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The Relationship Between Financial Development and Income Inequality for Different Income Groups: An ARDL Bounds Test Approach for Türkiye

Uğur TOPÇU *(https://orcid.org/0000-0003-2537-7966), Çanakkale Onsekiz Mart University, Türkiye; ugurtopcu@comu.edu.tr*

Farklı Gelir Grupları İçin Finansal Gelişim ve Gelir Dağılımı Eşitsizliği Arasındaki İlişki: Türkiye İçin Bir Zaman Serisi Analizi

Abstract

As financial development (FD) has become as important a factor as economic growth, this study analyses how financial development shapes income inequality, based on the Kuznets Curve approach. The research aims to contribute significantly to the literature by examining the relationship between financial development and income distribution from a more current perspective. For this reason, within the scope of the study, two models were created to measure how FD affects different income groups, and the Kuznets Curve approach selected the dependent variables of these models. As a result of the literature review, the independent variables were determined as the FD index, the square of the FD index, the annual percentage change in the consumer price index, the natural logarithm of GDP, and the natural logarithm of transfer expenditures. As a result of the ARDL test, it was concluded that FD caused the gap between the low-income and high-income groups to widen, the share of the low-income group in society to decrease, and the share of the high-income group to increase. These results showed that transfer expenditures can provide short-term solutions to reduce income inequality caused by financial development (FD) in developing economies such as Türkiye. However, it has been recommended that it is necessary to improve financial education, raise awareness and implement financial market reforms for a long-term solution.

Keywords : Financial Development, Income Inequality, Kuznets Curve, ARDL Bounds Test.

JEL Classification Codes : C22, D33, O11.

Öz

Finansal gelişmenin (FD) ekonomik büyüme kadar önemli bir faktör haline gelmesi nedeniyle, bu çalışma finansal gelişmenin gelir eşitsizliğini nasıl şekillendirdiğini Kuznets Eğrisi yaklaşımına dayanarak analiz etmektedir. Araştırma, finansal gelişme ile gelir dağılımı arasındaki ilişkiyi daha güncel bir bakış açısıyla inceleyerek literatüre önemli bir katkı sağlamayı amaçlamaktadır. Bu nedenle çalışma kapsamında FD'nin farklı gelir gruplarını nasıl etkilediğini ölçmek için iki model oluşturulmuş ve bu modellerin bağımlı değişkenleri Kuznets Eğrisi yaklaşımına uygun olarak seçilmiştir. Literatür taraması sonucunda bağımsız değişkenler FD endeksi, FD endeksinin karesi, tüketici fiyat endeksindeki yıllık yüzde değişim, GSYİH'nın doğal logaritması ve transfer harcamalarının doğal logaritması olarak belirlenmiştir. ARDL testi sonucunda FD'nin düşük ve yüksek gelir grupları arasındaki uçurumun açılmasına, düşük gelir grubunun toplumdaki payının azalmasına, yüksek gelirli grupların payının azalmasına neden olduğu sonucuna varılmıştır. Elde edilen bu sonuç Türkiye gibi gelişmekte olan ekonomilerde finansal gelişmenin (FD) neden olduğu gelir eşitsizliğini azaltmak için transfer harcamalarının kısa vadeli çözümler sağlayabileceğini göstermiştir. Ancak uzun vadeli bir

çözüm için finansal eğitimin iyileştirilmesi, farkındalığın artırılması ve bu konuda finansal piyasa reformlarının uygulanması gerektiği önerisinde bulunulmuştur.

Anahtar Sözcükler : Finansal Gelişim, Gelir Eşitsizliği, Kuznets Eğrisi, ARDL Sınır Testi.

1. Introduction

Income inequality is the unequal distribution of total income across individuals or groups. Traditionally measured by the Gini coefficient, it remains one of the most pressing issues in contemporary economic discussions. Until the 1970s, the prevailing view was that economic growth, or "enrichment", was the primary driver of societal development. However, as income inequality increased after the 1970s, the focus shifted, with growing attention paid to the distributional impacts of economic growth, particularly over the past two decades. Recent studies, such as those by Grigoli (2017), have highlighted the asymmetric effects of growth on income distribution. It is now widely accepted that economic growth does not benefit all individuals equally, prompting a surge in research to identify policies to address these disparities.

The 2008 global financial crisis brought significant attention to financial development, leading to important reforms and regulations, particularly within financial markets. Foreign direct investment (FDI) enhances a country's technological capacity, production efficiency, and economic activities (Lee et al., 2017). In the context of increasing global integration and technological advancement, examining how financial development influences various economic variables, particularly income distribution, is essential. The dissemination of technology and information across sectors can have varying effects: while FDI may improve productivity and wages in sectors where it is directed, it could exacerbate inequality in other sectors. For example, the infusion of FDI into high-tech industries may lead to higher wages and skill development in those sectors, while leaving other industries behind. From another perspective, an influx of FDI could negatively affect domestic investors, potentially leading to greater income equality if it reduces the wealth of the wealthiest segments of society. However, this potential for improving income distribution remains complex and requires further examination.

