. It is important to examine economic growth, which has an important place in the macroeconomic field, and evaluate the positive impact it has on employment, which is within the expectations. At this point, the concept of without employment growth, which offers an output beyond expectations, has become the focus of new studies and has been evaluated among the topics referenced in the literature. When the studies are examined, it is observed that quantitative analysis methods are used more frequently in studies where the concept of GDP is taken into account when evaluating economic growth and the effect of the relevant variable on employment is examined. This situation can be explained by the fact that the existence of without employment can be tested by comparing the GDP variable with employment rates. When the studies in the literature were examined, it was determined that different tests were applied in quantitative studies examining the existence of without employment growth. When these tests are evaluated, cointegration tests, causality tests, etc. were observed. Among the tests identified, it was observed that the tests most frequently used in the literature were causality tests. In this regard, studies that carried out analysis using causality tests were examined within the literature.

While many studies found a causal relationship between unemployment and economic growth (Bölükbaş, 2018; Meyer and Sanusi, 2019; Uçan and Çebe, 2018), others could not find such a relationship and said that growth cannot exist without employment. Some academic studies (Abraham, 2019; Abubakar & Nurudeen, 2019; Bayrak, 2019; Eğri, 2018; Padhi & Panda, 2021; Türüoğlu, 2018) argue for the existence of without employment growth in the literature. The results obtained vary depending on factors such as the year range and sample considered.

When the analysis methods applied in the studies were examined, it was determined that causality tests were constructed using traditional analysis methods. Besides the use of traditional unit root tests, no academic study has been found in which the Granger Fourier analysis method, one of the new generation methods, is used to examine the relationship between economic growth and unemployment between 1923 and 1980. Cliometric analysis will be applied to test the existence of a relationship between variables and to examine the relationship between economic growth and employment rates in agriculture, industry and service sectors before 1980. Two separate tests will be applied within the study to determine the relationship between the variables and obtain output on whether there is growth without employment. In the study, Augmented Dickey Fuller (ADF) unit root test was used for unit root analysis and Fourier Granger Causality Test will be applied to determine the causality between the relevant variables.

After the introduction of the study, the scope and results of some academic studies examining the concept of without employment growth in the field are expressed, and then the methodology of the study is expressed. The results obtained as a result of the analysis will be presented in tables. In the last part of the study, the findings were interpreted, and an economic evaluation was carried out. This study contributes to the literature as it is the first study to present cliometric analysis by evaluating the relationship between economic growth and unemployment before 1980.

Although economic growth and economic development issues constitute the main subject of study in the field of macroeconomics, unemployment and employment are frequently discussed in the literature, prioritizing social development and welfare. Economic growth can be explained by measuring the increase in gross domestic product as a result of an increase in the amount of production, by increasing the demand for the workforce to carry out the relevant production and subsequently minimizing the unemployment problem.

More than one quantitative and qualitative study has been carried out on the relevant subject in the literature, and the factors that create without employment growth and the problems encountered after without employment growth are examined. When the studies were examined, (Uras, 2016) examined the unbalanced relationship between economic growth and unemployment between 2000 and 2014 and examined the causality relationship between the variables. Although the study cannot mention the existence of a two-way relationship between unemployment and economic growth, it does mention the existence of a relationship from unemployment to growth.

Another study takes the unemployment problem into consideration, considering it among the economic problems caused by economic growth. As a basis for examining the issue of growth without employment, the study was created using a quantitative analysis method; The unexpected level of relationship between economic growth and unemployment following the 2001 crisis is shown. Although the study was based on economic growth and unemployment rates determined from 1975 to 2008, it concluded that there was a causality relationship between the variables (Takim, 2015).

Another quantitative study (Özdemir & Yildirim, 2013), which is introduced to the literature to examine the period between 2005 and 2013 and evaluated the relationship between economic growth and unemployment, stated that there is a relationship between the variables, but a long-term relationship cannot be mentioned. Another study (Öztürk & Sezen, 2018) examining the relationship between economic growth and employment using a causality test states that there is a one-way causality relationship from economic growth to unemployment. Data between 2005 and 2017 were taken into account in the study, and it can be stated that growth that does not create employment is rejected based on the existence of a causality relationship.

