

The Persistence of Undeclared Employment: Empirical Evidence from Türkiye

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Abstract: Unregistered employment, which is a worldwide economic problem, is also a difficult economic problem for the Türkiye's economy. When academic studies on informal employment are examined, it is seen that these studies are generally aimed at defining and measuring informal employment in economies or explaining the relationship between informal employment and other macroeconomic data. On the other hand, this study examines whether agriculture-adjusted informal employment is persistent for the Türkiye's economy by using data from the Turkish Statistical Institute for the period 2010/01-2021/12. To analyze the persistence of informal employment, the Fourier ADF test is used in addition to classical unit root tests. The findings reveal that agriculture-adjusted informal employment in Türkiye is heritable. The study reveals that there have been periodic improvements in the fight against informal employment in Türkiye, but this success is not sustainable without permanent legal regulations and stable policy implementation. As a policy recommendation, the study suggests that structural reforms should be made for Türkiye to achieve lasting success in the field of informal employment and that these reforms should be determined.

Keywords: Unregistered Employment, Unregistered Economy, Employment

Jel Codes: C32, E24, E26

Kayıt Dışı İstihdamın Kalıcılığı: Türkiye'den Ampirik Kanıtlar

Öz: Dünya genelinde ekonomik bir problem olan kayıt dışı istihdam, Türkiye ekonomisi için de çözülmesi güç bir ekonomik sorundur. Kayıt dışı istihdam ile ilgili yapılan akademik çalışmalar incelendiğinde bu çalışmaların genel itibarıyla ekonomilerde yer alan kayıt dışı istihdamın tanımlanması, ölçülmesi ya da kayıt dışı istihdam ile başka makroekonomik verilerin arasındaki ilişkilerin açıklanmasına yönelik olduğu görülmektedir. Bu çalışma ise Türkiye'nin 2010/01-2021/12 dönemleri için Türkiye İstatistik Kurumu verileri kullanarak, tarımdan arındırılmış kayıt dışı istihdamın Türkiye ekonomisi için kalıcı olup olmadığını incelemektedir. Çalışmada gayri resmi istihdamın kalıcı olup olmadığını analiz etmek için klasik birim kök testlerinin yanı sıra Fourier ADF testi kullanılmıştır. Bulgular, Türkiye'de tarımdan arındırılmış kayıt dışı istihdamın kalıtsal olduğunu ortaya koymaktadır. Çalışma, kayıt dışı istihdamla mücadelede Türkiye'de dönemsel olarak iyileşmeler olduğunu fakat kalıcı kanun düzenlemeleri ve istikrarlı politika uygulamaları olmadan bu başarının sürdürülebilir olmadığını ortaya koymaktadır. Çalışma sonucunda politika önerisi olarak, Türkiye için kayıt dışı istihdam alanında kalıcı başarılar için yapısal reformlar yapılması ve bu düzenlemelerde kararlı olunması önerilmektedir.

Anahtar Kelimeler: Kayıt Dışı İstihdam, Kayıt Dışı Ekonomi, İstihdam

Jel Kodları: C32, E24, E26

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1. Introduction

The informal economy is the transfer of an economic activity outside the boundaries of the registered economy by partially or completely violating the documentation system

and hiding it from the state or the business stakeholders (employees, partners, creditors, etc.) (Altuğ, 1999). Informal economic activities, which are a complex problem in terms of their nature and consequences, are widely present in all economies (Elgin, 2020). The informal economy has reflections in different areas. The incomplete or total non-representation of actual employment in official records with regard to wages or duration is known as informal employment, which is a sub-branch of the informal economy in the labor sector (Erdoğan, 2018). Informal employment, which emerged in the 1950s in the world and Türkiye in the 1980s, reached 50% in the 1990s due to the labor, tax and retirement policies implemented after 1980 in Türkiye and continued this trend until the early 2000s (Erdal, 2019). In recent years, the phenomenon of informal employment, which has brought many social and economic problems for developed and developing countries, has become a more important problem for the country when Türkiye's internal and external migration movements are considered. In particular, the wave of migration to Türkiye as a result of the civil war that started in Syria has directly and indirectly affected Türkiye's labor market (Akcan, 2018). Aside from the damage it causes to the economy, informal employment also leads to social problems (Sugözü, 2010). For this reason, Türkiye is combating informal employment with various measures. Especially in recent years, many legal regulations and projects have been implemented within the framework of social security reform to stop or reduce informal employment in Türkiye (Turgut, 2020; Erdal, 2019). According to Turkish Statistical Institute (TÜİK)'s informal employment data, as can be seen in Figure 1, the informal employment rate, which was 29.13% on average in 2010 and was excluding agricultural employment, decreased to an average of 17.5% in 2021. When evaluated in this way, it can be said that the measures taken have successful results. To explain this decline in unregistered employment rates, it would be appropriate to briefly mention the measures taken to combat unregistered employment in recent years.