In his book "The Wealth of Nations", Adam Smith stated that "By pursuing his general interest, he often looks after the interest of society more effectively and increases its value than when he intends to look after it" and that economic actors making decisions in line with their interests will maximise social output (Smith, 2020: 349). This statement by Smith is a thesis that today's liberal economists have generally accepted under the name of "the principle of the invisible hand". The social effects of economic growth, which result from individuals looking after their interests, have begun to be questioned, especially in the 20th century. One famous study that questions the relationship between economic growth and income inequality is the article "Economic Growth and Income Inequality", published in the American Economic Review in 1955 by Simon Kuznets. Kuznets (1955) contributed to the economic literature with the "Kuznets Ratio" and "Kuznets Curve" in this study. The

Kuznets Ratio is found by dividing the shares of the 20% or 40% of the population with the lowest income from the society's total income by the shares of the 20% or 40% with the highest income from the society's total income. The research by Kuznets concluded that economic development first increases and then decreases income inequality in society. The result reached in the study was visualised with the "Kuznets Curve", which has an inverted U shape (Kuznets, 1955: 2-11). There have been significant changes in economic terms between today's world and the world in which Kuznets's study was conducted. Compared to the 1950s, the financial market has become a more critical driving force in the economy. For this reason, if the Kuznets Curve, which is used to show the relationship between income inequality and economic development, is adapted to the development in the financial market, a more appropriate analysis can be made for today's economic system, and a policy proposal suitable for today's conditions can be made accordingly.

In Türkiye, the Gini coefficient has steadily increased since 2012, signalling a growing disparity in income distribution (Solt, 2020). This rise in inequality has been linked to a general decline in life satisfaction, suggesting that widening income gaps may negatively affect social well-being and individual quality of life. However, brief periods of improvement occurred during specific economic recovery phases or policy interventions (TUIK, 2023). These developments imply that the income redistribution policies enacted during this period have been ineffective or insufficient in addressing the underlying causes of inequality. Despite public calls for comprehensive structural reforms, political priorities have often favoured short-term, reactive measures that address immediate economic concerns rather than long-term systemic change. Consequently, Türkiye emerges as an ideal context for presenting research topics and formulating policy recommendations.

This study investigates the relationship between FDI and income inequality in Türkiye, using the Kuznets Curve framework to analyse data from 1985 to 2021. A time series analysis will employ the Autoregressive Distributed Lag (ARDL) bounds testing method. This research is the first to examine the impact of FDI on low- and high-income groups within the Kuznets Curve context, offering a novel contribution to the literature on income inequality and FDI in emerging economies.

To structure the paper, the first section reviews the existing literature on income inequality and FDI, providing the theoretical foundation for the study. The second section presents the data and model, followed by a detailed explanation of methodology in the third section. The fourth section reports the analysis results, and the paper concludes with a discussion of the findings and policy recommendations. This structure allows for a clear research presentation, culminating in practical implications derived from the analysis.

2. Literature Review

The literature review generally reveals a consistent negative correlation between FD and income inequality. The studies typically include a time series applied to models that

accept the Gini coefficient as a dependent variable for specific countries or panel data analyses used to country groups.

Research	Countries	Period	Main Variables	Econometric Methodology	Result
Batuo, Guidi & Mlambo (2010)	22 African Countries	1990-2004	Financial Development, Income Distribution	GMM	The relation between variables is inverse
Kim & Lin (2011)	72 Selected Countries	1960-2005	Financial Development, Income Distribution	Panel Threshold Regression	The effect of the level of financial development on income distribution varies.
Gimet & Lagoarde-Segot (2011)	49 Selected Countries	1994-2002	Financial Development, Income Distribution, GDP per capita, Trade Openness	SVAR	Bidirectional causality is detected between the variables.
Hamori & Hashiguchi (2012)	126 Selected Countries	1963-2002	Financial Development, Income Distribution, GDP per capita, Trade Openness	GMM	FD significantly eliminates inequality in income distribution
Yinusa & Alimi (2014)	Nigeria	1981-2012	Financial Development, Income Distribution	Johansen Cointegration Test, Error Separation Model (ECM)	FD significantly eliminates inequality in income distribution
Park & Shin (2015)	162 Selected Countries	1960-2011	Financial Development, Income Distribution	Panel Data Analysis	The relationship between the variables is U-shaped
Naceur & Zhang (2016)	143 Selected Countries	1961-2011	Financial Development, Income Distribution, GDP per capita, Trade Openness, Government Expenditure Ratio	OLS and IV	FD significantly eliminates both the poverty gap and inequality in income distribution.
Destek, Okumuş & Manga (2017)	Türkiye	1977-2013	Financial Development, Income Distribution, GDP per capita, Trade Openness, Government Expenditures Ratio, Inflation	ARDL Bounds, VECM Granger Causality	The relationship between the variables is U-shaped
Younsi & Bechtini (2018)	BRICS	1995-2015	Financial Development, Income Distribution	Pedroni panel cointegration test, Kao residual panel cointegration test, Granger causality test	Financial development positively affects income inequality, and there is a unidirectional causality between financial development and income inequality.
Koçak & Uzay (2019)	Türkiye	1980-2013	Financial Development, Income Distribution	DOLS FM-OLS	FD has a reducing effect on İncome inequality in the long term
Hsieh, Chen & Lin (2019)	86 Selected Countries	1989-2014	Financial Development, Income Distribution	CUP-FM CUP-BC	A linear relationship between income inequality and FD, with inequality increasing in financially developed countries.
Erik-Akyol & Akbalık (2020)	10 Developed Countries	2000-2019	Gini coefficient, Inflation, Domestic loans to GDP ratio, Market capitalisation to GDP ratio	Panel data analysis, Dumitrescu and Hurlin's causality analysis	Inflation is linearly related to the Gini coefficient, and GDP variables are inversely related, with bidirectional causality between variables.
Yılmaz & Demirgil (2021)	Türkiye	1980-2018	Gini Coefficient, FD Index, GDP change	ARDL time series	Variables cointegrated in the long term, the Financial Kuznets curve is valid.
Çetin et al. (2021)	Türkiye	1987-2018	Gini index, Economic growth, Technological innovation, Domestic loans, Broad money	Time series analysis	The financial Kuznets curve is valid for Türkiye in the long term.
Keskin (2022)	Türkiye	1987-2019	Shares of different income groups, GDP growth rate, and Inflation	ARDL time series analysis	The highest income group's share increased, the middle-income group decreased, and no co-integration was found for the lowest income group.
Arat et al. (2022)	15 Middle and Upper-Income Countries, including Türkiye	2002-2018	Gini coefficient, Financial Development, GDP per capita, Inflation rate, Foreign trade	Panel data analysis	The inverted-U hypothesis supported income inequality and FD.