Another study (Mihei & Atilgan, 2010) conducted an analysis based on the fact that the relationship between unemployment and economic growth has an inverse proportion as discussed in the arrow's law, and concluded that the economic climate changed as of the 2001 crisis and growth without employment increased. In his study, Bölükbaşı (2018) aimed to examine whether there was employmentless growth in Turkey for the years 2010-2017 by using econometric analysis methods. In the study, although var analysis and Granger causality test were applied, it was determined that there was a one-way relationship from economic growth to youth unemployment. Meyer & Sanusi (2019) conducted an analysis using quarterly data between 1995 and 2016 and applied causality analysis between variables. The test result applied within the study shows that there is a causality relationship from economic growth to investments.

Studies examining the relationship between unemployment and economic growth variables and detecting the existence of a causality relationship between the variables in different periods and in selected samples, and accordingly finding that there is no growth without employment (Bölükbaşı, 2018; Meyer & Sanusi, 2019; Uçan & Çebe, 2018); In addition, it was determined that there was no causality relationship between the variables and that there was growth without employment; More than one academic study is included in the literature (Abraham, 2019; Abubakar & Nurudeen, 2019; Bayrak, 2019; Eğri, 2018; Padhi & Panda, 2021; Türüoğlu, 2018).

When the studies in the literature are examined, it is observed that traditional tests are frequently used for studies in which the quantitative analysis method is applied, and no article has been found stating that the Fourier analysis method, which is among the new generation unit root tests, was studied for a cliometric examination on without employment growth before 1980. In this respect, it can be stated that this study differs

from other studies in the literature and contributes to the Fourier analysis method with its structure that minimizes the margin of error by including sine and cosine values in the analysis. Although there are many articles in the literature that examine the field, the fact that there is no study that comprehensively scans the subject as in this study and provides up-to-date output by using new generation analysis methods at this point explains the contribution of this study.

## 1. METHODOLOGY

It has been observed that the methods applied in the studies in the literature that examine the relationship between economic growth and employment and evaluate whether there is growth without employment are considered as quantitative analysis methods. When the studies in the literature are evaluated, it has been determined that traditional analysis methods are frequently used when examining growth without employment, and it is thought that a contribution to the literature can be made by using Fourier analysis, which is referred to as the new generation analysis method.

For this reason, in order to contribute to the literature, the Fourier analysis method, which is among the new generation unit root tests, will be used in the study. Although Fourier analysis was first applied in the literature by Jean Baptiste Joseph Fourier, who was active in the literature as a mathematician, the relationship between two variables in the literature is examined and it is used in economic approaches. The flexible Fourier form and Dickey–Fuller type was introduced to the literature by Enders & Lee in 2012. It is embodied in an academic study titled "unit root tests". The study was created by examining the relationship between two variables in macroeconomic analysis and applying the Dickey Fuller unit root test, which is important in determining whether the series contains a unit root (Enders & Lee, 2012). When critical values are taken into account in the study, values at significance levels are expressed and serve as a guide on how to interpret the test results.

Within the scope of the study, sectoral employment data of the agricultural industry and service sectors, which were determined in Turkey before 1980 and were discussed as of 1923, the year of the proclamation of the Republic, were constructed by using the data obtained from the study written by Şahin & Yildirim (2015). The sectoral data obtained in the study (Şahin & Yildirim, 2015) were calculated by the authors by obtaining the "Statistical Indicators 1923-2011-TURKSTAT" data. In this regard, the GDP variable, which represents economic growth, was compiled using the data pool of TURKSTAT and was included in the study by taking the logarithm of the data since the calculation was made at fixed prices.

In order to perform unit root analysis of the data in the study, the Augmented Dickey Fuller Unit Root Test Model, which includes both a trend and a constant term, was used, as well as the Augmented Dickey Fuller Unit Root Test Model, which includes a constant term. Formulas (1) and (2) can be expressed as the general formulation of the test.

$$\Delta Y_t = \alpha_0 + \lambda Y_{t-1} + \mu_t \quad (1)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \lambda Y_{t-1} + \mu_t \quad (2)$$

Another test to be applied within the scope of familiarization is the Fourier Granger Causality test in order to evaluate the causality relationship between the economic growth variable and sectoral employment rates. Granger causality test was first introduced to the literature with the study titled "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods", named after its author (Granger, 1969). Although the study has developed a suitable formulation for examining the causality relationship between variables, the relevant formulas are expressed in lines (3) and (4).

