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Analysis of Turkey's classic and financial kuznets curves in regards to the level of development and increased distribution+

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ABSTRACT

In this research, we probe the authenticity of both the Financial Kuznets Curve hypothesis and the classical Kuznets curve within the Turkish economy, exploring the interrelation between financial development and income distribution. By employing the ARDL bounds test approach in the econometric analysis, we ascertain that the Financial Kuznets Curve is applicable to Turkey. This means the correlation between income distribution and the extent of financial development adopts an inverted U-shaped pattern. Moreover, the interrelation between GDP and income distribution doesn't form an inverted U pattern, demonstrating that the classical Kuznets curve is not pertinent in the context of Turkey. From the derived outcomes, it is inferred that prioritizing policies that accentuate financial development would constitute a more judicious economic strategy in Turkey, particularly for redressing disparities in income distribution, instead of merely focusing on economic growth.

I. Introduction

One of the core responsibilities of economic administration is to rectify inequalities in income distribution. The propulsion of development is largely contingent on financial evolution, which is notably influenced by liberal policies. Financial development fundamentally pertains to the realm where, beyond banking and stock exchanges, financial assets are channeled, offering an array of funds and credit options to potential borrowers and integrating both local and foreign assets. This progression in finance enables more efficacious utilization of savings, propelling economic enhancement by translating savings to investments. The prevailing explicative nature of scientific inquiries into individual income distribution in Turkey is predominantly due to the limited availability of pertinent studies and the ensuing data shortfall. This renders the available knowledge on income distribution trends in Turkey rather restricted. Addressing this knowledge gap is pivotal for a deeper understanding of the dynamics of income distribution and the symbiotic relationship between growth and income distribution and is essential for the development of relevant policies.

This study seeks to scrutinize the relationship between financial development, total loans disbursed, foreign direct investments, and income distribution in the Turkish economy from 1995 to 2022. Additionally, the study assesses the applicability of both classical and financial Kuznets curves by incorporating variables such as growth and the financial development index and their respective squares. This analysis is anticipated to make a substantial contribution to existing literature, as there are scarce studies in both national and international domains that concurrently examine the financial and classical Kuznets curves. The incorporation of credit utilization and foreign direct investment as variables is also expected to augment the uniqueness of this study. To achieve these objectives, the study will initially delve into outlining the theoretical framework, followed by a review of both national and international literature. In the concluding sections, econometric analyses will be deployed to investigate the interrelationships between the variables, and the resultant estimations will be delineated.

Kuznets (1955) posited that as development and economic growth occur, the distribution of income would initially experience a decline in equity, but as growth and income continue to rise, the inequality in income distribution would subsequently diminish. Kuznets maintained that due to more pronounced income disparities in developing nations compared to their developed counterparts, the escalating income inequality at the onset of economic development could impede the subsequent phases of the developmental trajectory (Kuznets, 1955).

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Referred to as the Kuznets Hypothesis in scholarly literature and represented as an inverted U-shaped curve, the Kuznets curve has undergone several adaptations over the years. One such adaptation is the Financial Kuznets Hypothesis introduced by Greenwood and Jovanovic (1990). This hypothesis posits a relationship between financial development and income inequality analogous to the classical Kuznets curve. Both development and financial development amplify economic growth by fostering the accumulation of physical and human resources. Thus, the enactment of policies that enhance the developmental state of the financial system within countries is crucial (Hepsağ, 2017).

The interconnections between income distribution and both development and financial development are interpreted through two distinct perspectives within the framework of the Kuznets Hypothesis. Greenwood and Jovanovic (1990) depict the relations between these elements as an inverted U Curve, aligning with the classical Kuznets curve, while Galor and Zeira (1993) advocate for the linear hypothesis. It uses the Lorenz Curve for the GINI coefficient developed by Gini (1912) to measure income distribution inequality. Developed by Lorenz (1905), the Lorenz curve is a graphical expression of the inequality in the distribution of income to the population. The curve intersects the diagonal of a square at its extreme points. The GINI coefficient takes a value between 0 and 1, and as it approaches 1, income inequality increases.

