

The Relationship Between Financial Development and Income Inequality: A Fourier Approach in the Case of Türkiye

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Abstract

While financial development is recognized as the driving force of economic growth, income inequality is a significant concern regarding social justice and sustainable development. The relationship between these two concepts can directly affect countries' economic policies and social balances. Therefore, the deepening and expansion of financial systems may create injustice in income distribution, but it also has the potential to reduce inequalities when appropriately managed. This study aims to determine the long-run impact of financial development on income inequality in Türkiye. For this purpose, the data set for the variables covers the period 1991-2022 and consists of annual observations. Income inequality (Gini coefficient) is used as the dependent variable, and the financial development index is used as the independent variable. In the study, the stationarity of the variables was tested with the Fourier unit root test (FKPSS) and KPSS unit root test. After the determination that the variables were not stationary at their level values, the Fourier cointegration test was used to test the existence of a long-run relationship between the variables. The study found that there is a cointegration relationship between financial development and income inequality in Türkiye. After establishing the co-integration relationship, our long-run DOLS estimation revealed a statistically significant negative relationship between financial development and income inequality at a 1% confidence level. The key conclusion drawn from this is that increases in financial development lead to reduced income inequality. This result underscores the potential impact of increasing financial development on reducing income inequality, and the importance of efforts and policies.

Keywords: Financial Development, Income Inequality, Fourier Cointegration

Finansal Gelişme ve Gelir Eşitsizliği İlişkisi: Türkiye Özelinde Fourier Yaklaşımı

Öz

Finansal gelişme, ekonomik büyümenin itici gücü olarak kabul edilirken, gelir eşitsizliği, toplumsal adalet ve sürdürülebilir kalkınma açısından önemli bir endişe kaynağıdır. Bu iki kavram arasındaki ilişki, ülkelerin ekonomik politikalarını ve sosyal dengelerini doğrudan etkileyebilmektedir. Dolayısıyla finansal sistemlerin derinleşmesi ve yaygınlaşması, gelir dağılımında adaletsizlik yaratabileceği gibi, doğru yönetildiğinde eşitsizlikleri azaltma potansiyeline de sahip olmaktadır. Bu çalışmada Türkiye'de finansal gelişmenin gelir eşitsizliği üzerindeki uzun dönemli etkisi tespit edilmeye çalışılmıştır. Bu amaç kapsamında, değişkenlere ilişkin veri seti 1991-2022 dönemini kapsamakta ve yıllık gözlemlerden oluşmaktadır. Çalışmada bağımlı değişken olarak gelir eşitsizliği (gini katsayısı), bağımsız değişken olarak ise finansal gelişme endeksi kullanılmıştır. Çalışmada, değişkenlerin durağanlığı Fourier birim kök testi (FKPSS) ve KPSS birim kök testi ile sınanmış, değişkenlerin düzey değerlerinde durağan olmadıklarının tespiti sonrasında, değişkenler arasındaki uzun dönemli ilişkinin varlığını sınamak için ise Fourier eş-bütünleşme testinden yararlanılmıştır. Çalışmanın sonucunda, Türkiye'de finansal gelişme ile gelir eşitsizliği arasında eş-bütünleşme ilişkisinin olduğu tespit edilmiştir. Eş-bütünleşme ilişkisinin tespiti sonrasında gerçekleştirilen uzun dönem DOLS tahmin sonuçlarına göre, finansal gelişme ile gelir eşitsizliği arasında istatistiki olarak %1 güven düzeyinde anlamlı negatif ilişki tespit edilmiş, finansal gelişmedeki artışların gelir eşitsizliğini azalttığı sonucuna ulaşılmıştır. Bu sonuç, uzun vadede ülkede finansal gelişmenin artırılmasına yönelik çabaların ve politikaların toplumda gelir eşitsizliğinin azaltılmasına katkı sunacağını göstermektedir.

Anahtar Kelimeler: Finansal Gelişme, Gelir Eşitsizliği, Fourier Eş-bütünleşme


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Introduction

The concept of financial development is generally defined as the development of financial markets, institutions, and instruments to meet the needs of the actors in the financial system. This development means diversifying the instruments used in financial markets and the widespread use of these instruments (Gökten et al., 2008, p. 122). On the other hand, income inequality generally aims to reveal the unequal distribution of national income among individuals or households in income distribution calculations. Therefore, the concept of "income inequality" is used when discussing individual income distribution survey results (Çelik, 2004, p. 59). Various measurement tools have been developed to measure individual income inequality. Lorenz curve, Gini coefficient, percentile method, range of variation, and coefficient of variation are the primary measurement techniques used to measure income inequality. However, the most widely used tools in the literature are the percentile method, Lorenz curve, and Gini coefficient. The Gini coefficient is also used in this study. The Gini coefficient varies between 0 and 1. If income is shared equally in a society, the Gini coefficient equals 0. However, if only one person receives the income in a society, the Gini coefficient equals 1 (TÜİK, 2008, p. 57).