$$Y_t = \alpha_0 + \sum_{i=1}^{k1} \alpha_i Y_{t-i} + \sum_{i=1}^{k2} \beta_i X_{t-i} + \varepsilon_t \quad (3)$$

$$X_t = X_0 + \sum_{i=1}^{k3} x_i X_{t-i} + \sum_{i=1}^{k4} \delta_i Y_{t-i} + v_t \quad (4)$$

The Granger Causality test applied in the study will be applied in the study as its new generation version, the Fourier Granger causality test. The Fourier analysis method contributes to the examination of the relationship between variables by adding sine and cosine values to the formulation, minimizing the margin of error and providing a more accurate and healthy output. In addition, the fact that Fourier analysis is used relatively less frequently in the literature compared to traditional analysis methods increases the reliability of this study and explains its contribution.

Formulas (5) and (6) are expressed as Fourier Granger causality test formulas.

$$\beta(t) \cong \beta_0 + y_{1k} \sin\left(\frac{2\pi kt}{T}\right) + y_{2k} \cos\left(\frac{2\pi kt}{T}\right) \quad (5)$$

$$y_t = \beta_0 + y_{1k} \sin\left(\frac{2\pi kt}{T}\right) + y_{2k} \cos\left(\frac{2\pi kt}{T}\right) + \vartheta_1 y_{1t} + \dots + \vartheta_u y_{t-u} \quad (6)$$

The results obtained after applying the above formulas in the study will provide information on whether there is a causal relationship between the variables under examination and, if so, in which direction there is a relationship.

## 2. RESULTS

In the study, economic growth and sectoral unemployment rates between 1923, the date of the proclamation of the Republic, and 1980 were examined by subjecting them to unit root test and causality tests. Although the tests to be applied and the formulations of the tests are stated in the third section of the study, in this section the relevant tests are constructed after the application of the data obtained.

In this part of the study, Table 1 shows the descriptive statistics of the tests applied. In this regard, when table 1 is examined, the descriptive values of the tests to be applied in this study can be observed.

**Table 1. Descriptive Statistics**

	<b>Log-GDP</b>	<b>Agriculture</b>	<b>Industry</b>	<b>Service</b>
Mean	4.991978	77.14552	7.963276	14.89172
Median	4.663358	81.72	7.32	11.655
Maximum	7.715013	89.95	14.91	32.11
Minimum	3.47116	53.24	3.5	6.53
Std. Dev	1.499639	11.56371	3.398519	8.282826
Skewness	0.999401	-0.66567	0.637811	0.613048
Kurtosis	2.409253	2.06123	2.380756	1.929749

When Table 1 is examined; In addition to the economic growth (GDP) variables examined in the study, sectoral employment data (agriculture, industry, services) were examined. Above, the logarithmic value of GDP, which is the economic growth variable, and descriptive statistics of the values of the variables are expressed. Table 2 and table 3 show the unit root test results used in the study.

**Table 2. Fixed Term Augmented Dickey Fuller Unit Root Test Level Values**

	<b>Log-GDP</b>	<b>Agriculture</b>	<b>Industry</b>	<b>Service</b>
%1 Critical Value	-3,550396	-3,550396	-3,550396	-3,552666
$\Delta$ %1 Critical Value	-3,552666	-3,552666	-3,552666	-3,552666
%5 Critical Value	-2,913549	-2,913549	-2,913549	-2,914517
$\Delta$ %5 Critical Value	-2,914517	-2,914517	-2,914517	-2,914517
%10 Critical Value	-2,594521	-2,594521	-2,594521	-2,595033
$\Delta$ %10 Critical Value	-2,595033	-2,595033	-2,595033	-2,595033
ADF Stat.	-0,163512	3,926512	0,755263	1,775599
$\Delta$ ADF Stat.	-7,599942	-4,332042	-7,287849	-3,599283
Prob.	0,9367	1,0000	0,9924	0,9997
$\Delta$ Prob.	0,0000	0,0010	0,0000	0,0088

Table 2 shows the results of the constant term model of the Augmented Dickey Fuller Unit Root test. When the results of the constant term unit root test are evaluated, it is seen that the independent variables consisting of agriculture, industry and service sectors and the dependent variable consisting of the growth rate each contain a unit root at their level values, but are purified from the unit root as a result of taking the first order difference.