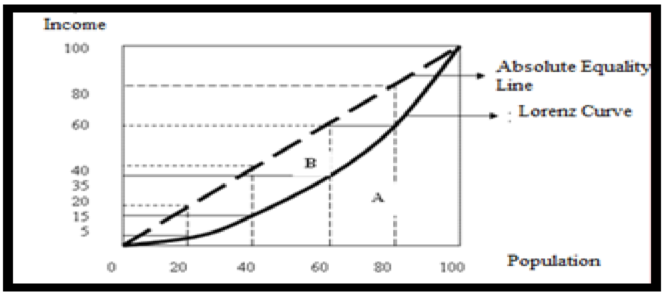

Figure 1: Lorenz Curve

In Figure 1's Lorenz curve, the vertical axis depicts the accumulated income percentages, while the horizontal axis indicates the accumulated population percentages (%). The entirety of society's income is reflected on the vertical side, with the total population that shares this income shown on the horizontal side. A diagonal line at 45 degrees, shown as dashed, represents perfect equality, where every portion of the population gets an equal income percentage.

When we drift further from this dashed diagonal, it signifies a growth in income equality. The two reverse L-shaped lines originating from the bottom left corner, moving first horizontally and then ascending vertically, stand for absolute inequality. In essence, a GINI coefficient of 0 suggests that the income is shared with utmost equality across the population. Conversely, a coefficient value of one implies a skewed distribution of national income. The Lorenz curve for any given distribution can be articulated either through the cumulative distribution function, F(X), or the probability density function, f(X), as shown in equation (1) (Altunöz, 2021).

$$\mathbf{L(F)} = \frac{\int_{-\infty}^{x(F)} xf(x)dx}{\int_{-\infty}^{\infty} xf(x)dx} = \frac{\int_{0}^{F} x(F')dF'}{\int_{0}^{1} x(F')dF'} \qquad (1)$$

In Figure 1, the GINI coefficient is the ratio of the area between the Lorenz curve and the diagonal to the area under the line of full equality. The area between the exact equality line and the Lorenz curve is shown as B in figure 1. The area under the Lorenz curve is shown with A. In this context, the GINI coefficient is expressed as in equation (2).

$$\text{Gini coefficient} = B / (B+A) \qquad (2)$$

If the Gini coefficient is lower than 0.20, it indicates low inequality, between 0.20 and 0.50 indicates moderate inequality, and above 0.50 indicates high inequality. Another income distribution measurement method is the share method. In this method, households are grouped as 1% 100%, 5% 20%, 10% 10% and 5 20%, and the shares of the groups from the total income are compared. Although the Turkish economy has made significant progress in income distribution in recent years, the problem has not been fully resolved. This situation can be observed in Table 1.

Per Table 1, a diminishing P80/P20 ratio signifies a reduction in income inequality. Between 2006 and 2021, the GINI coefficient and P80/P20 ratios didn't showcase substantial betterment. The GINI coefficient, initially at 0.428 in 2006, dwindled to 0.40 in 2021, while the P80/P20 ratio contracted from 9.6 to 7.6. In this regard, the P80/P20 ratio, reflecting the income disparity between the wealthiest 20% of the populace and the poorest 20%, has descended by 2 points. A noteworthy observation in Table 1 is the non-stable yet discernible reduction in the rate compared to 2006, with a notable decline particularly in 2020 due to the pandemic. Accordingly, Table 2 displays the 20 percent Individual Groups in Turkey.

Income and Living Conditions Survey data for 2021 in Table 2 are presented with reference to the previous calendar year 2020. In the income calculations in the aforementioned report, household incomes are converted into equivalent household disposable income considering the household composition and size. According to the results of Table 2, the share of the high 20% group in total income decreased by 0.8 points compared to the previous year and decreased to 46.7%, while the share of the lowest income 20% group increased by 0.2 points to 6%, increased to 1. Gini coefficient sharing in the regional sense, which was announced by TURKSTAT until 2019, left its place to the P80/P20 ratio as of 2019. This situation can be observed in Table 3.

Table 1: Turkey's GINI Coefficient and P80/P20 Ratio (2006-2021)

Date	GINI Coefficient	P80 / P20 Ratio
2006	0,428	9,6
2007	0,406	8,1
2008	0,405	8,1
2009	0,415	8,5
2010	0,402	7,9
2011	0,404	8,0
2012	0,402	8,0
2013	0,400	7,7
2014	0,391	7,4
2015	0,397	7,6
2016	0,404	7,7
2017	0,399	7,5
2018	0,408	7,6
2019	0,395	7,4
2020	0,410	8,0
2021	0,401	7,6