Three different hypotheses in the literature explain the impact of financial development on income inequality. The first one is the inequality-narrowing hypothesis, which explains that financial development has a decreasing effect on income inequality; another one is the inequality-widening hypothesis, which explains that financial development has an increasing effect on income inequality, and the last one is the financial Kuznets curve (FKE) hypothesis which is based on the existence of an inverted U-shaped relationship between financial development and income inequality. According to the inequality narrowing hypothesis, financial development reduces income inequality by increasing the access of low-income individuals and small enterprises to financial services. By increasing credit, savings, and investment opportunities, financial development provides a greater incentive to participate in economic activities and promotes economic growth. This allows broader segments to benefit from economic opportunities and reduces income inequality (Clark et al., 2006; Bittencourt, 2006; Liang, 2006; Pata, 2020).

According to the inequality widening hypothesis, which explains the relationship between financial development and income inequality, financial development may increase income inequality. It is argued that developing financial markets generates more profits for wealthy individuals and large enterprises. While high-income groups can access financial instruments more efficiently and earn more, low-income individuals need help benefiting from these opportunities. This situation leads to more inequality in income distribution. Galor and Zeira (1993) proposed this hypothesis. They developed a dynamic model for income distribution in an economy where generations are linked by inheritance and investment indivisibility. In this model, there is an economy in which a single good (for consumption and investment) is produced using skilled and unskilled labor-intensive technology. In addition, individuals' lives are divided into two periods; according to these periods, individuals can work unskilled in both periods or invest in capital in the first period, receive education, and work skilled in the second period. The model assumes that individuals are the same regarding skills and preferences but differ only in inherited wealth. Individuals determine whether or not they invest in capital by the level of their inheritance and the credit they receive under the imperfections of capital markets. Thus, while wealthy individuals can leave a more considerable legacy to future generations by working at the highest quality and investing in human capital, poor individuals cannot. This increases income inequality in the long run (Galor and Zeira, 1993, p. 35-36). Therefore, wealthy individuals can retain intergenerational economic power by accumulating wealth and passing it on to future generations. Poor individuals, on the other hand, cannot improve their economic position due to a lack of capital and limited educational opportunities, thus perpetuating the existing income inequality. Thus, financial developments and market conditions cause income inequality to increase and become more pronounced in society (Rajan & Zingales, 2003; Law & Tan, 2009). Another hypothesis is the financial Kuznets curve hypothesis. In this hypothesis, the relationship between financial development and income inequality is an inverted U-shape. This hypothesis was developed by Greenwood and Jovanovic (1990) and explained as follows: At the beginning of economic development, financial markets are pretty backward, and economic growth is relatively slow. Although financial markets have started to develop in the continuation of the development process, only wealthy people have access to financial instruments due to the high costs. This situation continues until the economy reaches maturity and both savings rates and income inequality increase. When the economy reaches maturity, the number of individuals utilizing financial instruments increases, economic growth accelerates, and income inequality decreases (Greenwood & Jovanovic, 1990).

The relationship between financial development and income inequality is a pivotal topic in economic literature. Financial development, with its potential to foster a more efficient allocation of resources and spur economic growth, holds promise. This development can significantly enhance the access of low-income individuals to financial services, empowering them to engage in economic activities. Initiatives like micro-finance programs, support for small enterprises, and the expansion of banking services have the power to elevate the income levels of low-income groups, thereby contributing to a positive reduction in income inequality. However, it's important to note that the impact of financial development on income inequality is not always positive. In certain scenarios, the deepening of the financial system can facilitate the access of high-income individuals and large corporations to financial resources, potentially exacerbating income inequality. The processes of liberalization and deregulation in financial markets can lead to financial crises and economic fluctuations, which tend to disproportionately affect low-income groups, thereby increasing income inequality. It's crucial to understand that the effects of financial development on income inequality are not uniform, but rather contingent on the structure of the policies implemented and the prevailing economic conditions.

Understanding the complex nature of financial development and income inequality is crucial in building a solid financial system and ensuring long-term economic stability. The use of the Fourier KPSS unit root test, which reveals slow changes, as well as sudden changes in the study's analysis, and the subsequent determination of the long-run relationships between the variables by using the recently developed Fourier cointegration test, reveals the study's difference from other studies in the literature. This study focuses on the impact of financial development on income inequality. Within the framework of the study, firstly, various hypotheses explaining the relationship between financial development and income inequality are presented, followed by a comprehensive literature review on the subject. In the rest of the study, the data set, the model applied, and the empirical findings are analyzed in detail. In the last section, the results of the analyses made in the light of these findings and the possible implications of these results on economic policy are discussed.

Literature Review

The literature shows that the results of the studies on the relationship between financial development and income inequality are negative and positive. While some studies indicate that there is a negative relationship between financial development and income inequality (income inequality decreases as financial development increases), some studies, on the contrary, have found that there is a positive relationship between financial development and income inequality (income inequality increases as financial development increases) (Clarke et al, 2006; Batuo et al., 2010; Akbıyık, 2012; Jauch & Watzka, 2012; Sehrawat & Giri, 2016; Younsi & Bechtini, 2018; Kar & Kar, 2019; Akalin et al., 2024; İşcan & Demirel, 2024). In this study, we aim to shed new light on this complex relationship by analyzing the effect of income inequality on financial development using the Fourier method, a novel approach that is different from those used in the literature. We believe that our research will inspire further exploration and contribute significantly to the literature in this sense.