The methods applied in Türkiye to combat unregistered employment are based on a multidimensional strategy. In this context, primarily, regulations were made in basic legislation such as the Social Insurance and General Health Insurance Law No. 5510, the Labor Law No. 4857, and the Unemployment Insurance Law No. 4447; coordination was ensured between the Social Security Institution, the Ministry of Labor and Social Security, and other relevant institutions, and inspection mechanisms were strengthened. In line with action plans such as the Strategy Document and Action Plan for Combating Unregistered Employment (2011-2013; 2017-2019), inspections were increased, and training and information campaigns were conducted for employers and employees. To encourage registered employment, premium incentives were introduced for employers with Law No. 6111, and private sector employment was also attempted to be increased within the scope of the Employment Mobilization Program (2017). In addition, the Active Labor Force Programs carried out in cooperation with Turkish Employment Agency and Social Security Institution, vocational training courses for women and youth aimed to increase the registered and qualified workforce. In addition, regional projects such as the Rural Development Support Program have been implemented to reduce unregistered employment caused by migration from rural to urban areas, thus improving job opportunities in rural areas. It can be said that these practices have resulted in a decrease in unregistered employment rates (Erdal, 2019).

However, another problem is whether the phenomenon of informal employment is permanent or temporary. In other words, is this data obtained in the fight against informal employment sustainable for Türkiye? In this sense, the sustainability approach will be used to evaluate whether informal employment is permanent. The concept of sustainability was brought up by the United Nations to seek answers to the question of whether people's living standards are acceptable and whether these lifestyles are worth passing on to future generations (UNDP, 1994). The term sustainability supports the concept it comes before with the meanings of providing support, continuity, and forward

development (Olçay, 2015). When the term sustainability comes together with informal employment, an undesirable situation arises for economies. Because the sustainability of informal employment is an undesirable phenomenon for economies due to its consequences.

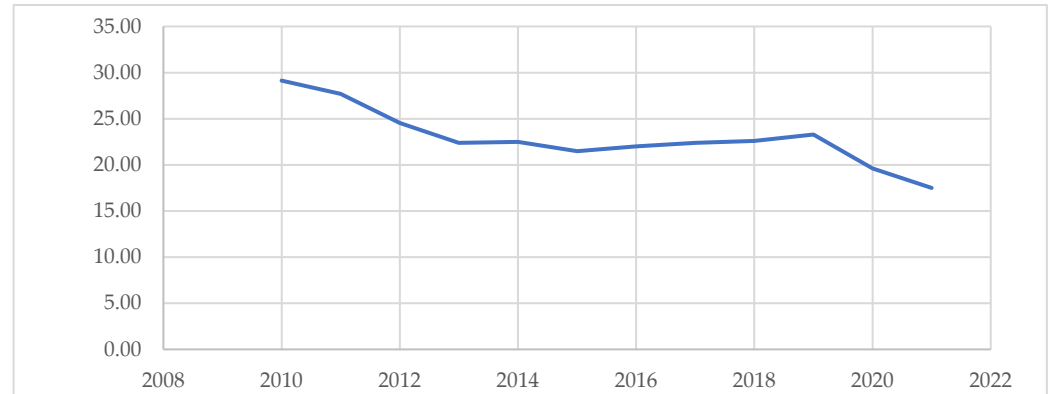


Figure 1. Undeclared employment, adjusted for agriculture, by year (%) (Source: TÜİK, 2025)

This study aims to analyze whether unregistered employment is permanent using Türkiye's 2010/M1-2021/M12 period agriculture-free unregistered employment data. In this way, the sustainability of the policies implemented in Türkiye to combat unregistered employment will also be analyzed. According to the literature review, no such empirical study has been conducted for Türkiye before. The study aims to contribute to the literature in this respect. Unit root tests are used in sustainability analyses. For this reason, the study used the Fourier ADF test, a current unit root test, in addition to classical unit root tests.

In this context, a literature review on unregistered employment was conducted after the introduction section. In the next section, the data set and methodology are presented, and in the conclusion section, the findings obtained in the fourth section are evaluated and policy recommendations are included.

2. Literature

As a result of the research conducted specifically for the research topic of the study, few publications were found in the existing literature that questioned whether or not informal employment is permanent. However, empirical and non-empirical studies on informal employment were found in domestic and international literature. In this section, descriptive, statistical and econometric domestic and international studies on informal employment will be presented respectively.

Pradhan and Soest (1995) , informal employment in urban areas of Bolivia was analyzed using household-level survey data from 1989. The study found that the selectivity effect is higher in informal employment, while women receive lower wages whether in the formal or informal sectors.

The study by Henley et al. (2009) used data from the Brazilian household survey for the years 1992–2004 to analyze the rate of informal employment according to three different definitions; roughly 63% of employment in Brazil is informal according to at least one of the three definitions, but only 40% is informal according to all three.

In the study conducted by Cuevas et al. (2009), the Indonesian National Labor Force Survey period of February 2007 was used to calculate informal employment. As a result of the study, informal employment was estimated to be at least 29.1% of total employment in Indonesia.

In the study conducted by Heintz (2010), he defined informal employment in Sri Lanka, the Philippines and Mongolia for the period 2006-2009 and made suggestions on how to estimate the informal employment in the countries he researched with the labor force surveys he used as a result of the study.