Karim et al. (2022)	Afghanistan, Bangladesh, India, Nepal, Sri Lanka, Pakistan	2006-2009	Financial Development, Income Inequality	Fixed effects, POLS methods	FD reduced the impact of income inequality in the selected economies.
Kim and Lin (2023)	62 Selected Countries	1970-2019	Inflation, Income Inequality, Financial Development	SGMM	A linear relationship between income inequality and inflation, and an inverse relationship between inflation and FD.
Okafor et al. (2023)	48 Selected African Countries	1996-2018	Financial Development, Income Inequality	SGMM	Different effects of FD dimensions on income inequality: inverse relationship with access, stability, efficiency, and linear relationship with depth.

As seen in the table, the existing literature on the relationship between financial development and income inequality primarily focuses on the general direction in which income distribution changes due to financial development. However, limited research examines explicitly how financial development affects the incomes of different income groups in a detailed manner, considering both absolute and relative changes. This study aims to fill this gap by analysing the specific income effects across various income groups, providing a more nuanced understanding of the relationship between financial development and income inequality. Additionally, this study's findings will help form targeted policy recommendations based on the observed income shifts, offering practical insights for policymakers in addressing inequality.

3. Data and Model

In the study, two separate models will be established to determine how the share of the lowest-income group and the share of the highest-income group are affected by FD in Türkiye and to analyse the effects of other factors on these variables separately.

As mentioned in the literature review section, although the Gini index is generally used as the dependent variable in most studies on income inequality, the study will use data on the share of 20% of society with the lowest income share and the share of 20% with the highest income share, parallel to Kuznets's (1955) study. In this direction, two models with different dependent variables and the same independent variables will be established, and the consistency of the results will be compared.

All independent variables except the transfer expenditure variable were determined following the literature review. Although it is seen in the literature that government expenditures are used due to their regulating effect on income inequality, it was preferred to use transfer expenditures in the study, considering that their direct effect would be higher. In this context, the independent variables of the models were determined as the FD index, the square of the FD index, the annual change in the CPI, the natural logarithm of the revenue, and the natural logarithm of transfer expenditures. The models to be established are stated below:

$$\textbf{Model 1: } b20_t = \beta_0 + \beta_1\, fdi_t + \beta_2\, fdi^2_t + \beta_3\, cpi_t + \beta_4\, lny_t + \beta_5\, lntr_t + \varepsilon_t \quad (1)$$

$$\textbf{Model 2: } t20_t = \alpha_0 + \alpha_1\, fdi_t + \alpha_2\, fdi^2_t + \alpha_3\, cpi_t + \alpha_4\, lny_t + \alpha_5\, lntr_t + \varepsilon_t \quad (2)$$

In the equation, $b20_t$ is the share of the lowest 20% of the population in total income, $t20_t$ is the share of the highest 20% of the population in total income, fdi_t is the FD index, fdi^2_t is the square of the FD index, cpi_t is the annual percentage change in CPI, lny_t is the natural logarithm of GDP, and finally $lntr_t$ is the natural logarithm of transfer expenditures. The u_t term at the end of the models is the independent identically distributed error term. In the analysis, Türkiye's annual data for the period 1985 - 2021 will be used. The data on the share of the lowest 20% of the population in total income and the share of the highest 20% in total income were taken from the "World Inequality Database" database. The FD index prepared by the International Monetary Fund (IMF) was used for the FD data. The annual percentage change data in GDP and CPI were obtained from the "World Bank World Development Indicators" database. The transfer expenditures data were compiled from the "Central Government Budget Statistics" database of the General Directorate of Accounting of the Ministry of Treasury and Finance of the Republic of Türkiye.

4. Methodology

Within the framework of Kuznets's (1955) analysis, the effect of the level of FD on these income groups will need to be examined in the short and long term. Therefore, an appropriate co-integration model will be used to measure the long-term effect for both models, and an error correction model will be used to determine the short-term impact. The effect of the change in the level of FD on the lowest and highest income groups is expected to be asymmetric.

Since the Engle-Granger Test (Engle & Granger, 1987) from co-integration analyses only provides analysis opportunities for bivariate models, it is inappropriate for the model. The Johansen Test (Johansen, 1988; Johansen, 1995) is only suitable for multivariate models that are stationary at the same level. In cases where variables are stationary at different levels, the ARDL model (Pesaran et al., 2001) can be applied, but all variables must be stationary at the same level or level 1.

Phillips-Perron unit root tests were applied to determine the variables' stationarity level and select the co-integration model; the results are presented in Table 1.