Clarke et al. (2006) analyzed the relationship between financial development and income inequality. According to the study's results, which used data from 83 countries between 1960-1995, income inequality decreases as financial development increases in the long run. It is also stated that financial development will also improve growth. The findings of the study by Batuo et al. (2010) also revealed similar results. The study's results, which cover the period 1990-2004 and analyze the data of 22 African countries using the panel data method, indicate that income inequality decreases as economies develop their financial sectors. The results also confirm that the level of education plays a vital role in making income distribution more equal. Another finding is that no evidence supports Kuznets' hypothesis of an inverted U-shaped relationship between development and income inequality. Similar results were also found in the study by Akbıyık (2012). The study analyzed the relationship between financial development and income inequality between 2000 and 2010 using panel data from 60 developed and developing countries. A negative linear relationship between financial development and income inequality indicates that financial development reduces income inequality. Moreover, evidence is found for Kuznets' hypothesis of an inverted U-shaped relationship between development and income inequality, except for developed countries. The panel is stationary without a unit root, indicating that shocks to income inequality are not permanent.

Beck, Demirgüç, and Kunt (2007) analyzed data between 1960 and 2005 using panel data regression in their study of 72 countries. They concluded that the development of financial instruments has an equal

and positive effect on poor individuals. With the increase in financial development, the income share of the lowest income quintile of the population increases. Bittencourt (2010) examined the relationship between financial development and income inequality using panel data analysis based on six regions of Brazil. The financial sector and financial instruments were advantageous in reducing income inequality, and financial development significantly reduced it.

Jauch and Watzka (2012) tried to determine the relationship between financial development and income inequality. Using data from 138 developed and developing countries, they concluded that financial development increases income inequality. Kar and Kar (2019) also tried to determine the effect of financial development on income inequality in BRICS economies. According to the empirical results based on the pooled mean group (PMG) estimator of data from 1990-2014, the income inequality-increasing hypothesis, which suggests that financial development in these emerging economies does not benefit low-income groups, is supported. In other words, empirical findings reveal that financial development increases income inequality in the long run.

Sehrawat and Giri (2016) aimed to examine the relationship between financial development, rural-urban income inequality, and poverty reduction in South Asian economies. The stationarity properties of the variables were checked with LLC and IPS panel unit root tests in the study using data from 1990-2013. Pedroni's panel cointegration test was used to examine the long-run relationship, and the panel dynamic least squares (PDOLS) method was applied to estimate the coefficients of the cointegrated equation. In addition, short-run and long-run causality are analyzed using the panel Granger causality test. The findings confirm that there is a long-run equilibrium relationship between the variables. PDOLS results show that financial development and economic growth reduce poverty in South Asian countries, while rural-urban income inequality increases poverty. The empirical findings of the panel Granger causality test show that there is short-run causality from rural-urban income inequality and financial development to poverty reduction and from economic growth to inequality. Younsi and Bechtini (2018) also investigated whether there is a causality between economic growth, financial development, and income inequality. The data for BRICS countries (Brazil, Russia, India, China, and South Africa) for 1995-2015 were analyzed using the panel data method. As a result of the study, Kuznets' hypothesis, in the form of an inverted U between economic growth, financial sector development, and inequality in BRICS countries, was supported. The results of the Granger causality test show that there is a one-way causality from the financial development index to income inequality.

Akalin, Erdoğan and Pata (2024) tried to determine the effect of financial development on income inequality in Türkiye. The study, in which data for the years 1988-2020 were used, was conducted using the time series ARDL bounds test method. The findings of the study suggest that there is a long-run relationship between financial development and income inequality. They concluded that increases in financial development, inflation, and per capita income increase income inequality. In the study by İşcan and Demirel (2024), the findings of the study, in which the data of developing countries and developed countries for the years 2002-2019 are analyzed by panel data method, differ for developing countries and developed countries. In developing countries, income inequality (Gini index) increases by 0.27% when financial development increases by 1%, while in developed countries, income inequality (Gini index) decreases by 0.05% when financial development increases by 1%.

Research on the relationship between financial development and income inequality shows that this relationship can be negative or positive. Some studies suggest that financial development reduces income inequality, while others suggest it increases it. Moreover, it has also been found that there is a causality relationship between financial development and income inequality. For example, a study conducted in Türkiye has shown that financial development increases income inequality. Similarly, it has been found that financial development increases income inequality in developing countries while it decreases it in developed countries. Some studies have shown that financial development reduces income inequality and improves economic growth simultaneously. Other studies have concluded that financial development does not benefit low-income groups and increases income inequality. Some studies show that financial development reduces poverty, but rural-urban income inequality increases poverty. In conclusion, there are different findings in the literature on the relationship between financial development and income inequality, and studies on this issue reveal different results depending on the level of development of countries and the methods and data sets used.