Source: TURKSTAT (2022), Income and Living Conditions Report 2021

Table 2: Individual Groups of 20 Percent in Turkey

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Income reference year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	100	100	100	100	100	100	100	100	100	100
First %20	5.9	6.1	6.2	6.1	6.2	6.3	6.1	6.2	5.9	6.1
Second %20	10.6	10.7	10.9	10.7	10.6	10.7	10.6	10.9	10.6	10.8
Third %20	15.3	15.2	15.3	15.2	15	14.8	14.8	15.2	14.9	15.1
Fourth %20	21.7	21.4	21.7	21.5	21.1	20.9	20.9	21.4	21.1	21.3
Last %20	46.6	46.6	45.9	46.5	47.2	47.4	47.6	46.3	47.5	46.7

Source: TURKSTAT (2021 Income and Living Conditions Report)

Table 3: Regional Income Distribution Status in Turkey (2013-2021)

Dates	Provinces and Regions with the Lowest Gini Coefficients	Provinces and Regions with the Highest Gini Coefficients
2013	Eastern Blacksea 0,315	Mediterranean Region 0.399
2014	Zonguldak, Karabük, Bartın 0,304	Erzurum, Erzincan, Bayburt 0.413
2015	Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir 0,308	Şanlıurfa, Diyarbakır 0,420
2016	Zonguldak, Karabük, Bartın 0,315	Adana, Mersin 0.414
2017	Erzurum, Erzincan, Bayburt 0,291	İstanbul 0.443
2018	Malatya, Elazığı, Bingöl 0,305	İstanbul 0.444
Dates	The Province with the Highest Income According to P80/P20 Ratio	The Province with the Lowest Income According to P80/P20 Ratio
2019	İstanbul 7,8	Zonguldak, Karabük, Bartın 4,2
2020	İstanbul 7,7	Zonguldak, Karabük, Bartın 4,2
2021	İstanbul 7,6	Malatya, Elâzığ, Bingöl, Tunceli4,1

Source: Compiled by the author announced by TURKSTAT.

According to Table 3, there are serious differences between regions and provinces in Turkey, and these differences are not stable on a yearly basis. Considering the years 2013-2018, which are reported as GINI coefficient, the average of the provinces with the lowest GINI coefficient is 3, and the average of the provinces with the highest GINI coefficient is 0.41. When we examine the year 2019, Istanbul ranked first among the provinces with the highest income with a P80/P20 ratio of 7.8 in income distribution inequality and maintained its position in 2020 and 2021 as well. Zonguldak, Karabük and Bartın share the last three in 2020 and 2021 in the ranking of the provinces with the lowest income distribution inequality with a P80/P20 ratio of 4.2. Zonguldak, Karabük and Bartın regions, which have a P80/P20 ratio of 4.2, appear as the cities with the lowest rates. This means that the income inequality in the region formed by these three cities is relatively less. In 2022, while Istanbul kept its place, Zonguldak, Karabük, Bartın were replaced by Malatya, Elazığ, Bingöl and Tunceli.

2. Literature

Chen (2003) conducted an analysis using panel data to examine the validity of the Kuznets curve in 43 selected countries from Africa, Asia, and Latin America. She found the relationship between the variables to exhibit an inverted-U shape. Ang (2008) scrutinized the validity of the financial Kuznets hypothesis for India spanning the years 1951-2004, concluding that investments in both foreign and domestic financial sectors intensify disparities in income distribution. Law and Tan (2009) applied the ARDL bounds test approach in their study, assessing the relevance of the financial Kuznets hypothesis to the Malaysian economy from 1980-2000. The study included variables like financial development, Gini coefficient, GNI per capita, institutional quality, and inflation. The results implied that economic growth, enhanced institutional quality, and diminished inflation alleviate disparities in income distribution. Malinen (2012) examined the classical Kuznets hypothesis for Latin American countries, postulating a long-term equilibrium relationship between growth and income distribution, with the relationship being negative in developed countries. Hoi and Hoi (2012) explored the influence of financial development on income distribution in Vietnam over 2002-2008, using panel data analysis. They concluded that financial development mitigates income distribution inequality, but no strict U-shaped relationship exists between the two variables. Park and Shin (2015) delved into the impact of financial development on income inequality, analyzing 162 developing Asian countries between 1960 and 2011. Preferring panel data analysis, they found the nature and magnitude of the relationship between income distribution and financial development to vary across countries, and they observed a U-shaped relationship in every country included in the analysis. Also, Altunöz (2015) investigated the Kuznets curve's validity in the Turkish context between 1991 and 2014, relating income to financial development. He concluded that variables like GDP per capita, trade, and private sector loans play a positive role in addressing income inequality. Topuz and Dağdemir (2016) examined the applicability of the Kuznets curve across 94 nations between 1995-2011, affirming the hypothesis's validity. The study revealed that in countries with low to middle incomes, economic growth was associated with a rise in income inequality, whereas in affluent nations, it resulted in a decrease. Destek et al. (2017) scrutinized the same hypothesis for Turkey from 1977-2013, concluding that escalations in inflation rate and public expenditures magnified income disparity, while a surge in national income equitably distributed the income. Their findings corroborated the inverted-U shaped Financial Kuznets curve within the surveyed period. HepSağ (2017) applied the ARDL bounds test approach to evaluate the Financial Kuznets Curve's validity in G7 countries. The outcomes revealed its applicability to Italy and Germany but not to Canada, England, or the USA. Torusdağ and Barut (2020) evaluated both the classical and financial Kuznets hypotheses for Turkey, establishing the validity of the Environmental Kuznets curve but not the Financial Kuznets Curve. Pata (2020) explored multiple relationships, including financial development and Gini coefficient, in Turkey between 1987-2016, discovering that while inflation and fixed capital stock accentuate income inequality, urbanization diminishes it.