Table: 1
Results of Phillips-Perron Unit Root Test of Variables

Variable	At level			First Difference		
	No Constant	Constant	Constant + Trend	No Constant	Constant	Constant + Trend
b20	0.830635	-1.613893	-1.884276	-5.139348*	-5.684211	-8.243615
t20	-1.392677	-1.682309	-1.598002	-4.368581*	-4.512101	-4.619022
fdi	1.592925	-2.884375***	-3.335209	-5.972430*	-7.617554	-10.94561
fdi2	1.678582	-1.335706	-3.228974**	-6.631423*	-9.231785	-9.848104
cpi	-0.941318	-1.051964	-1.862699	-5.948304*	-5.866821	-5.827812
lntr	2.869564	-2.143807	-0.082147	-6.691025*	-7.947969	-11.53288
lny	2.645167	-1.752848	-1.461309	-5.333758*	-6.132723	-6.413521
Critical Values	%1		-3.626784	%1		-3.632900
	%5		-2.945842	%5		-2.948404
	%10		-2.611531	%10		-2.612874

, **, * signs indicate stationarity at 1%, 5% and 10% significance levels, respectively.*

The applied unit root test result table shows that the dependent variables b20 and t20 become stationary after taking their first-degree differences. While the independent variables fdi and fdi^2 are stationary at the level, cpi, lntr, and lny become stationary when their first-degree differences are taken.

Since the variables' stationarity levels are not the same and there is no second-degree stationary variable among them, it is appropriate to use the ARDL bounds test to test the model. The ARDL model is presented below. In this model, Y is the matrix of the dependent variable, X is the matrix of explanatory variables, and u_t is the independent identically distributed error term.

$$Y_t = \alpha + \sum_{i=1}^{m} \gamma_i Y_{t-i} + \sum_{i=0}^{n} \beta_i X_{t-i} + u_t \quad (3)$$

The ARDL model, which will include the variables in the X matrix in the empirical studies to be conducted, is presented separately for both models below.

Model 1: $b20_t = \alpha + \sum_{i=1}^{m} \beta_i\, b20_{t-i} + \sum_{i=0}^{n1} \gamma_i\, fdi_{t-i} + \sum_{i=0}^{n2} \delta_i\, fdi^2_{t-i} + \sum_{i=0}^{n3} \varepsilon_i\, cpi_{t-i} + \sum_{i=0}^{n4} \mu_i\, lny_{t-i} + \sum_{i=0}^{n5} \alpha_i\, lntr_{t-i} + u_t$ (4)

Model 2: $t20_t = \alpha + \sum_{i=1}^{m} \beta_i\, t20_{t-i} + \sum_{i=0}^{n1} \gamma_i\, fdi_{t-i} + \sum_{i=0}^{n2} \delta_i\, fdi^2_{t-i} + \sum_{i=0}^{n3} \varepsilon_i\, cpi_{t-i} + \sum_{i=0}^{n4} \mu_i\, lny_{t-i} + \sum_{i=0}^{n5} \alpha_i\, lntr_{t-i} + u_t$ (5)

The ARDL bounds test will question the existence of co-integration between variables. After estimating the coefficients in the equation, the F-test will determine whether the coefficients showing the long-term relationship are simultaneously equal to 0. In the bounds test, the null hypothesis ($\theta1 = \theta2 = \theta3 = \theta4 = \theta5 = \theta6 = 0$) indicates that there is no long-term relationship between the variables.

Model 1: $\Delta b20_t = \alpha + \sum_{i=1}^{m} \beta_i \Delta b20_{t-i} + \sum_{i=0}^{n1} \gamma_i \Delta fdi_{t-i} + \sum_{i=0}^{n2} \delta_i \Delta fdi^2_{t-i} + \sum_{i=0}^{n3} \varepsilon_i \Delta cpi_{t-i} + \sum_{i=0}^{n4} \alpha_i \Delta lny_{t-i} + \sum_{i=0}^{n5} \mu_i \Delta lntr_{t-i} + \theta_1\, b20_{t-1} + \theta_2\, fdi_{t-1} + \theta_3\, fdi^2_{t-1} + \theta_4\, cpi_{t-1} + \theta_5\, lny_{t-1} + \theta_6\, lntr_{t-1} + u_t$ (6)

Model 2: $\Delta t20_t = \alpha + \sum_{i=1}^{m} \beta_i \Delta t20_{t-i} + \sum_{i=0}^{n1} \gamma_i \Delta fdi_{t-i} + \sum_{i=0}^{n2} \delta_i \Delta fdi^2_{t-i} + \sum_{i=0}^{n3} \varepsilon_i \Delta cpi_{t-i} + \sum_{i=0}^{n4} \alpha_i \Delta lny_{t-i} + \sum_{i=0}^{n5} \mu_i \Delta lntr_{t-i} + \theta_1\, t20_{t-1} + \theta_2\, fdi_{t-1} + \theta_3\, fdi^2_{t-1} + \theta_4\, cpi_{t-1} + \theta_5\, lny_{t-1} + \theta_6\, lntr_{t-1} + u_t$ (7)

If the ARDL bounds test results are as expected, the error correction model will be estimated separately for both dependent variables using the equations below. While the first parts of the error correction models express the short-term relationship, the error correction term (ECMt-1) coefficient (λ), which is expected to be between -1 and 0, is used to calculate how many periods it will take to reach the long-term equilibrium in case of a deviation from the equilibrium as a result of a shock.