**Table 3. Fixed Term Augmented Dickey Fuller Unit Root Test First Difference Values**

	<b>Log-GDP</b>	<b>Agriculture</b>	<b>Industry</b>	<b>Service</b>
%1 Critical Value	-4,127338	-4,127338	-4,127338	-4,130526
$\Delta$ %1 Critical Value	-4,130526	-4,130526	-4,130526	-4,130526
%5 Critical Value	-3,490662	-3,490662	-3,490662	-3,492149



$\Delta\%5$ Critical Value	-3,492149	-3,492149	-3,492149	-3,492149
$\%10$ Critical Value	-3,173943	-3,173943	-3,173943	-3,174802
$\Delta\%10$ Critical Value	-3,174802	-3,174802	-3,174802	-3,174802
ADF Stat.	-1,958249	-0,804863	-1,511591	-1,341070
$\Delta$ ADF Stat.	-7,629195	-5,427635	-7,443017	-4,591007
Prob.	0,6110	0,9589	0,8141	0,8671
$\Delta$ Prob.	0,0000	0,0002	0,0000	0,0027

In addition to the unit root test, the Granger Causality test will be applied in the study to determine the relationship between variables, and the test will be carried out by applying the Fourier Granger Causality test, a new generation analysis method, to the data obtained.

**Table 4. Fourier Granger Causality Test**

	Wald Stat.	Asymptotic Probability Value	Bootstrap Probability Value	Frequency	Delay	Conclusion
Log-GDP—Agriculture	3,557*	0,059	0,068	1	1	Log-GDP→ Agriculture
Log-GDP—Industry	3,530*	0,060	0,058	3	1	Log-GDP→ Industry
Log-GDP—Service	1,824	0,177	0,187	1	1	Log-GDP— Service
Agriculture —Log-GDP	3,855*	0,050	0,061	1	1	Agriculture →Log-GDP
Industry—Log-GDP	13,285***	0,000	0,000	3	1	Industry→Log-GDP
Service—Log-GDP	2,387	0,122	0,132	1	1	Service— Log-GDP

**Note:** Bootstrap values were calculated with 1000 Bootstraps. The signs \*, \*\* and \*\*\* indicate significance at the 10%, 5% and 1% level, respectively.

Table 4 expresses the results of the Granger causality test, and when the test results were examined, a bidirectional causality relationship was detected from the Log-GDP value to the agriculture and industry sector variables. As a result of the applied test, when the Log-GDP value and the service sector variable were examined, no causality relationship was found between the variables. When the results are evaluated, it can be said that there is a growth without employment between the service sector and economic growth, since no causality relationship has been found.

### 3. DISCUSSION

The study is assessed by a rise in the sample country's output quantity, which is expressed as economic growth, and will be quantified by the gross domestic product (GDP) variable inside the research. GDP can be expressed as a variable that provides statistical output to determine the growth that occurs in the economy in a calendar year. Measuring the gross domestic product and then analysing it according to the

relevant year range is the basis of macroeconomic studies and provides output about the rate of economic growth. Against the economic growth variable, the other variable to be examined to evaluate the relationship is considered as sectoral employment data. Sectoral employment data was carried out to evaluate how effective the sectors under examination are in economic development and to determine what kind of relationship the sectors have with economic growth in the relevant country and in the selected year range. The sectors to be examined within the scope of the study are discussed in 3 separate groups.

These variables are identified as agriculture, industry and service sectors. By examining the relationship between these variables discussed in the study, it was evaluated in which sectors the existence of without employment growth could be mentioned. For the intended determination, firstly, the Augmented Dickey Fuller unit root test, which is the most frequently used in the literature and determines whether the series of variables contain a unit root, and the Fourier Granger causality test, which is among the new generation analysis methods examining the causality relationship between these variables, were applied.