Yu (2012) used an econometric model to investigate how South Africa measures informal employment both before and after the Quarterly Labour Force Survey and other recently proposed techniques. The findings show that 94.7% of freelancers are classified as informal by at least one criterion, while only 62.6% are classified as informal by five criteria.

In the study conducted by Williams et al. (2017), they analyzed the 2012 and 2013 unregistered employment data using the labor input method for EU member countries. As a result of the study, there is a lower unregistered employment in countries such as Germany, France and the UK, while there is a higher undeclared labor problem in new countries to the EU.

Windebank and Horodnic (2017), the reasons for unregistered employment in France were analyzed with a survey involving 1,027 people. As a result of the study, it was found that penalties and inspection findings did not significantly affect unregistered employment, but as tax morale increased, unregistered employment decreased.

The study conducted by Gashi and Williams (2019) utilized a household survey conducted in Kosovo in 2017. As a result of the regression analysis, they calculated that 34.6% of the employees were employed informally.

In the study conducted by Elgin and Elveren (2021), the relationship between inequality, informality and feminization of work was revealed using panel data for the period 1963-2018 for 125 countries. As a result of the study, it was found that there was a positive relationship between the informal sector and poor countries in terms of income inequality, and a negative relationship in richer countries. It also increases women's labor force participation at lower income inequality levels.

In the study conducted by Khan and Hussain (2021), the size and determinants of informal employment in Pakistan were estimated using data from the Pakistan Labour Force Survey (2017-18) with four different measurement methods using regression analysis method. As a result, according to at least one measurement, 94.53% of employment is informal, but according to four measurements, 71.4% of employees are found to be informal.

In the study conducted by Williams (2021), Eurobarometer surveys conducted in various regions of Europe in 2019 were used. As a result of the study, the penalties applied in the EU and the probability of being caught are not significantly related to unregistered employment. On the other hand, there is a strong and significant relationship between unregistered employment and the level of vertical trust (citizens' trust in the state) and horizontal trust (citizens' trust in each other). However, this situation is not seen in the same way in every European country.

The study conducted by Williams and Horodnic (2021) examined undeclared work, underreported employment and fake freelance work in the EU. The study used Eurobarometer surveys for the years 2007, 2013 and 2019. The findings show that a high proportion of freelancers are in fake freelance work. As a result of the study, it was revealed that structures such as undeclared employment and underreported employment in the EU economy exhibit persistent characteristics.

When foreign literature is examined, studies on the definition and measurement of informal employment in particular attract attention. It should also be noted that the study conducted by Williams and Horodnic (2021) is valuable in terms of investigating the permanence of informal employment.

In the studies conducted in Türkiye in the field of informal economy, the reasons for informal employment and the relationships between informal employment and other macroeconomic variables have generally been examined.

In the study conducted by Fidan and Genç (2013), the risks of employees working unregistered were calculated based on 10 variables affecting unregistered employment in Türkiye using the Household Labor Force Survey and a regression model. As a result of the study conducted using the 2009 data set, it was found that the factors other than rural-urban were significant and were variables affecting unregistered employment.

In the study conducted by Şahin (2018), a research was conducted to determine the reasons for employers leaving the registry and the possibility of transitioning to unregistered employment, covering 440 enterprises in Çorum province and district centers. As a result of the study, it was found that the first reason pushing the companies to unregistered employment was financial and the other reason was tax-related.

In the study conducted by Dam et al. (2018), the effects of economic growth, unemployment and inflation on unregistered employment for the period 2002-2016 were analyzed with an econometric model for Türkiye. As a result of the study, the coefficients of unemployment and inflation variables were found to be positive and statistically significant, while the coefficient of economic growth was found to be negative and statistically insignificant. In addition, a 10% increase in unemployment increases unregistered employment by 4%.

In the study conducted by Bölükbaş (2018), the relationship between informal employment, youth unemployment and economic growth in Türkiye between January 2010 and September 2017 was examined using the VAR model and the Granger causality test. As a result, while a two-way causality relationship was determined between economic growth and informal employment in Türkiye for the periods examined, no causality was found between youth unemployment and informal employment.

In the study conducted by İnal (2019), monthly data between 2005-2018 were used to investigate the link between informal employment and economic growth. Dolado-Lütkepohl causality test was used to determine whether the variables were causally related. The findings showed that informal employment and economic growth were cointegrated in January 2005-June 2018, there was no significant long-term or short-term relationship between the variables, and there was a one-way causal relationship between informal employment and economic growth in the causality test. No noticeable correlation was found between informal employment and economic growth.

In the study conducted by Kaptangil and Kırca (2020), symmetric causality relationships were examined between the informal employment rate and tourism demand using Türkiye's 2013/01-2016/12-period data. As a result of the study, according to the symmetry test of Hacker and Hatemi -j (2006), a negative shock from tourism demand was found to be directed towards a positive shock in informal employment, according to the asymmetric test of Hatemi -j (2012), a positive shock from tourism demand was found to be directed towards a positive shock in informal employment, and a positive shock from tourism demand was found to be directed towards a negative shock in informal employment. In addition, according to the asymmetric impulse-response function of Hatemi -j (2014), the asymmetric causality between these two variables was found to be negative.