Model 1: $\Delta b20_t = \alpha + \sum_{i=1}^{m} \beta_i\, \Delta b20_{t-i} + \sum_{i=0}^{n1} \gamma_i\, \Delta fdi_{t-i} + \sum_{i=0}^{n2} \delta_i\, \Delta fdi^2_{t-i} + \sum_{i=0}^{n3} \varepsilon_i\, \Delta cpi_{t-i} + \sum_{i=0}^{n4} \alpha_i \Delta lny_{t-i} + \sum_{i=0}^{n5} \pi_i \Delta lntr_{t-i} + \lambda\, ECM_{t-1} + u_t$ (8)

Model 2: $\Delta t20_t = \alpha + \sum_{i=1}^{m}.\beta_i\ \Delta t20_{t-i} + \sum_{i=0}^{n1}.\ \gamma_i\Delta fdi_{t-i} + \sum_{i=0}^{n2}.\ \delta_i\Delta fdi^2_{t-i} + \sum_{i=0}^{n3}.\varepsilon_i\Delta cpi_{t-i} + \sum_{i=0}^{n4}.\alpha_i\Delta lny_{t-i} + \sum_{i=0}^{n5}.\mu_i\Delta lntr_{t-i} + \lambda\ ECM_{t-1} + u_t$ (9)

Finally, diagnostic tests (normality, serial autocorrelation, heteroscedasticity, and Ramsey-Reset tests) and structural break tests (Cusum and Cusum Squares) will be applied to the models' residuals to confirm the accuracy of the obtained results.

5. Analysis Results

To apply the ARDL bounds test, the first thing to do is to determine the optimal lag times of the variables. The Akaike information criterion will be used to determine the optimal lag times of the variables in the model. Accordingly, the analysis results for Model 1, whose dependent variable is b20, are presented in Figure 1. Since the model with the lowest value in Figure 1 will be determined to offer the optimal lag length, the ARDL (1,4,3,2,3,4) model was selected among 20 alternative models for Model 1.

Figure: 1
Alternative Lag Lengths for Model 1

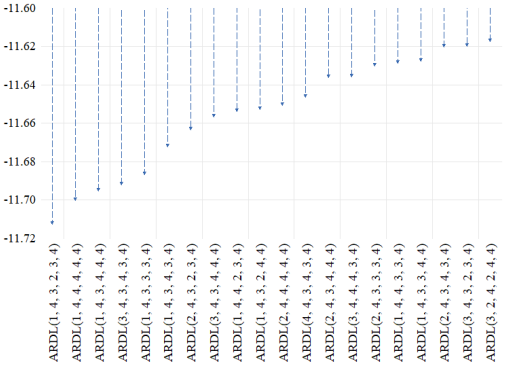


Figure 2 presents the same analysis results for Model 2, with t20 as the dependent variable. The ARDL (5,4,3,3,4,2) model, which has the lowest value in Figure 2, was selected for the analysis.

Figure: 2
Alternative Lag Lengths for Model 2

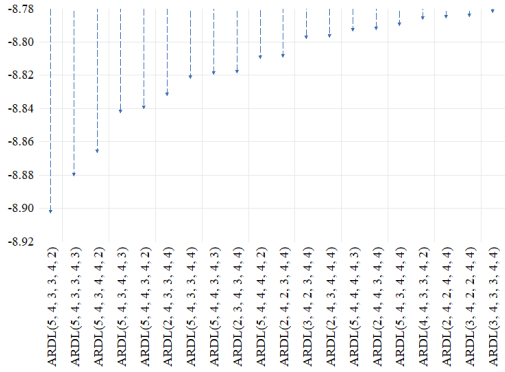


Table 2 presents the results of the ARDL bounds test applied to test the long-term relationship for both models. The F-statistic values of the tests performed for Model 1 and Model 2 were 7.445852 and 10.09151, respectively. Since the F-statistic values of both models are greater than the 1% significance level upper limit critical value of 5.419, the null hypothesis stating that there is no co-integration relationship between the variables for both models will be rejected.

Table: 2
ARDL Bounds Test Results

Estimated Model	**Optimal Delay Length**	**F-statistics (k=5)**
Model 1 (b20)	1,4,3,2,3,4	7.445852
Model 2 (t20)	5,4,3,3,4,2	10.09151
Critical Values (n=35)	**I(0)**	**I(1)**
%1	3.900	5.419
%5	2.804	4.013
%10	2.331	3.417

If the diagnostic tests evaluating the statistical significance of the models yield favourable outcomes, a long-term relationship exists between the dependent variable and the independent variables in both models.

Since the existence of the long-term relationship has been determined, it is now possible to analyse both short-term and long-term relationships. Therefore, first, long-term and short-term estimates will be made. Table 3 shows the long-term coefficient estimation results for Model 1, whose dependent variable is b20.

Table: 3
Long-Term Coefficient Estimation for Model 1 (b20)

Variable	Coefficient	Standard Error	t-statistics	Prob.
fdi	-0.616059	0.238891	-2.578829	0.0275**
fdi2	0.775298	0.321338	2.412715	0.0365**
cpi	0.010663	0.003951	2.691549	0.0226**
lny	-0.019028	0.010791	-1.763239	0.1083
lntr	0.029113	0.011013	2.643471	0.0246**
C	0.111094	0.143006	0.776850	0.4552

****: Significant at the 1% level. **: Significant at the 5% level. *: Significant at the 10% level.*

The long-term estimation results for Model 1 show that all variables except lny are determinants of b20.

As the level of FD in the country increases, the share of the lowest-income 20% of society decreases. The estimation results show that a 1% increase in the FD index decreases the share of the lowest-income 20% of society by 0.62%. Therefore, it is inferred that FD contributes to increased income inequality for the lowest-income 20%.