The tests applied examine the period between 1923 and 1980, which is the period covered in the study, and the fact that there is no study examining the relevant year with similar methods in the literature contributes to the literature. When the study was carried out, employmentless growth was detected between the service sector and economic growth. In this regard, although there was growth in the service sector between 1923 and 1980, the economic growth did not have a positive effect on employment. In this regard, it can be stated that the change in the economy does not have an impact on the sector. This study may serve as a guide for researchers who will conduct an economic analysis of the relevant period.

## **CONCLUSION**

Cliometric analysis is a type of analysis created by examining a period of historical importance, and this study was created to examine the data set of variables after 1923, which is referred to as the post-Republican period. The year range in the study started from 1923 and was considered until 1980. Within the scope of the study, a macroeconomic analysis was carried out, the GDP variable was taken into account as a descriptor of economic growth, and data from the agriculture, industry and service sectors were taken into account for the sectoral employment analysis. The sectoral data to be examined was constructed using the data obtained from the study written by Şahin & Yildirim (2015).

When the test to be applied for the study is evaluated by examining the studies in the literature, it is observed that quantitative analysis methods are frequently used in the literature. This can be achieved by comparing GDP and employment rates, which are statistically published as economic growth indicators. At this point, the test to be applied in the study needs to evaluate whether there is a relationship between the variables. While detecting a relationship between the increase in GDP and sectoral

employment data shows that there is no growth without employment, the absence of a relationship between the variables shows the existence of growth without employment.

The study aimed to determine whether there was employment-free growth between the years considered by evaluating the causality relationship between the variables. Based on the relevant purpose, two separate tests have been applied, and the first of these tests is the Augmented Dickey Fuller Unit Root test, which is among the unit root tests and the most used test in the literature.

Following the unit root test, the relationship between economic growth and sectoral employment needs to be tested by testing the existence of employmentless growth. The causality test to be applied in the study to determine the causality relationship is the granger causality test, and instead of the traditional version of the test, the version that examines sine and cosine values will be applied. In order to benefit from the Fourier Granger analysis method, it is necessary to first test the stationarity of the series by evaluating the unit root analysis results. At this point, after determining the same level of stationarity, Granger causality will be applied. In this direction, the Fourier Granger Causality Test, which is an improved version of the Granger Causality test introduced to the literature by Granger (1969) with Fourier functions, was applied. According to the unit root test results, all variables were found to be stationary at first difference levels. According to the results of the Fourier causality test applied, a bidirectional causality relationship was found between employment and growth in the agricultural and industrial sectors. No causal relationship was found between service sector employment and economic growth.

The results obtained from the research, which was carried out as a result of the application of new generation analysis methods and thought to contribute to the literature, show the following. Before 1980, the service sector was of little or no importance to the Turkish economy. However, from the first years of the Republic, when the agricultural economy was dominant, until 1980, there was a strong relationship between the agricultural and industrial sectors and economic growth.

## 1980 ÖNCESİ TÜRKİYE'DE SEKTÖREL İSTİHDAMSIZ BÜYÜMENİN KLİOMETRİK ANALİZİ: FOURIER KANITLARI (GENİŞLETİLMİŞ ÖZET)

### 1. GİRİŞ

Kliometrik Analiz, tarihsel bir döneme ilişkin analiz yapmak amacıyla gerçekleştirilmektedir. İki değişken arasındaki ilişkiyi inceleyen bu tarihsel analiz yönteminde, ilgili döneme ilişkin fikir edinmek amacıyla ekonometrik yöntemler kullanılmaktadır. Çalışmanın amacı Cumhuriyetin ilanından sonra başlayan ve kriz dönemi olarak tanımlanabilecek 1980 darbesine kadar olan dönemi incelemektir. Örneklem olarak seçilen dönem, yeni bir siyasi ve ekonomik dönemin başlangıcını temel almakta ve siyasi ve ekonomik bir krizle sonuçlanmaktadır. Bu bağlamda