Şenel and Öçal (2021), the regions in which the distribution of unregistered employment in Türkiye is concentrated were investigated using the 2017 TÜİK Household Labor Force Survey Micro Data Set according to demographic indicators. As a result of the study, the sector with the highest unregistered employment was agriculture, while the region with the lowest unregistered employment was found to be the Central Anatolia Region.

In the study conducted by Çelik et al. (2021), the relationship between informal employment and unemployment, inflation and economic growth was examined in the long term and short term. In the study, quarterly data for the years 2004-2020 were used in the ARDL bounds test analysis. As a result of the study, informal employment and other variables are related in the long term, and a 1-unit increase in economic growth and inflation, respectively, causes a decrease of 0.233 and 0.039 in informal employment, and a 1-unit increase in unemployment causes an increase of 0.991 in informal employment.

In the study conducted by Badalič (2023), informal working life in Türkiye was analyzed by collecting data from 39 Syrian refugee workers and employers. As a result of the study, it was found that the reason why Syrian employers wanted to stay in the

informal sector was not based on the aim of making profit but on the desire of Syrians to have solidarity among themselves.

The study conducted by Çelik (2023) examined whether informal employment in Türkiye would pose a risk to social security in the future. The research used the Punctuated Equilibrium Theory, one of the models for public policy analysis. As a result of the study, it shows that the information collected to prevent informal employment is incomplete for some reasons (method, measurement and appropriate policy issue) and the policies created will not be perfect. In addition, although the implemented policies are working, Türkiye's informal employment problem will continue in various forms in the foreseeable future.

In the study conducted by Eralp and Çağdaş (2023), the effects of income distribution inequality and poverty on the rate of unregistered employment in 26 regions in Türkiye between 2014 and 2019 were investigated through spatial panel data analysis. According to the study results, poverty has a more significant effect on unregistered employment than income distribution inequality.

In the study conducted by Karakuzu and Yıldız (2023), the relationship between the economic discontent index, real minimum wage data and informal employment was examined using data between 2001-2021 for Türkiye. While ADF, PP, Kapetanios and FADF unit root tests were used to determine the stationarity levels of these series, the ARDL bounds test was used to examine whether the data had a long-term relationship. According to the results of the study, it was seen that the economic discontent index, real minimum wage series and informal employment rate were related to each other in the long run. The economic discontent index has a value of 0.36 in the normalized long-term version, while the coefficient of the real minimum wage is -0.17. In addition, the error correction term of the cointegration form is statistically significant and has a negative sign.

Conducted by Eralp (2024), it examined how Türkiye's informal employment is affected by inflation, unemployment rate and economic growth macroeconomic factors. In the study, a panel data set and panel quantile regression model for the period 2009-2020 were used for 26 regions within the scope of the Statistical Regional Unit Classification of the Turkish Statistical Institute (TUIK). According to the findings, if informal employment is widespread, economic growth will not affect it and will actually encourage informal employment among the unemployed who are not in the agricultural sector.

3. Dataset and Method

3.1. Dataset

Mahiroğulları (2017), “non-agricultural informal employment” provides more meaningful results about the nature of unregistered employment in a country, and non-agricultural unregistered employment is a component that increases total unregistered employment significantly. Therefore, to obtain more meaningful results in the study, monthly non-agricultural total unregistered employment data published by the Turkish Statistical Institute (TUIK) was preferred as data. Descriptive statistics regarding the data are as in Table 1. Data was seasonally adjusted before performing analysis.

Table 1. Descriptive statistics table

Mean	22.91596
Median	22.55
Maximum	30.1675
Minimum	15.6
Std. Dev.	3.137353
Skewness	0.349168
Kurtosis	3.12876
Jarque -Bera	3.025518
Probability	0.220301
Observations	144

These descriptive statistics summarize the characteristics of a data set of 144 observations used in the study. The mean value of the data is 22.92. The median value being 22.55 and being close to the mean value shows that the data generally has a symmetric distribution. The maximum value in the data is 30.1675 and the minimum value is 15.6, indicating a wide spread between these values. The standard deviation of the data is ± 3.14 , while the skewness value is 0.349, indicating that the data is largely symmetric. The kurtosis value being 3.13 shows that the data is quite close to a normal distribution. The Jarque-Bera test tests whether the data has a normal distribution, on the other hand, since the p-value is above 0.05, the assumption of normal distribution cannot be rejected. In other words, the data is close to a normal distribution. In general, the data set used in the study is largely close to a normal distribution. The fact that the median and mean values are close to each other indicates that there is no significant asymmetry between the data. The level of the standard deviation indicates that the data is not too scattered. According to the Jarque-Bera test results, the data does not show a significant deviation from the normal distribution.