Data Set, Methodology and Empirical Findings

Data Set

Within the scope of the study examining a long-run relationship between financial development and income inequality in Türkiye, the data set for the variables covers the period 1991-2022 and consists of annual observations. The data obtained from the Gini coefficient was used to indicate income inequality in the study. The Gini coefficient, one of the measures of income inequality, varies between 0, which reflects full equality, and 1, which indicates complete inequality. In the calculation of the Gini coefficient, household disposable income, which is calculated by subtracting taxes paid and regular transfers to other households or individuals from the total annual income of households and individuals in the income reference period, is used. The study's data set was obtained from the Thomson Reuters Eikon database. Explanations of the variables used in the study are shown in Table 1.

Table 1. Variables and Descriptions

<i>Variables</i>	<i>Symbol</i>	<i>Explanations</i>
Income Inequality	GE	Income Inequality Rate
Financial Development Index	FDI	Financial Development Rate

Methodology

In order to analyze the cointegration relationship between the variables in the study, the stationarity of the variables is investigated first, and it is expected that the variables will not be stationary at their level values (I_1). Unlike other unit root tests, the KPSS unit root test developed by Kwiatkowski et al. (1992) tests the stationarity assumption under the null hypothesis. The KPSS-based unit root test (Fourier KPSS) and cointegration test (Fourier Shin), developed later in the literature, also test the stationarity assumption under the null hypothesis. Prior to the unit root tests using Fourier functions, the unit root tests in the literature have been criticized in some aspects. Perron's (1989) unit root test was criticized for exogenously determining the structural change and led to the emergence of unit root tests (Lee & Strazicich, 2003; Saikkonen & Lütkepohl, 2002; Lumsdaine & Papell, 1997; Zivot & Andrews, 1992) in which the dates of structural change are determined endogenously. The criticism of these tests is that the number and type of structural changes are determined a priori. Testing a series affected by two structural changes with the Zivot and Andrews unit root test, which allows for one structural change, or testing a series affected by one structural change with the Lumsdaine and Papell unit root test, which allows for two structural changes, would lead to erroneous results. Recently, new unit root tests using Fourier functions have been added to the literature, offering a solution to this problem. Unit root tests developed using Fourier functions can detect sudden and slow changes, and the location, number, and form of structural change do not affect the power of the test (Yılancı, 2017, p. 55).

Based on the Kwiatkowski vd. (1992) (KPSS) unit root test, the Fourier KPSS (FKPSS) test, is one of the first unit root studies conducted by Becker et al. (2006) using the Fourier function. The Fourier KPSS (FKPSS) unit root test detects slow as well as sudden changes; the form, location, and number of structural changes do not affect the power of the test. In the FKPSS test, the equations that Becker et al. (2006) formulated to test the stationarity of the series are given below in level and trended form, respectively.

$$y_t = \alpha_0 + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + e_t$$

$$y_t = \alpha_0 + \beta_t + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + e_t$$

In the equation system, k is the number of frequencies, t is the trend, and T is the sample size. The Fourier KPSS (FKPSS) unit root test, introduced to the literature using Fourier functions, tests the stationarity of the series under the null hypothesis (H_0). Rejection of the null hypothesis (H_0) in the FKPSS unit root test indicates that the series has a unit root.

Cointegration analyses are performed on non-stationary series. Therefore, when non-stationary series are differentiated and rationalized, the data lose some of their properties and the short and long-run relationships that the data have disappeared. Therefore, there will be no long-run relationship between the

series. Cointegration tests eliminate these problems. The common problem in the tests developed for cointegration studies in the literature (Hatemi-J, 2008; Johansen et al., 2000; Gregory & Hansen, 1996; Engle & Granger, 1987) is the a priori identification of the number and form of structural change.

Tsong et al. (2016) introduced a new cointegration test to the literature using Fourier functions and eliminated the problems of previous cointegration tests. Unlike the cointegration tests in the literature, it tests for the existence of cointegration under the null hypothesis (H_0) rather than the absence of cointegration. Due to this approach, it can be considered an extension of the FKPSS unit root test for cointegration. The Fourier cointegration test provides robust results despite the form and number of structural changes. In the Fourier cointegration (FSHIN) test, which was introduced to the literature by Tsong et al. (2016), the final equation to be used to test the main hypothesis is given below (Yılancı, 2017, p. 58):

$$y_t = \delta_0 + \alpha_k \sin\left(\frac{2k\pi t}{T}\right) + \beta_k \cos\left(\frac{2k\pi t}{T}\right) + X_t' \beta + \nu_{1t}$$

Yukarıdaki denklemde yer alan t trendi, k frekans deęerini, T ise gözlem sayısını göstermektedir.