Altunöz (2021), using ARDL bounds test method for his analysis on Turkey, concluded the classical Kuznets curve as invalid and the financial one as valid, while Dumrul et al. (2021) found no long-term cointegration relationship between financial development and income inequality in the context of the Financial Kuznets Curve Hypothesis in Turkey. Özdemir (2021) researched the Financial Kuznets curve's validity across 27 OECD countries from 1990-2017, the empirical findings of which contested the conventional belief in the hypothesis's validity, illustrating a U-shaped structure instead. Efeoğlu (2022), researching newly industrialized countries between 1987-2019, asserted the validity of both the classical and financial Kuznets curves, uncovering an inverted-U relationship between financial development and income inequality, with per capita GDP and its square as control variables, thereby substantiating the inverted-U relationship between income per capita and income inequality in such nations. Çay and Akan (2023) investigated the relationship between economic growth and environmental pollution in their study by testing the Environmental Kuznets Curve (EKC) hypothesis using data from 37 OECD countries. In their analysis, they used variables such as energy consumption, per capita real gross domestic product (GDP), the square of per capita real GDP, urbanization rate, trade liberalization, and CO2 emissions for the period covering the years 1990-2015 for OECD countries. As a result of the analysis; the coefficient of energy consumption has been found to be positive and statistically significant. Generally, energy consumption has a positive impact on carbon emissions. The increase in trade liberalization has increased carbon emissions in some countries, while it has reduced carbon emissions in others. The increase in the urbanization rate has reduced carbon emissions in some countries, while it has created a positive impact in others. The openness index has generally been observed to have a negative effect on carbon emissions. As a result of the study, the EKC hypothesis was found to be valid in 14 countries, while it was concluded that the EKC hypothesis was not valid in 23 countries. İmamoğlu and Onbaşıoğlu (2023) have examined the role of globalization on environmental quality by applying the Environmental Kuznets Curve (EKC) hypothesis for Pakistan between the years 1975–2015. Variables and the Autoregressive Distributed Lag (ARDL) methodology and the error correction model were used to examine the short and long-term relationship between globalization and environmental quality. Empirical findings reveal that independent variables such as CO2 emissions, GDP, energy, and globalization have a long-term relationship. In the case of Pakistan, the findings of this research have been corroborated by the EKC hypothesis, also supported by the impulse response function. Moreover, Granger causality indicates that there is a long-term unidirectional causality involving GDP, energy usage, globalization, and carbon dioxide in Pakistan.

3. Econometric Analysis of the Kuznet Curve Hypothesis

In this section, the validity of the classical and financial Kuznets hypothesis for the Turkish economy (whether it is an inverted U-shaped or not) in the Turkish economy will be analyzed for the years 1995-2022. The variables included in the analysis, their symbols and the sources obtained can be viewed in Table 4.