3.2. Unit Root Tests: Theoretical Background

The unit root tests can be classified into two distinct categories: classical unit root tests and unit root tests that account for structural breaks. In this context, classical unit root tests analyze the series under the assumption that they maintain a constant structure over time. Among the most frequently cited unit root tests in the extant literature are the Augmented Dickey-Fuller (ADF) test, developed by Dickey and Fuller (1979); the PP test, developed by Phillips and Perron (1988); and the KPSS test, developed by Kwiatkowski et al. (1992). The ADF and PP tests are designed to test the null hypothesis that a series contains a unit root, meaning it is non-stationary. Conversely, the KPSS test operates under the assumption that the series is stationary under the null hypothesis. However, the omission of structural breaks—such as regime changes, crises, or policy changes, which are commonly observed in economic time series—compromises the reliability of the results of these tests (Dickey & Fuller, 1979; Phillips & Perron, 1988; Kwiatkowski et al., 1992).

Since the classical tests do not provide efficient and consistent results in the presence of structural breaks, unit root tests that integrate structural breaks into the model have been developed. In this context, the Zivot and Andrews (1992) test, one of the most frequently used unit root tests with structural breaks in the literature, has a structure that endogenously determines the break date and allows only one break in the series. On the other hand, while the Perron (1989) test analyzes by exogenously determining the break date, the LM test developed by Lee and Strazicich (2003, 2004) can endogenously determine the number and points of breaks and analyze both one and two structural breaks. These tests help to prevent a stationary series from being mistakenly considered unit rooted in the presence of structural breaks (Perron, 1989; Zivot & Andrews, 1992; Lee & Strazicich, 2003, 2004).

A newer and more flexible approach to unit root tests is based on Fourier terms. In these tests, structural changes in time series are modeled as gradual and smooth transitions over time rather than sudden and sharp breaks. The Fourier ADF test developed by Enders and Lee (2012) adds sine and cosine terms to the classical unit root tests, allowing for the modeling of structural changes in the series without directly specifying the timing and form of these changes. Fourier terms increase the flexibility and testing power of the model by representing unknown and complex structural breaks as continuous functions. Thus, it becomes possible to perform a more robust stationarity test without the need for prior knowledge about the form or timing of breaks (Enders & Lee, 2012; Becker, Enders, & Lee, 2006). Furthermore, since Fourier terms emphasize that the structural break occurs smoothly rather than abruptly, they capture the breaks in macroeconomic data more realistically. Therefore, the Fourier test is preferred among the tests with structural breaks in this study.

3.3. Augmented Dickey-Fuller (ADF) Test

In the studies conducted, the fact that the series in the model tend to increase or decrease continuously over time causes a stationarity problem and causes incorrect and different results than expected econometrically (Akcan, 2019). Since macroeconomic time series are affected by shocks in the economy, the stationarity of the series is analyzed with unit root tests (Yurdakul, 2000). The pioneering study for unit root tests was the Augmented Dickey-Fuller Unit Root Test (ADF) conducted by Dickey and Fuller in 1979. The same researchers improved the analysis by including autoregressive processes in the ADF test (Dickey and Fuller, 1981).

The equation (1) suggested for the ADF test shows the stationarity tests without coefficient and trend effect; equation (2) shows the stationarity tests with constant coefficient effect but no trend effect, and equation (3) shows the stationarity tests with both constant-coefficient and trend effect.

$$\Delta Y_t = \beta_1 Y_{t-1} + \sum_{i=1}^k \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad (1)$$

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \sum_{i=1}^k \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad (2)$$

$$\Delta Y_t = \beta_0 + \alpha t + \beta_1 Y_{t-1} + \sum_{i=1}^k \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad (3)$$

ΔY_t expression of the equation represents $(Y_t - Y_{t-1})$. The constant term is β_0 and the trend is indicated by t . The β_1 in the model is used to express the coefficient of (Y_{t-1}) . The term (t) is used for the test statistic of β_1 . The Dickey-Fuller table values are compared with the t value to determine the accuracy of the hypothesis $\beta_1 = 0$. If $H_0 = \beta_1 = 0$, the series is not only non-stationary but also has a unit root, if $H_0 = \beta_1 < 0$, there is no β_1 unit root in the series and the series is stationary.

3.4. Phillips Perron (PP) Test

Phillips and Perron (1988) developed a model in which the error term does not contain correlation and heteroscedasticity by improving the ADF unit root test. The regression equations for this model are given in equations (4) and (5). This regression model is calculated according to the least squares method. In the equation, T , $\hat{\mu}_t$, $(\hat{\mu}_t, \hat{\alpha})$ and $(\tilde{\mu}, \tilde{\beta}, \tilde{\alpha})$ represent the number of observations, the error term, and the coefficients of the regression equation.

$$Y_t = \hat{\mu} + \hat{\alpha} Y_{t-1} + \hat{\mu}_t \quad (4)$$

$$Y_t = \tilde{\mu} + \tilde{\beta} \left(t - \frac{T}{2} \right) + \tilde{\alpha} Y_{t-1} + \tilde{\mu}_t \quad (5)$$