In the above equation, t is the trend, k is the frequency value, and T is the number of observations. If a cointegration relationship is detected, the parameters in the long-run relationships estimated by the Ordinary Least Squares (OLS) method may have various problems (Shin, 1994, p. 92). Stock and Watson (1993) introduced the dynamic least squares method (DOLS), which considers the endogeneity of independent variables and can be used to estimate cointegrated vectors. The DOLS estimator can also provide efficient results in the presence of endogeneity problems. Moreover, the parameters are adjusted for possible autocorrelation and non-normal distribution problems in the error term (Pata & Ela, 2020, p. 180). Tsong et al. (2016) suggested using the DOLS method to obtain long-run forecasting results after determining a cointegration relationship between variables. The model created for this estimator is shown below:

$$GE_t = \alpha_0 + \alpha_1 FDI_t + \sum_{i=-p}^p \delta_i FDI_{t-i} + \varepsilon_t$$

Fourier cointegration analysis was used as an econometric method to investigate a long-run relationship between financial development and income inequality in Türkiye. In order to perform the Fourier cointegration analysis, the stationarity of the variables was first tested using FKPSS and KPSS unit root tests. After the determination of non-stationarity, the existence of a long-run relationship between financial development and income inequality was investigated with the help of the Fourier cointegration test (FSHIN). After determining the existence of a cointegration relationship between the variables in the study, the DOLS (Dynamic Ordinary Least Squares) method proposed by Tsong et al. (2016) was used to obtain the long-run estimation results between financial development and income inequality.

Empirical Findings

Table 2 gives the descriptive statistics of Income Inequality, which is used as the dependent variable, and Financial Development, which is used as the independent variable.

Table 2. Descriptive Statistics for Variables

	<i>GE</i>	<i>FDI</i>
Mean	0.411531	0.404
Median	0.412000	0.430
Maximum	0.428000	0.510
Minimum	0.391000	0.190
Std. Dev.	0.011553	0.092
Skewness	-0.125995	-0.635
Kurtosis	1.611379	2.298
Jarque-Bera	2.655	2.810
Probability	0.265	0.245
Observations	32	32

The data set of the variables analyzed in Table 2 above consists of 32 observations. Considering the analysis period, the income inequality variable's average, maximum, and minimum values are 0.411, 0.428,

and 0.391, respectively. The financial development variable's mean, maximum, and minimum values in this period are 0.404, 0.510, and 0.190, respectively.

The graphs of the level and first difference of the variables are presented in Figure 1 below. As seen in the figure, Fourier estimations successfully capture the oscillations of the series.



Figure 1. Graphs of Variables and Fourier Functions

The Fourier KPSS unit root test, introduced to the literature using the KPSS unit root test and Fourier functions, tests the stationarity of the series under the null hypothesis (H_0), unlike many unit root tests developed. The unit root test results for the series used in the study are presented in Table 3.

Table 3. Unit Root Test Results

Variables	Frequency	Min.SSR	FKPSS	KPSS	F Test Stat.
GE	1.0000	0.0006	0.1841 (7)	0.4898	93.1225
Δ GE	5.0000	0.8408	0.0960 (4)	0.3758	3.3103
FDI	1.0000	0.0876	0.3487 (3)	0.7369	29.6683
Δ FDI	5.0000	0.0190	0.07529 (1)	0.3014	1.4410

Note: The values in parentheses indicate the bandwidth provided by the Newey-West method. At the 10%, 5%, and 1% levels, the FKPSS test critical values are 0.1318, 0.1720, and 0.2699, respectively, while the KPSS test critical values are 0.3470, 0.4630, and 0.7390, respectively. The F test critical values used to test the significance of the trigonometric terms at the 10%, 5%, and 1% levels are 3.935, 4.651, and 6.281, respectively.

According to the results of the FKPSS and KPSS unit root test in Table 3, the null hypothesis (H_0) that GE and FDI variables do not have a unit root (the series is stationary) is rejected at the 5% significance level. When FKPSS and KPSS unit root tests are applied again by taking the first-order differences of the non-stationary variables, the null hypothesis (H_0) cannot be rejected. These results indicate that both variables become stationary when first-order (I_1) differences are taken. When the F test statistic used to test the significance of the trigonometric terms is compared with the critical values, it is seen that the trigonometric terms are significant.

The Fourier cointegration test, introduced to the literature using Fourier functions, tests the existence of cointegration under the null hypothesis (H_0), unlike many other cointegration tests developed. The Fourier - Shin cointegration test results applied to test the existence of a long-run relationship between financial development and income inequality in Türkiye are presented in Table 4 below.

Table 4. Cointegration Test Results

Frequency	Min.SSR	Fourier Cointegration Test Statistics	Shin Cointegration Test Statistics	F Test Statistics
1	0.3235	0.0818 (3)	0.0904 (3)	51.7418

Note: Fourier cointegration test critical values at 10%, 5% and 1% levels are 0.095, 0.124 and 0.198, respectively.

Table 4 presents the results of the Fourier - Shin co-integration test. The FSHIN co-integration test result shows a co-integration relationship between financial development and income inequality in Türkiye at the 5% level. This result shows that changes in financial development have a long-run effect on income inequality. This study used the DOLS (Dynamic Ordinary Least Squares) method proposed by Tsong et al. (2016) to obtain the long-run estimation results between financial development and income inequality. After determining a co-integration relationship between the variables, the long-run coefficients were estimated using the DOLS method, including Fourier functions. The long-run estimation results between financial development and income inequality in Türkiye are presented in Table 5 below.