Table 4: Variables, Abbreviation and Sources

abbreviation	Variables	Sources
logGINI	GINI	OECD and Worldbank
logGDP	Gross Domestic Product (Current)	TURKSTAT and Worldbank
$(logGDP)^2$	Gross Domestic Product (Current) squared	TURKSTAT and Worldbank
$logloan$	Total Credit / GDP	Banks Association and TURKSTAT.
$logFDI$	Financial Development Index	IMF
$(logFDI)^2$	Financial Development Index squared	IMF
$loginv$	Foreign Direct Investments / GDP	Ministry of Commerce

Based on Table 4, the GINI coefficient serves as the variable representing income distribution, while GDP (current prices 2013), the ratio of net inflow foreign direct investments to GDP, and the financial development index, which assesses the functionality of financial institutions and markets, act as variables reflecting economic development. The loan variable is represented by the sum of loans extended by both the public and private sectors, and it is expressed as a proportion of GDP. Given that the Financial Kuznets Curve hypothesis fundamentally posits an inverted U-shaped and non-linear relationship, the squares of the FDI and GDP variables are incorporated into the model. All variables are logged for the analysis, and they are considered on an annual basis. Economic models primarily aim to explore the enduring relationships between varying elements.

In econometric analyses, the presence of unit roots in time series, meaning non-stationarity, can lead to spurious regression issues. To mitigate this, the variables under scrutiny should be stationary and devoid of a unit root. The ascertainment of this condition is executed through unit root tests, with a preference for the Philips-Perron (PP) unit root test initially. Although the Augumented Dickey-Fuller (ADF) unit root test often used in scholarly literature assumes that the error terms are statistically independent with constant variance, the Phillips and Perron (1988) test extended this assumption concerning error terms (Altunöz, 2013).

The regression equations applied in the ADF test align with those used in the PP unit root test. Nonetheless, the autocorrelation issue is addressed by applying a non-parametric adjustment in the τ statistics of the preceding term's parameter (δ). The established regression catering to this need is elucidated in equation (3).

$$\Delta Y_t = \beta' D_t + \pi Y_{t-1} + u_t \;\; and \; u_t \sim I(0) \qquad (3)$$

PP unit root test results can be viewed in Table 5.

Table 5: Philips Perron Unit Root Test Results

Seri	PP Unit Root Test			
	I(0)		I(1)	
	not constant	constant	not constant	constant
$logGINI$	-1.261(0)	-1.301 (0)	-6.521(1)*	-6.651(1)*
$logGDP$	-0.105(0)	-4.322 (0)	-4.019(1)*	-5.886(1)*
$logGDP^2$	0,422(0)*	0,587(0)*	-	-
$logloan$	-1.302(0)*	-1.431(0)*	-	-
$logFDI$	-4,871(0)*	-5,920(0)*	-	-
$logFDI^2$	-6,179(0)*	-6,827(0)*	-	-
$loginv$	-0.449(0)	-1.698(0)	-6.415(1)*	-5.723(1)*

Note: *,** and *** denote stationarity at the significance level of 1%, 5% and 10%, respectively.

According to Table 5, while the total credit and financial development index variables were stationary at the 1% significance level, all the remaining variables became stationary at the 1% significance level with and without a trend when their first difference is taken. It is stationary at level when squared while the growth variable is first stationary. Perron (1989) states that erroneous results may arise in cases of structural break in the analysis. The unit root test developed by Zivot and Andrews (1992) recommends 3 different models. In model A, it assumes that the series will be broken all at once, and the constant term contains a dummy variable. In model B, a one-time break in the slope of the trend function is predicted and the slope coefficient includes the dummy variable. In the C model, both the constant coefficient and the training coefficient contain a dummy variable and combine the first two models. This situation is seen in equations (4), (5) and (6). (Zivot ve Andrews, 1992: 261).

Model A: $Y_t = \mu + B_t + \delta Y_{t-1} + \emptyset_1 DU(\lambda) + \sum_{i=1}^{k} \delta_i \Delta Y_{t-i} + \varepsilon_t$ (4)
Model B: $Y_t = \mu + B_t + \delta Y_{t-1} + \emptyset_2 DT(\lambda) + \sum_{i=1}^{k} \delta_i \Delta Y_{t-i} + \varepsilon_t$ (5)
Model C: $Y_t = \mu + B_t + \delta Y_{t-1} + \emptyset_1 DU(\lambda) + \emptyset_2 DT(\lambda) + \sum_{i=1}^{k} \delta_i \Delta Y_{t-i} + \varepsilon_t$ (6)

In models, dummy variables are expressed as DU and DT. DU denotes a break in level and DT denotes a break in the slope.

$$\boldsymbol{DU}(\lambda) = \begin{cases} 1, t > T_B \\ 0, \ t < T_B \end{cases} \quad \boldsymbol{DT}(\lambda) = \begin{cases} t - T\lambda \ \ t > T_B \\ 0, \quad t < T_B \end{cases}$$

Here, t=1,2,....T denotes time, break date $T_B$and break point $\lambda = \frac{T_B}{T}$, Unit root test results are shown in Table 5.