3.5. Fourier ADF test

Fourier ADF test is a unit root test developed as an alternative to traditional unit root tests. It is used especially when there are irregular structural breaks or non-linear trends in a series. Fourier series are used to model this break or non-linear structure in the time series. Fourier ADF test is modeled as shown in equation (6) (Enders and Lee, 2012).

$$\Delta y_t = \alpha y_{t-1} + \beta_1 \sin\left(\frac{2\pi kt}{T}\right) + \beta_2 \cos\left(\frac{2\pi kt}{T}\right) + \sum_{i=1}^p \phi_i \Delta y_{t-i} + \varepsilon_t \quad (6)$$

Here, k represents the frequency of the Fourier series, α the coefficient estimate that determines whether there is a unit root in the series, T represents the total number of observations, Δy , the first difference of y , and $\sin$ and $\cos$ represent the Fourier terms (Enders and Lee, 2012).

Hypothesis of the Test

$H_0: \beta_1 = 0$ ve $\beta_2 = 0$ (It states that the Fourier terms are not meaningful. At the same time, the meaninglessness of the Fourier terms means that there is no structural break in the series.

$H_1: \beta_1 \neq 0$ veya $\beta_2 \neq 0$ (At least one Fourier term is significant)

Fourier test, firstly the significance of the trigonometric terms is tested. If the trigonometric terms are significant, the results of the Fourier ADF test are taken into account, if the Fourier terms are not significant, classical unit root tests are performed.

4. Empirical Findings

The ADF and PP unit root tests used in the study were considered classical unit root tests. First, the ADF and PP tests, which are classical unit root tests, were applied to the variable and the results are presented in Table 2.

Table 2. Classical Unit root test results

Tests	Fixed		Stable and Trendy	
	Test Statistic Value	Probability Values		
ADF test	-1,593	0.48	-1.976	-0.6
Philips Perron (PP)	-1,796	-0.38	-2,523	-0.31

As seen in Table 2, according to the probability values of both the ADF test and the PP test, it is found that there is a unit root in both the constant and constant and trend models of the series. In other words, according to the classical unit root tests, the series is not stationary. However, in the classical unit root tests, there is a tendency not to reject the basic hypothesis in case of structural breaks. Therefore, in the next stage of the study, the Fourier ADF test is performed by taking into account the possibility of structural breaks.

Table 3. Fourier ADF Test Estimation Result

Variable	Frequency(k)	Min SSR	F constraint test value	Appropriate delay length	FADF test statistic value
NAUE	1	95,619	11,402	3	-5,515

*NAUE = Non-agricultural unregistered employment, Min SSR= Minimum Sum of Squared Residuals,

Table 3 shows the Fourier ADF test statistics results. Accordingly, the frequency value (k) was determined as 1, while the appropriate lag length was determined as 3. The critical values of the test consist of the critical values found in the study of Enders and Lee (2012). In this context, first of all, the F constraint test value is compared with the table critical value and the significance of the trigonometric terms (sin and cos) is checked. In this context, since the calculated value of the 11.402 F test at the 5% level is greater than the critical value of 9.14, the null hypothesis stating that the Fourier terms are not significant is rejected. In other words, it is understood that the Fourier terms are significant and there is 1 structural break in the series.

the Fourier terms are significant, in the next stage, the FADF test statistic value is compared with the Enders and Lee (2012) table critical value to decide whether the series is stationary or not. In this sense, since the FADF test statistic value of -5.515 in Table 2 is smaller than the critical value of -4.35 at the 5% significance level, the null hypothesis stating that the series is not stationary is rejected and the finding that the series is stationary is reached.

5. Conclusion

Unregistered employment, a sub-branch of the informal economy, is one of the most important economic problems for many countries. Although the reasons for undeclared employment vary from country to country, economists generally address this problem by relating it to macroeconomic variables. This study focuses on the question of whether undeclared employment is permanent in Türkiye. When Türkiye's undeclared employment data is examined, it is seen that there has been a significant decrease in recent years. Another aim of the study is to determine whether the decreasing trend of unofficial employment as a result of the implemented policies is sustainable.

In this study, Türkiye's 2010/01-2021/12 monthly non-agricultural unregistered employment data were analyzed with classical unit root tests (ADF and PP) and Fourier

ADF test. As a result of the study, it was found that unregistered employment is permanent for Türkiye. It should also be noted that the decrease in unregistered employment is not sustainable for the Türkiye's economy.

Considering the positive and negative consequences of unregistered employment, it is inevitable for developing countries like Türkiye to have informal sectors in their economies. Türkiye, which receives intense external migration and has a young population, will bring about other socio-economic problems if its workforce structure is completely registered. In this sense, completely eliminating unregistered employment is both a rational policy and seems impossible. In this sense, the aim of policy makers should be to reduce the rate of unofficial employees to the level of developed countries. The measures taken in Türkiye to combat unregistered employment are useful, but they do not make sufficient contributions. According to the results of the study, a paradigm shift seems necessary for Türkiye in combating the problem of unregistered employment. Undoubtedly, many policies can be suggested for this change. In particular, registered employment should be encouraged with strict legal regulations. However, social security amnesties applied from time to time reduce the employer's compliance with the implemented social security legislation. Therefore, it is clear that laws with increased impact should be implemented with determination. It should also be noted that registered employment should be encouraged with insurance premium incentives. Undoubtedly, policymakers are combating informal employment with various tools, but for lasting success, structural reforms in this area of social security are inevitable.