Observing the adverse effects of FD and the positive impact of the square of FD on the independent variable in the long term indicates that the result aligns with the Kuznets Curve. The findings suggest that the impact of FD on b20 will initially be negative, followed by a positive effect. As expected, the relationship between transfer expenditures and the share of the lowest income 20% of society is again linear. It is concluded that the increase in transfer expenditures made by the state increases the share of the lowest income 20% of society, thus reducing income inequality. This result demonstrates that the positive effect of transfer expenditures is crucial in prioritising social policy.

Finally, contrary to expectations, the relationship between the annual change in the CPI and the share of the lowest income 20% in society is linear. This situation is estimated because this group generally comprises wage earners, and nominal wage increases are indexed to inflation. After examining the long-term variables, the short-term relationship between the variables was investigated using the error correction model, and the coefficient indicating the error correction rate was estimated. The estimation results are presented in Table 4.

Table: 4
Short-Term Coefficient Estimation for Model 1 (b20)

Variable	Coefficient	Standard Error	t-statistics	Prob.
Δ(fdi)	-0.163017	0.024224	-6.729656	0.0001*
$\Delta(fdi_{t-1})$	0.112793	0.028285	3.987732	0.0026*
$\Delta(fdi_{t-2})$	0.005601	0.014324	0.390979	0.7040
$\Delta(fdi_{t-3})$	0.031484	0.005810	5.419284	0.0003*
$\Delta(fdi^2)$	0.264922	0.033645	7.492421	0.0000*
$\Delta(fdi^2_{t-1})$	-0.026364	0.033645	-0.783597	0.4514
$\Delta(fdi^2_{t-2})$	0.087581	0.024405	3.588600	0.0049*
Δ(cpi)	0.003423	0.001222	2.800113	0.0188**
$\Delta(cpi_{t-1})$	0.005347	0.001237	4.320676	0.0015*
Δ(lny)	0.002393	0.000790	3.028093	0.0188**
$\Delta(lny_{t-1})$	0.013047	0.001565	8.339397	0.0000*
$\Delta(lny_{t-2})$	0.009253	0.001441	6.421730	0.0001*
Δ(lntr)	0.007148	0.001183	6.042952	0.0001*
$\Delta(lntr_{t-1})$	-0.001255	0.000930	-1.348785	0.2072
$\Delta(lntr_{t-2})$	0.000122	0.000924	-0.131998	0.8976
$\Delta(lntr_{t-3})$	0.004510	0.000814	5.541343	0.0002*
ECM_{t-1}	-0.646463	0.070791	-9.132007	0.0000*

****: Significant at the 1% level. **: Significant at the 5% level. *: Significant at the 10% level.*

When the estimation results of the error correction model are examined, it is shown that all variables, including lny, which are not determinants of the model in the long term, are determinants of b20 in the short term. Although the coefficients of all variables are consistent with the long-term coefficients, a linear relationship is estimated between lny and b20. Therefore, it is estimated that the GDP increases the share of the 20% with the lowest income in society in the short term, and the GDP has no effect on this variable in the long term.

Similar to the long-term results, observing the adverse effects of FDI and the positive impact of the squared term of FDI on the independent variable in the short term indicates that the result is consistent with the Kuznets Curve. Furthermore, the positive impacts of inflation, the increase in GDP, and the rise in transfer expenditure on the b20 in the short term highlight the importance of these factors in shaping short-term policies. In this context, it is concluded that growth-oriented policies, supported by transfer expenditures, should be prioritised to improve the situation of this income group.

The fact that the error correction term (ECMt-1), which expresses how many periods it will take to return to the steady-state balance in the event of a deviation from the balance that may occur in the short term, is statistically significant at the 1% significance level is also an indicator of the existence of a long-term relationship. The error correction term coefficient of -0.646463 indicates that approximately 65% of a short-term deviation from the steady-state balance is corrected in the next period.

After interpreting the results of Model 1 with the dependent variable b20, the same analyses will be conducted for Model 2 with the dependent variable t20. The estimates made in Model 2 are expected to be asymmetric from those in Model 1. The long-term coefficient estimates obtained from the ARDL bounds test for Model 2 are presented in Table 5.

Table: 5
Long-Term Coefficient Estimation for Model 2 (t20)

Variable	Coefficient	Standard Error	t-statistics	Prob.
fdi	0.766225	0.340946	2.247352	0.0745***
fdi2	-1.269935	0.502276	-2.528363	0.0526***
cpi	0.015863	0.007040	2.253189	0.0740***
lny	0.058239	0.025611	2.274009	0.0721***
lntr	-0.061422	0.019100	-3.215756	0.0236**
C	0.125149	0.415181	0.301431	0.7752

****: Significant at the 1% level. **: Significant at the 5% level. *: Significant at the 10% level.*

The long-term estimation results for Model 2 show that all independent variables are determinants of the dependent variable t20. The coefficients of all variables except cpi in the model are asymmetric with Model 1.

While the share of the 20% of the society with the lowest income decreases as the level of FD increases in Model 1, the results of Model 2 show that FD increases the share of the 20% of the society with the highest income in the society. Accordingly, a 1% increase in the FD index increases the share of the 20% of society with the highest income from society by 0.77%. The results obtained from both models show that the increase in the level of FD decreases the income of the 20% with the lowest share and increases the income of the 20% with the highest share, thus increasing the inequality in income distribution in a two-way manner.

On the other hand, the increase in transfer expenditures made by the state asymmetrically reduces the share of 20% of society's income from society with Model 1. In this respect, transfer expenditures, contrary to FD, increase the income of the 20% of society with the lowest share while decreasing the income of the 20% of society with the highest share, thus reducing the inequality in income distribution in a two-way manner.