çalışmada 1923-1980 yılları arasındaki cumhuriyet döneminin kliometrik analize tabi tutulacağı ifade edilebilir. Çalışma kapsamında seçilen örneklem için istihdamsız büyüme hipotezinin geçerliliğinin tespit edilmesi amaçlanmaktadır. Çalışma kapsamında seçilen örneklem için istihdamsız büyümenin geçerliliği belirlenecektir. Bu bağlamda çalışmada sektörel istihdam değişkenleri ve ekonomik büyüme değişkenleri incelenecektir. Ekonomik büyüme, bir ülkenin bir takvim yılında üretim miktarındaki artışla ölçülmekte olup, literatürde ülkenin gayri safi yurtiçi hasılasının üretim yoluyla artması ölçüm yöntemine temel teşkil etmektedir. Çalışmada ilgili ölçümü gerçekleştirmek için Gayri Safi Yurtiçi Hasıla verilerinden yararlanılacaktır. İncelenecek bir diğer değişken ise tarım, sanayi ve hizmet sektörlerini içerisine almaktadır. Çalışmada ekonomik büyümeyi incelemek için GDP verileri kullanılacaktır. İstihdam verilerinin sektörel bazda değerlendirilmesi ile 1923-1980 döneminde ekonomideki büyüme ve üretim artışının istihdam düzeyindeki değişiminin belirlenmesi ve hangi sektörün istihdam olmadan büyüme yaşadığını değerlendirmek amacı güdülmektedir.

## 2. YÖNTEM

Değişkenler arasındaki ilişki incelenerek istihdamsız büyümenin varlığı sektörel bazda test edilecek ve veri setleri iki ayrı analizde incelenecektir. Çalışmada uygulanacak testler hem geleneksel analiz yöntemleri hem de yeni nesil analiz yöntemleri uygulanarak gerçekleştirilecektir. Çalışmada uygulanacak testlerden ilki, değişkenler arasındaki nedensellik ilişkisini belirlemeye yönelik geleneksel Genişletilmiş Dickey Fuller (ADF) birim kök testi ve Fourier Granger Nedensellik testi olarak ifade edilebilir. Çalışmada birim kök analizi uygulamak için Genişletilmiş Dickey Fuller Birim kök analizi serinin hem trend gem de sabit terim içerdiği varsayımı altında gerçekleştirilecektir. Granger Nedensellik Testi literatüre ilk kez "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods", isimli çalışma ile kazandırılmıştır.

## 3. TARTIŞMA

Uygulanan Granger Nedensellik testinde yeni nesil analiz yöntemlerinden Fourier analiz yönteminin kullanılması, çalışmanın literatüre katkı sağlayacağını göstermektedir.

## 4. SONUÇ

Artırılmış Dickey Fuller testi sonuçları incelendiğinde, bağımlı değişken olan büyüme hızı ile bağımsız değişkenler olan tarım, sanayi ve hizmet sektörlerinin her birinin kendi düzey değerlerinde birim köklere sahip olduğu gözlemlenmiştir ve bu doğrultuda seri birinci derece farkı alınarak birim kökten arındırılmıştır. İstihdamsız büyümenin tespiti amacıyla yapılan çalışmada uygulanan Fourier Granger nedensellik testi sonucunda elde edilen çıktılar, istihdamsız büyümenin 1923-1980 yılları arasında hizmet sektöründe geçerli olduğunu, göstermektedir. Buna ek olarak tarım ve sanayi sektörlerinde istihdamsız büyüme hipotezi geçersizdir.