In this study, while informal employment data were taken into consideration, agricultural informal employment rates were not included in the analysis. In the literature review, it was seen that the agricultural dimension of informal employment in Türkiye was not included. Agricultural informal employment could also be taken into consideration in further studies.

References

- Altuğ, O. (1999). Kayıtdışı ekonominin boyutları (1997). *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, (15), 257-276.
- Akcan, A. T. (2018). Türkiye işgücü piyasasında Suriyeli sığınmacıların yeri ve etkileri. *Sosyal güvenlik dergisi*, 8(2), 59-73.
- Akcan, A. T. (2019). Türkiye'de gençlerin işsizlik histerisi. *Kastamonu Üniversitesi İktisadi Ve İdari Bilimler Fakültesi dergisi*, 21(1), 31-47.
- Badalič, V. (2023). Trapped in the underground economy: Syrian refugees in the informal labour market in Turkey. *Third world quarterly*, 44(5), 967-984.
- Becker, R., Enders, W., & Lee, J. (2006). A stationarity test in the presence of an unknown number of smooth breaks. *Journal of Time Series Analysis*, 27(3), 381-409. <https://doi.org/10.1111/j.1467-9892.2006.00478.x>
- Bölükbaş, M. (2018). Kayıt dışı istihdam ve genç işsizlik ekonomik büyüme ile ilişkili olabilir mi? Türkiye için ekonometrik bir analiz. *Sosyal Güvenlik dergisi*, 8(2), 75-90.
- Cuevas, S.; Rosario, A.; Barcenas, M. L.; Christian, M. (2009). *Informal employment in Indonesia* (Asian Development Bank Economics Working Paper Series No. 156). Asian Development Bank.
- Çelik, R.; Keskin, A.; Keskin, A. (2021). Türkiye'de ekonomik büyüme, işsizlik ve enflasyonun kayıt dışı istihdam üzerindeki etkisi: ARDL sınır testi yaklaşımı. *Journal of social policy conferences*, 80, 451-474.
- Çelik, T. (2023). Türkiye'de kayıt dışı istihdam sorunu kalıtsal mıdır? *Bandırma Onyedil Eylül Üniversitesi Sosyal Bilimler Araştırmaları dergisi*, 6(CEEİK 2023 Özel Sayısı), 93-110.
- Dam, M. M.; Ertekin, Ş.; Kızılca, N. (2018). Türkiye'de kayıt dışı istihdamın boyutu: Ekonometrik bir analiz. *Dokuz Eylül Üniversitesi İktisadi İdari Bilimler Fakültesi dergisi*, 33(1), 293-318.
- Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74(366a), 427-431.