In Model 1, the long-term increase in income was not statistically significant for the income of the 20% of society with the lowest share, while in Model 2, the change in income had a linear relationship with the share of the 20% of society with the highest share, as expected. Accordingly, it was concluded that the increase in income increased the share of this group in society.

Finally, it was estimated that the annual change in the CPI caused an increase in income of 20% of society, with the highest share. It is thought that this situation is due to the fact that this group is a group that generally earns from the sales of goods and services to consumers. The increases in consumer goods prices increase this group's earnings nominally. After analysing the long-term relationship, the error correction model was applied to investigate the short-term relationship for Model 2, and the results are presented in Table 6.

Table: 6
Short-Term Coefficient Estimation for Model 2 (t20)

Variable	Coefficient	Standard Error	t-statistics	Prob.
$\Delta(t20_{t-1})$	0.221208	0.078480	2.818649	0.0372**
$\Delta(t20_{t-2})$	-0.154275	0.075396	-2.046206	0.0961***
$\Delta(t20_{t-3})$	-0.211801	0.094566	-2.239711	0.0752***
$\Delta(t20_{t-4})$	0.208408	0.100244	2.079012	0.0922***
$\Delta(fdi)$	-0.493476	0.086551	-5.701547	0.0023*
$\Delta(fdi_{t-1})$	-1.174630	0.121745	-9.648243	0.0002*
$\Delta(fdi_{t-2})$	-0.857806	0.120558	-7.115320	0.0009*
$\Delta(fdi_{t-3})$	-0.199729	0.026092	-7.654748	0.0006*
$\Delta(fdi^2)$	0.498304	0.122124	4.080309	0.0095*
$\Delta(fdi^2_{t-1})$	1.415820	0.166803	8.487977	0.0004*
$\Delta(fdi^2_{t-2})$	0.709858	0.153599	4.621507	0.0057*
$\Delta(cpi)$	-0.007136	0.005161	-1.382620	0.2253
$\Delta(cpi_{t-1})$	-0.105194	0.010235	-10.27766	0.0001*
$\Delta(cpi_{t-2})$	-0.037591	0.006166	-6.096614	0.0017*
$\Delta(lny)$	-0.005421	0.004077	-1.329680	0.2411
$\Delta(lny_{t-1})$	-0.126982	0.009486	-13.38682	0.0000*
$\Delta(lny_{t-2})$	-0.132772	0.011607	-11.43871	0.0001*
$\Delta(lny_{t-3})$	-0.061250	0.005891	-10.39753	0.0001*
$\Delta(lntr)$	-0.082633	0.008084	-10.22210	0.0002*
$\Delta(lntr_{t-1})$	-0.035315	0.005424	-6.511144	0.0013*
ECM_{t-1}	-1.697841	0.136194	-12.46632	0.0001*

****: Significant at the 1% level. **: Significant at the 5% level. *: Significant at the 10% level.*

When the error correction model estimation results for Model 2 are evaluated, it is observed that CPI does not exhibit a statistically significant relationship with t20 in the short term. However, a significant relationship is found in the cases with 1 and 2 lags, and the negative sign of the coefficient suggests an inverse relationship. Upon examining the estimation results for the lny variable, it can be concluded that there is no statistically significant relationship with t20 in the short term. However, a significant relationship is identified in cases with 1, 2, and 3 lags, and the negative sign of the coefficient indicates an inverse relationship between lny and t20.

Contrary to long-term estimates, the relationship between t20 and fdi is inversely proportional, and with the fdi2 variable, it is linearly proportional. In addition, an inverse relationship was found between variables lntr and t20, consistent with long-term estimates. Therefore, it was concluded that in the short term, FD and transfer expenditures reduce the share of the 20% group with the highest share in society.

The fact that the error correction term (ECMt-1), which shows how long it will take to reach the steady-state balance that may occur in the short term, is statistically significant at 1% and indicates a long-term relationship. The estimated coefficient value of -1.697841 indicates that in the event of a deviation from the steady-state balance in the short term, the long-term balance is approached very quickly.

Diagnostic tests are conducted to evaluate the statistical significance, and the results presented in Tables 7 and 8 were applied separately to each model.

Table: 7
Diagnostic Test Results Applied for Model 1

Test	H_0 Hypothesis	Prob.	H_0 Hypothesis Decision
Breusch-Godfrey Serial Correlation LM Test	There is no serial correlation.	0.7205	Fail to Reject
Heteroskedasticity Test: Breusch-Pagan-Godfrey	The variance of the residuals is constant.	0.4745	Fail to Reject
Heteroskedasticity Test: ARCH(1)	The variance of the residuals is constant.	0.4643	Fail to Reject
Jarque Bera Normality Test	The residuals have a normal distribution.	0.9581	Fail to Reject

Table 7 presents the results of the diagnostic tests applied for Model 1; because of the applied tests, it was determined that the model did not have a serial correlation problem, the variance of its residuals was constant, and its residuals had a normal distribution.

Table: 8
Diagnostic Test Results Applied for Model 2

Test	H_0 Hypothesis	Prob.	H_0 Hypothesis Decision
Breusch-Godfrey Serial Correlation LM Test	There is no serial correlation.	0.4433	Fail to Reject
Heteroskedasticity Test: Breusch-Pagan-Godfrey	The variance of the residuals is constant.	0.8906	Fail to Reject
Heteroskedasticity Test: ARCH(1)	The variance of the residuals is constant.	0.9048	Fail to Reject
Jarque Bera Normality Test	The residuals have a normal distribution.	0.5955	Fail to Reject

Table 8 presents the results of the diagnostic tests applied for Model 2. The tests showed that, as in Model 1, Model 2 does not have a serial correlation problem; the variance of its residuals is constant, and its residuals have a normal distribution. Finally, CUSUM and CUSUMSQ tests were applied to both models to investigate the stability of the variables. The graphs of the test results for each model are presented in Figures 3 and 4.