Table 5. DOLS Estimation Results

Dependent Variable : GE				
Method : Dynamic Least Squares (DOLS)				
Variables	Coefficient	Std.Error	t-stat.	Prob.
FDI	-0.023	0.005	-4.323	0.002
C	0.420	0.002	202.680	0.000
Cos	0.006	0.000	14.744	0.001
Sin	0.010	0.000	13.330	0.002
R ²	0.919			

Table 5 shows that the R² value indicating the explanatory power of financial development for income inequality in Türkiye is 91.9%. The long-run estimation results reveal a statistically significant negative relationship between financial development and income inequality at the 1% confidence level. In other words, when financial development increases by one unit in Türkiye, income inequality decreases by 0.023 units. The study results show that financial development enables low-income individuals to benefit more from economic opportunities by increasing their access to financial services, thereby reducing income inequality.

The study's findings align with some previous studies in the literature. For example, Clarke et al. (2006) and Batuo et al. (2010) find that financial development reduces income inequality in the long run. Similarly, Akbıyık (2012) found a negative relationship between financial development and income inequality. These studies reveal that financial development reduces income inequality and promotes economic growth.

Toda Yamamoto causality results are given in Table 6 below.

Table 6. Toda Yamamoto Causality Test Results

Dependent Variable: GE	x ² Statistic	Degrees of Freedom	Probability
FDI	3.698	1	0.054*
Dependent Variable: FDI			
GE	3.533	1	0.060*

Note: ***, ** and * indicate causality at 1%, 5% and 10% significance levels, respectively.

Table 6 shows a statistically significant causal relationship between financial development and income inequality at the 10% level. Similarly, a unidirectional causality relationship from the income inequality variable to the financial development variable was found to be statistically significant at the 10% significance level. In other words, there is a reciprocal causality relationship between the financial development variable and income inequality at the 10% significance level.

Conclusion

The relationship between financial development and income inequality is highly controversial in economic literature. While it is generally accepted that financial development is one of the key drivers of economic growth, income inequality stands out as a critical issue for social justice and sustainable development. When managed with adequate and appropriate policies, the deepening and expansion of financial systems can reduce income inequalities. Financial development can increase economic opportunities by making credit and investment opportunities available to a broader range of people, contributing to a more balanced income distribution in the long run. However, if care is not taken in this process, financial development can exacerbate income inequalities. Therefore, policymakers must keep this balance in mind. Deepening and expanding financial systems may reduce income inequalities when appropriately managed.

This study aims to analyze the impact of financial development on income inequality in Türkiye. The dataset covering the period 1991-2022 was obtained from the Thomson Reuters Eikon database. In the analysis of the study, firstly, the stationarity of the variables was tested with the Fourier unit root test (FKPSS) and KPSS unit root tests, and the long-run relationship between the variables, which were found to be non-stationary at their level values, was examined with the Fourier cointegration test (FSHIN). The results of the analysis revealed that there is a cointegration relationship between financial development and income inequality in Türkiye. According to the long-run DOLS estimation results, a statistically significant negative relationship was found between financial development and income inequality at the 1% confidence level, and it was concluded that increases in financial development reduce income inequality. The study's findings analyzing financial development's impact on income inequality in Türkiye suggest that financial development reduces income inequality. The inequality-narrowing hypothesis states that financial development will reduce income inequality by increasing the access of low-income individuals and small businesses to financial services. Therefore, the results of this study support the inequality-narrowing hypothesis in the literature. These findings also support the studies by Clarke et al. (2006), Batuo et al. (2010), Akbıyık (2012), Sehrawat and Giri (2016), and Akalin et al. (2020).

The findings of this study suggest that financial development reduces income inequality in Türkiye. The study results show that financial development enables low-income individuals to benefit more from economic opportunities by increasing their access to financial services, thereby reducing income inequality. Moreover, it is observed that financial development encourages participation in economic activities by increasing credit, savings, and investment opportunities, accelerating economic growth, and making income distribution more equitable.

Future research could examine the different dimensions of financial development and its impact on income inequality in more detail. In particular, it is essential to assess the effectiveness of financial policies and investigate their long-term effects on social justice. Such studies can guide countries' financial systems to be more equitable and inclusive.

Ethical Declaration

During the writing process of the study "*The Relationship Between Financial Development and Income Inequality: A Fourier Approach in the Case of Türkiye*" scientific rules, ethical and citation rules were followed. No falsification was made on the collected data and this study was not sent to any other academic publication medium for evaluation.

Etik Beyan

"*Finansal Gelişme ve Gelir Eşitsizliği İlişkisi: Türkiye Özelinde Fourier Yaklaşımı*" başlıklı çalışmanın yazım sürecinde bilimsel kurallara, etik ve alıntı kurallarına uyulmuş; toplanan veriler üzerinde herhangi bir tahrifat yapılmamış ve bu çalışma herhangi başka bir akademik yayın ortamına değerlendirme için gönderilmemiştir.

Declaration of Conflict

There is no potential conflict of interest in the study.

Çatıřma Beyanı

Çalıřmada herhangi bir potansiyel çıkar çatıřması söz konusu deęildir.