- Dickey, D. A.; Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica*, 49(4), 1057-1072.
- Dickey, D. A.; Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the american statistical association*, 74(366), 427-431.
- Elgin, C. (2020). *The informal economy: measures, causes, and consequences* (1st ed.). Routledge, Abingdon Oxon, New York
- Elgin, C.; Elveren, A. Y. (2021, September). Informality, inequality, and feminization of labor. In *women's studies international forum* (Vol. 88, p. 102505). Pergamon.
- Enders, W.; Lee, J. (2012). The flexible fourier form and Dickey-Fuller type unit root tests. *Economics letters*, 117(1), 196-199.
- Eralp, A. (2024). Türkiye'de kayıt dışı istihdam üzerinde ekonomik büyüme, işsizlik ve enflasyonun etkisi: Panel kantil regresyon yaklaşımı. *Ankara Hacı Bayram Veli Üniversitesi İktisadi ve İdari Bilimler Fakültesi dergisi*, 26(1), 79-102.
- Eralp, A.; Çağdaş, Y. (2023). Türkiye'de kayıt dışı istihdam üzerinde gelir dağılımı ve yoksulluğun etkisi. *Journal of management & labor*, 7(2).
- Erdal, İ. Ö. Y. (2019). Türkiye'de kayıt dışı istihdam ve kayıt dışı istihdamla mücadele politikaları. *Ufuk Üniversitesi Sosyal Bilimler Enstitüsü dergisi*, 8(16), 225-246.
- Erdinç, Z. (2018). Küreselleşme sürecinde Türkiye'de kayıt dışı istihdam. *Social mentality and researcher thinkers journal*, 4(12), 580-596.
- Fidan, H.; Genç, S. (2013). Unregistered employment and analysis of factors affecting the unregistered employment: Turkish private sector case. *Mehmet Akif Ersoy Üniversitesi Sosyal Bilimler Enstitüsü dergisi*, 5(9), 137-150.
- Gashi, A.; Williams, C. C. (2019). Evaluating the prevalence and distribution of unregistered employment in Kosovo: Lessons from a 2017 survey. *South East European journal of economics and business*, 14(1), 7-20.
- Heintz, J. (2010). *Defining and measuring informal employment and the informal sector in the Philippines, Mongolia, and Sri Lanka* (United Nations Development Account Project Working Paper No. 3). United Nations.
- Henley, A.; Arabsheibani, G. R.; Carneiro, F. G. (2009). On defining and measuring the informal sector: Evidence from Brazil. *World development*, 37(5), 992-1003.
- İnal, H. (2019). *Kayıt dışı istihdam ve ekonomik büyüme ilişkisi: Türkiye örneği*. Yüksek lisans tezi, Balıkesir Üniversitesi, Sosyal Bilimler Enstitüsü, Balıkesir.
- Kaptangil, K.; Kırca, M. (2020). Türkiye'de kayıt dışı istihdam ve turizm talebi arasındaki simetrik ve asimetrik nedensellik ilişkilerinin analizi. *Maliye dergisi*, 178, 19-36.
- Karakuzu, M.; Yıldız, H. (2023). Türkiye'de iktisadi hoşnutsuzluğun kayıt dışı istihdam üzerindeki etkisi: ARDL sınır testi yaklaşımı. *JOEEP: Journal of emerging economies and policy*, 8(2), 168-178.
- Khan, M. T. A.; Hussain, B. (2021). Measurement and determinants of informal employment: evidence from Pakistan. *Pakistan social sciences*, 5(3), 309-324.
- Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root. *Journal of Econometrics*, 54(1-3), 159-178.
- Lee, J., & Strazicich, M. C. (2003). Minimum Lagrange multiplier unit root test with two structural breaks. *Review of Economics and Statistics*, 85(4), 1082-1089.
- Lee, J., & Strazicich, M. C. (2004). Minimum LM unit root test with one structural break. *Appalachian State University Working Paper*.
- Mahiroğulları, A. (2017). Türkiye'de kayıtdışı istihdam ve önlemeye yönelik stratejiler. *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi dergisi*, 22(2), 547-565.
- Olçay, T. (2015). *Sürdürülebilir kalkınma ve ölçümü üzerine bir inceleme* (Yayımlanmamış yüksek lisans tezi). Dokuz Eylül Üniversitesi, Sosyal Bilimler Enstitüsü, İzmir.
- Perron, P. (1989). The great crash, the oil price shock, and the unit root hypothesis. *Econometrica*, 57(6), 1361-1401.
- Phillips, P. C. & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75(2), 335-346.
- Pradhan, M., & Van Soest, A. (1995). Formal and informal sector employment in urban areas of Bolivia. *Labour economics*, 2(3), 275-297.

- Şahin, M. (2018). İşverenler perspektifinden Türkiye’de kayıt dışı istihdamın temel belirleyicileri: Bir ankette sonuçlar. *Hitit Üniversitesi Sosyal Bilimler Enstitüsü dergisi*, 11(3), 2055-2071.
- Şenel, D.; Öçal, M. (2021). Türkiye’de kayıt dışı istihdamın bölgesel analizi. *Çalışma ve toplum*, 2(69), 1201-1232.
- United Nations Development Programme (UNDP). (1994). *Human development report 1994*. Oxford University press.
- Sugözü, İ. H. (2010). Kayıt dışı ekonomiyi önlemede vergi politikaları (1980 - 2004 Türkiye örneği). *Sosyal ekonomik araştırmalar dergisi*, 10(19), 171-193.
- Turgut, A. (2020). Türkiye’de kayıt dışı istihdamın azaltılmasında sosyal güvenlik uygulamalarının etkileri. *International journal of disciplines in economics and administrative sciences studies (IDEA studies)*, 6(24), 1027-1041.
- Williams, C. C. (2021). Tackling unregistered employment in European regions: Towards a variegated policy approach. *UTMS Journal of economics*, 12(2), 104-122.
- Williams, C. C. & Horodnic, I. (2021). Trends in the undeclared economy and policy approaches. *Evidence from the 2007, 2013 and 2019 Eurobarometer Surveys*.
- Williams, C.; Bejaković, P.; Mikulić, D.; Franic, J.; Kadir, A.; Horodnic, I. A. (2017). An evaluation of the scale of undeclared work in the European Union and its structural determinants: estimates using the labour input method. *Publications Office of the European Union*, Luxembourg.
- Windebank, J. & Horodnic, I. A. (2017). Explaining participation in undeclared work in France: Lessons for policy evaluation. *International journal of sociology and social policy*, 37(3/4), 203-217.
- Yu, D. (2012). Defining and measuring informal employment in South Africa. *Development Southern Africa*, 29(1), 157-175.
- Yurdakul, F. (2000). Yapısal kırılmaların varlığı durumunda geliştirilen birim kök testleri. *Gazi Üniversitesi İktisadi ve İdari Bilimler Fakültesi dergisi*, 2(2), 21-34.
- Zivot, E., & Andrews, D. W. K. (1992). Further evidence on the great crash, the oil-price shock, and the unit-root hypothesis. *Journal of Business & Economic Statistics*, 10(3), 251-270.

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