## REFERENCES

- Abraham, V. (2019). Jobless Growth Through the Lens of Structural Transformation. *Indian Growth And Development Review*, 12(2), 182–201. <https://doi.org/10.1108/IGDR-07-2018-0077>
- Abubakar, J., & Nurudeen, I. (2019). Economic Growth in India, Is It a Jobless Growth? An Empirical Examination Using Okun's Law. *The Indian Journal of Labour Economics*, 62(2), 307–317. <https://doi.org/10.1007/s41027-019-00165-w>
- Bayrak, S. (2019). Ekonomik Büyüme, İstihdam ve İşsizlik İlişkisi: Geniş Tanımlı İşsizlik Oranları ile Türkiye Üzerine Bir Araştırma. *Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi*, 7(6), 301–310. <https://doi.org/10.18506/anemon.523421>
- Bölükbaş, M. (2018). Kayıt Dışı İstihdam ve Genç İşsizlik Ekonomik Büyüme ile İlişkili Olabilir Mi? Türkiye İçin Ekonometrik Bir Analiz. *Sosyal Güvenlik Dergisi*, 75–90. <https://doi.org/10.32331/sgd.492902>
- Çaşkurulu, E. (2014). İstihdamsız Büyüme (İstihdamsız İyileşme) Sorununa Karşı Kamusal Politikalar ve Önemi: Türkiye Açısından Bir Değerlendirme. *Amme İdaresi Dergisi*, 47(2), 43-76.
- Eğri, T. (2018). İşsizlik ve Ekonomik Çıktı İlişkisi: Mısır için Okun Yasası Analizi. *Journal of Yaşar University*, 13(49), 68–78. <https://doi.org/10.19168/jyasar.342728>
- Enders, W., & Lee, J. (2012). The flexible Fourier form and Dickey–Fuller type unit root tests. *Economics Letters*, 117(1), 196–199. <https://doi.org/10.1016/j.econlet.2012.04.081>
- Granger, C. W. J. (1969). Investigating Causal Relations by Econometric Models and Cross-spectral Methods. *Econometrica*, 37(3). <https://www.jstor.org/stable/pdf/1912791.pdf>
- Karataş, A. R. & Ergül, M. (2023). Türkiye’de Ekonomik Büyüme, Finansal Gelişme ve Ticari Açıklık: Genişletilmiş ARDL ile Kanıtlar, Necmettin Erbakan Üniversitesi Siyasal Bilgiler Fakültesi Dergisi, 5(Özel Sayı), 222-236. <https://dergipark.org.tr/pub/neusbf/issue/81358/1383700>
- Konukman, A., & Tureli, R. (2010). The Reflections of Economic Crisis On The Turkish Economy And The Future Prospects. *Ekonomik Yaklaşım*, 21(75), 77. <https://doi.org/10.5455/ey.10705>
- Meyer, D. F., & Sanusi, K. A. (2019). A Causality Analysis of the Relationships Between Gross Fixed Capital Formation, Economic Growth and Employment in South Africa. *Studia Universitatis Babeş-Bolyai Oeconomica*, 64(1), 33–44. <https://doi.org/10.2478/subboec-2019-0003>

- Mihci, S., & Atilgan, E. (2010). İşsizlik Ve Büyüme: Türkiye Ekonomisi için Okun Katsayıları. *İktisat İşletme ve Finans*, 25(296), 33–54. <https://doi.org/10.3848/iif.2010.296.2803>
- Özdemir, B., & Yildirim, S. (2013). Türkiye’de Ekonomik Büyüme ve İstihdam Arasındaki Nedensellik İlişkisinin Analizi: Özçikarimli Dalgacık Yaklaşımı. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, (38), 97-116.
- Öztürk, S., & Sezen, S. (2018). Ekonomik Büyüme ile İşsizlik Arasındaki İlişkinin Analizi: Türkiye Örneği. *Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 15(41). <https://dergipark.org.tr/tr/pub/mkusbed/issue/36823/388299>
- Padhi, B., & Panda, S. (2021). Employment and Economic Growth Dynamics in Odisha, India. *Journal of Public Affairs*, 21(2), e2168. <https://doi.org/10.1002/pa.2168>
- Şahin, L., & Yildirim, K. (2015). On Dokuzuncu Yüzyıldan Günümüze Türkiye’de İşsizlikle Mücadele Politikalarının Gelişimi. *Çalışma ve Toplum*, 2(45). <https://dergipark.org.tr/tr/pub/ct/issue/71785/1155103>
- Takım, A. (2015). Türkiye’de Ekonomik Büyüme ile İşsizlik Arasındaki İlişki: Granger Nedensellik Testi. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, (27).
- Türlüoğlu, E. (2018). Kadın İstihdam ve Büyüme İlişkisi: Var Modeli Analizi. *Avrasya Sosyal ve Ekonomi Araştırmaları Dergisi (ASEAD)*, 5(9). 59-68. <https://dergipark.org.tr/tr/pub/asead/issue/41120/497015>
- Uçan, O., & Çebe, G. N. (2018). 2008 Krizi Öncesi ve Sonrası Türkiye’de Ekonomik Büyüme, İşsizlik ve Enflasyon İlişkisi. *Ömer Halisdemir Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 11(3), 6–17. <https://doi.org/10.25287/ohuiibf.414713>
- Uras, Ö. (2016). Türkiye Ekonomisindeki İstihdamsız Büyümenin Ekonometrik Analizi. *Ekonometri ve İstatistik*, (24). 94-108

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