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TÜRKÇE GENİŞ ÖZET

Küreselleşme süreci, insanlık tarihi kadar eski bir olgu olmasına rağmen, literatürde 1980'li yıllardan itibaren bilgi ve iletişim teknolojilerindeki hızlı gelişmelerle birlikte daha sık kullanılmaya başlamıştır. Bu dönemden sonra yaşanan teknolojik ilerlemeler, küreselleşmenin etkilerini her alanda derinlemesine hissettirmiştir. Özellikle teknoloji alanındaki yenilikler, bu süreçte büyük bir esneklik kazandırarak ekonomik, finansal, siyasi ve sosyo-kültürel alanlarda önemli değişim ve dönüşümler yaratmıştır. Bu dönüşümler, küreselleşmenin hayatın her köşesine nüfuz etmesine ve çeşitli alanlarda kendini belirgin bir şekilde hissettirmesine neden olmuştur. Finansal gelişmenin gelir eşitsizliği üzerindeki etkisi literatürde üç farklı hipotez ile açıklanmaktadır. Bunlardan ilki finansal gelişmenin gelir eşitsizliğini azaltıcı etkisi olduğunu açıklayan eşitsizlik daralma (inequality-narrowing) hipotezi, bir diğeri finansal gelişmenin gelir eşitsizliğini artırıcı etkisi olduğunu açıklayan eşitsizlik-genişleme (inequality-widening) hipotezi, son olarak bir diğeri de finansal gelişme ve gelir eşitsizliği arasında ters U şeklinde bir ilişkinin varlığı üzerine kurulu finansal Kuznets eğrisi (FKE) hipotezidir. Eşitsizlik daralma hipotezine göre, finansal gelişme, düşük gelirli bireylerin ve küçük işletmelerin finansal hizmetlere erişimini artırarak gelir eşitsizliğini azaltmaktadır. Finansal gelişme, kredi, tasarruf ve yatırım olanaklarını artırarak, ekonomik faaliyetlere katılımı daha fazla teşvik edici bir unsur olmakta ve ekonomik büyümeyi teşvik etmektedir. Bu durum, daha geniş kesimlerin ekonomik fırsatlardan yararlanmasına olanak tanımakta ve gelir eşitsizliğini azaltmaktadır (Clark vd., 2006; Bittencourt, 2006; Liang, 2006; Pata, 2020). Finansal gelişme ve gelir eşitsizliği arasındaki ilişkiyi açıklayan eşitsizlik genişleme hipotezine göre ise, finansal gelişmenin gelir eşitsizliğini artırabileceği öne sürülmektedir. Finansal piyasaların gelişmesinin varlıklı bireyler ve büyük işletmeler için daha fazla kazanç sağladığı savunulmaktadır. Yüksek gelirli kesimler, finansal araçlara daha kolay erişebilir ve daha fazla kazanç elde edebilirken, düşük gelirli bireyler bu fırsatlardan yararlanmakta zorlanmaktadır. Bu durum ise gelir dağılımında daha fazla eşitsizliğe sebebiyet vermektedir. Bir diğeri hipotez ise finansal Kuznets eğrisi hipotezidir. Bu hipotezde finansal gelişme ve gelir eşitsizliği arasındaki ilişki ters U şeklindedir. Bu hipotez, Greenwood ve Jovanovic (1990) tarafından geliştirilmiş ve şu şekilde açıklanmıştır: Ekonomik kalkınmanın başlangıcında finansal piyasalar oldukça geri kalmış ve ekonomik büyüme oldukça yavaş ilerlemektedir. Kalkınma sürecinin devamında finansal piyasalar gelişmeye başlasa da yüksek maliyetler nedeniyle finansal araçlara sadece varlıklı kesimler erişebilmektedir. Bu durum, ekonomi olgunluk aşamasına ulaşana kadar devam eder ve hem tasarruf oranları hem de gelir eşitsizliği artar. Ekonominin olgunluk aşamasına gelindiğinde ise finansal araçlardan yararlanan bireylerin sayısı artar, ekonomik büyüme hızlanmakta ve gelir eşitsizliği azalmaktadır (Greenwood ve Jovanovic, 1990). Literatürde finansal gelişme ile gelir eşitsizliği arasındaki ilişkinin nasıl olduğuna yönelik yapılan çalışmaların sonuçlarının negatif ve pozitif yönlü olduğu görülmektedir. Bazı çalışmalar finansal gelişme ile gelir eşitsizliği arasında negatif yönlü (finansal gelişmişlik artarken gelir eşitsizliğinin azaldığı) bir ilişkinin var olduğunu belirtirken; bazı çalışmalarda tam tersi olarak finansal gelişme ile gelir eşitsizliği arasında pozitif yönlü (finansal gelişmişlik artarken gelir eşitsizliğinin de arttığı) bir ilişki olduğuna yönelik tespitlerde bulunmuşlardır (Clarke vd., 2006; Batuo vd., 2010; Akbıyık, 2012; Jauch ve Watzka, 2012; Sehrawat ve Giri, 2016; Younsi ve Bechtini, 2018; Kar ve Kar, 2019; Akalin vd., 2024; İşcan ve Demirel, 2024). Bu çalışmada da gelir eşitsizliğinin finansal gelişme üzerindeki etkisi literatürde kullanılan yöntemlerden farklı olarak Fourier yöntemi