Figure: 3
CUSUM and CUSUMSQ Test Results for Model

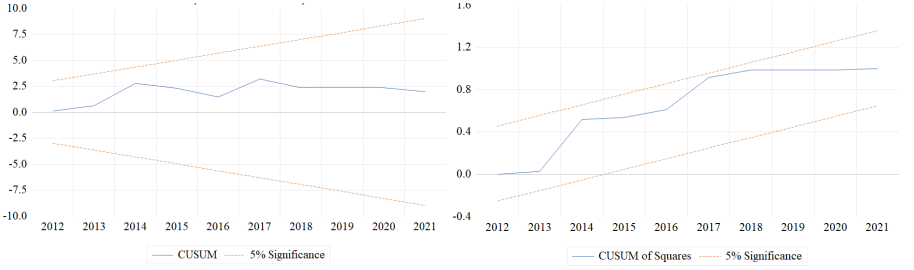
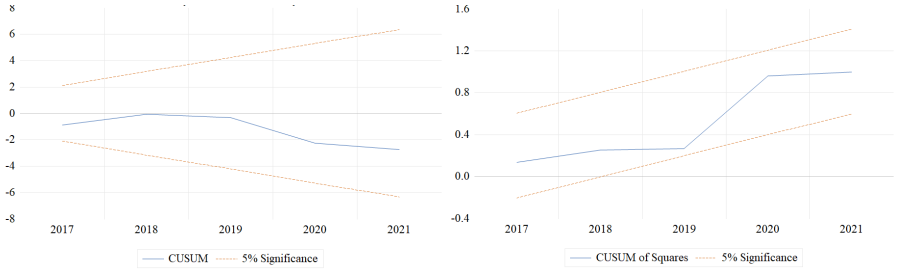


Figure: 4
CUSUM and CUSUMSQ Test Results for Model 2



It was concluded that the stability condition was met because the variable estimates for both models' CUSUM and CUSUMSQ test results were within the 95% confidence interval.

6. Conclusion

Governments in developing countries like Türkiye often prioritise short-term supply-side policies over comprehensive long-term reforms, partly driven by concerns about re-election. This tendency is particularly evident in cases where there is a shortage of foreign currency, prompting policymakers to seek immediate relief through short-term measures (Sirin et al., 2023: 2). While such policies may stimulate short-term economic growth, they fail to address the deeper structural issues that hinder sustainable and equitable economic development. For example, transfer expenditures may provide temporary financial relief but do little to rectify income distribution disparities or establish a foundation for long-term growth. Structural and economic reforms are essential to ensure a more balanced distribution of wealth and enduring economic stability. Without these reforms, the root causes of economic inequality and reliance on short-term solutions will likely persist.

In the study, the analysis results conducted on Model 1 showed that the share of the lowest income group and the FD index are inversely proportional both in the long and short term. A linear relationship was found between transfer expenditures and the share of this group of society. In Model 2, a linear relationship is estimated in the long term, and an inverse relationship is estimated in the short term between the share of this group of society's income and the FD index. Contrary to Model 1, an inverse relationship is found between transfer expenditures and the share of this group from society. According to the results, FD reduces the share of society's lowest and highest income in the short term. In the long run, FD causes the share of the lowest income group in society to decrease and the share of the highest income group to increase. Therefore, the increase in the level of FD for Türkiye leads to a decrease in the income of the low-income group and an increase in the income of the high-income group in the long term and causes an increase in inequality in income distribution. These results are consistent with Keskin (2022), who separated income groups as in this study. (Keskin, 2022: 921-927) According to the estimation results regarding the

transfer expenditures variable, the share of the income of the lowest income group is linear in both the short and long term, and the share of the highest income group is inversely proportional in both the short and long term. Therefore, an increase in transfer expenditures has a corrective effect on income distribution inequality in the short and long term.

Economic growth is vital for societal advancement, but must be accompanied by fair wealth distribution. While transfer expenditures can mitigate the negative impact of FD on income distribution in the short and long term, they do not resolve the underlying structural issues. As the model in this study illustrates, increasing transfer expenditures can reduce income inequality in the short term. However, such policies only provide temporary relief and fail to address the broader, systemic causes of inequality. To achieve long-term structural change, raising awareness about finance and financial products and introducing young people to the financial system is necessary. Additionally, reforms in the financial market aimed at reducing income inequality are critical. As suggested by Naceur and Zhang (2016) and Arat et al. (2022), enhancing financial literacy and fostering a financial culture can mitigate the long-term adverse effects of FD on income distribution. These efforts, alongside broader structural reforms, are essential to achieving lasting economic equity in Türkiye.

This study, which examines the effects of policy instruments on different income groups using two distinct models within a single analysis, offers a valuable contribution to the existing literature. Future research could extend this analysis by applying these models, based on the Kuznets Approach, to countries at different stages of development. Additionally, panel data analysis could be used to explore income distribution across country groups, such as OECD and BRICS nations. These future studies could provide deeper insights into the factors influencing income distribution and help formulate more nuanced and effective policies. Such analyses may enhance our understanding of global income inequality and contribute to developing more targeted policies.

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