kullanılarak analiz edilmekte ve bu anlamda literatüre katkı saęlayacaęı düşünölmektedir. Türkiye’de finansal gelişme ile gelir eşitsizlięi arasındaki uzun dönemli ilişkinin varlığının incelendięi çalıřma kapsamında deęişkenlere ilişkin veri seti 1991-2022 dönemini içermekte ve yıllık gözlemden oluşmaktadır. Çalıřmada gelir eşitsizlięinin göstergesi olarak Gini katsayısından elde edilen veriler kullanılmıřtır. Gelir eşitsizlięi ölçütlerinden biri olan Gini katsayısı, tam eşitlięi yansıtan 0 ile tam eşitsizlięi gösteren 1 arasında deęişmektedir. Gini katsayısının hesaplanmasında, hane halkı ve fertlerin yıllık gelirleri toplamından, gelir referans döneminde ödenen vergiler ile dięer hane halklarına veya kişilere yapılan düzenli transferlerin çıkarılmasıyla bulunan hane halkı kullanılabilir gelirinden yararlanılmıřtır. Çalıřmanın veri seti Thomson Reuters Eikon veri tabanından temin edilmiřtir. Türkiye’de finansal gelişme ile gelir eşitsizlięi arasındaki uzun dönemli ilişkinin varlığının arařtırıldıęı çalıřmanın analizinde ekonometrik yöntem olarak Fourier eş-bütünleşme analizinden yararlanılmıřtır. Fourier eş-bütünleşme analizini gerçekleřtirmek için öncelikle deęişkenlerin duraęan olup olmama durumları FKPSS ve KPSS birim kök testleri test edilmiř, duraęan olmadıklarının tespiti sonrasında, finansal gelişme ile gelir eşitsizlięi uzun dönemli ilişkinin varlığı Fourier eş-bütünleşme testi (FSHIN) yardımıyla arařtırılmıřtır. Deęişkenler arasında eş-bütünleşme ilişkisinin varlığı tespit edildikten sonra, finansal gelişme ile gelir eşitsizlięi arasındaki uzun dönem tahmin sonuçlarını elde etmede Tsong vd. (2016) tarafından önerilen DOLS (Dynamic Ordinary Least Squares) yöntemi kullanılmıřtır. Analizin sonucunda, Türkiye’de finansal gelişme ile gelir eşitsizlięi arasında eş-bütünleşme ilişkisinin olduęu tespit edilmiřtir. Eş-bütünleşme ilişkisinin tespiti sonrasında gerçekleřtirilen uzun dönem DOLS tahmin sonuçlarına göre, finansal gelişme ile gelir eşitsizlięi arasında istatistiki olarak %1 güven düzeyinde anlamlı negatif bir ilişki bulunmuř, finansal gelişmedeki artışların gelir eşitsizlięini azalttıęı sonucuna ulařılmıřtır. Türkiye’de finansal gelişmenin gelir eşitsizlięi üzerindeki etkisini inceleyen çalıřmanın bulguları, finansal gelişmenin gelir eşitsizlięini azalttıęı yönündedir. Eşitsizlik daralma (inequality-narrowing) hipotezi de, finansal gelişmenin, düşük gelirli bireylerin ve küçük işlemlerin finansal hizmetlere erişimini artırarak gelir eşitsizlięini azaltacaęını ifade etmektedir. Dolayısıyla bu çalıřmanın sonuçları, literatürde yer alan eşitsizlik daralma (inequality-narrowing) hipotezini destekler niteliktedir. Bu bulgular aynı zamanda Clarke vd. (2006), Batuo vd. (2010), Akbıyık (2012) Sehrawat ve Giri (2016) Akalin vd. (2020) tarafından gerçekleřtirilen çalıřmaları destekler niteliktedir. Bu çalıřmanın bulguları, Türkiye’de finansal gelişmenin gelir eşitsizlięini azalttıęı yönündedir. Çalıřmanın sonuçları, finansal gelişmenin düşük gelirli bireylerin finansal hizmetlere erişimini artırarak ekonomik fırsatlardan daha fazla yararlanmalarına olanak tanıdıęını ve bu sayede gelir eşitsizlięini azalttıęını göstermektedir. Ayrıca, finansal gelişmenin kredi, tasarruf ve yatırım olanaklarını artırarak ekonomik faaliyetlere katılımı teşvik ettięi ve bu durumun ekonomik büyümeyi hızlandırarak gelir dağılımını daha adil hale getirdięi gözlemlenmiřtir. Gelecekte yapılacak çalıřmalar, finansal gelişmenin farklı boyutlarını ve bu gelişmelerin gelir eşitsizlięi üzerindeki etkilerini daha ayrıntılı bir şekilde inceleyebilir. Özellikle, finansal politikaların etkinlięinin deęerlendirilmesi ve bu politikaların toplumsal adalet üzerindeki uzun vadeli etkilerinin arařtırılması önem arz etmektedir. Bu tür çalıřmalar, ölkelerin finansal sistemlerini daha adil ve kapsayıcı hale getirmek için yol gösterici olabilir.