Table 6: Zivot - Andrews Unit Root Test Results

		Zivot-Andrews					
		Model A		*Model B*		*Model C*	
Variables	*K*	*t*	*TB*	*t*	*TB*	*t*	*TB*
logGINI	1	-3,18**	2001: Q1	-3,01*	2000: Q3	-5,42**	2001: Q3
logGDP	0	-7,66	2000: Q3	-7.65	2001: Q2	-7,00	2000: Q2
$logGDP^2$	2	-7,67	2000: Q3	-7,91	2001: Q2	-7,21	2001: Q2
logloan	1	-2,61	2001:Q1	-3,11	2000: Q2	-4,12	2001: Q2
logFDI	1	-6,99	2008:Q3	-7,90	2008:Q3	-8,11	2008:Q3
$logFDI^2$	2	-7,99	2007:Q3	-8,01	2008:Q3	-8,34	2008:Q3
loginv	5	-8,94*	2008: Q2	-9,90	2008: Q3	-9,94	2008: Q2

Note: ** and * denote 5% and 1% significance level, respectively. Critical levels are -5.19 and -4.21 for Model A; Model B: -5.25 and -4.90; Model C: -6.60 and 6.11. The number of delays is expressed as k.

Structural breaks of the time series in Table 6 are considered by the Zivot-Andrews Unit Root test. According to the test results, the null hypothesis could not be rejected at the significance levels of the GINI and credit variables for all three models, and this result means that the GINI and credit variables are not stationary with the breakout dates in the table.

For the other variables, the null hypothesis was rejected according to each model result, so it was concluded that they were integrated in the first order (Altunöz, 2013 :187). The results show that while the dependent variable is stationary at the first difference, some of the variables subject to the other analysis are stationary at the level and some are stationary at the first difference. The ARDL Bounds Test Approach allows cointegration analysis for level and first order stationary variables, and the important constraint is that the dependent variable is not stationary at the level and no variable subject to the analysis is second order integrated (Pesaran et al., 2001). According to the obtained unit root test results, ARDL approach was decided to be the most appropriate model. The bounds test is based on the estimation of the constrained error correction model using the least squares (LCS) method. The model with the bounds test estimated can be followed in equation (7).

$$GINI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1 GINI_{t-1} + \sum_{i=0}^{n} \alpha_2 GDP_{t-1} + \sum_{i=0}^{n} \alpha_3 loan_{t-1} + \sum_{i=0}^{n} \alpha_4 FDI_{t-1} + \sum_{i=0}^{n} \alpha_5 inv_{t-1} + \beta_1 GINI_{t-1} + \beta_2 GDP_{t-1} + \beta_3 loan_{t-1} + \beta_4 FDI_{t-1} + \beta_5 inv_{t-1} + \varepsilon_t$$

In Equation (7), delta denotes the difference in the lags of the variables, and n stands for the lag length. For analyzing sequential dependency, Breusch-Godfrey was chosen as the test, and to ascertain the lag length, both Akaike Information Criteria (AIC) and Schwarz Information Criteria (SIC) were utilized. The execution of the ARDL Bounds test approach involves testing the null hypothesis, rooted in equation (6). Given this framework, to ensure the proper functionality of the F statistics derived from the Wald test, it is crucial that there exists no autocorrelation in the error terms. The hypotheses are established in the following manner.

$H_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ (No long-term relationship between GINI and independent variables)
$H_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$ There is a long-run relationship between GINI and independent variables)

The results of the determination of the lag length are presented in Table 7.

Table 7: Determination of Lag Length for Bound Test

m	*AIC*	*SIC*	$X^2(1)BREUSCH - GODFREY$	$X^2(4)BREUSCH - GODFREY$
1	5.69	6.51	12.09(0.000) **	16.500(0.010) **
2	5.72	6.51	11.47 (0.001) *	12.66(0.014) *
3	5.88	6.20	11.134(0.005)	14.49(0.024)
4	5.16	6.00	10.30(0.071)	12.88(0.040)
5	5.12	6.03	12.219 (0.010) *	12.31(0.0100) *
6	5.81	6.11	10.100(0.010)	16.16(0.071)
7	5.83	6.52	15.256(0.105)	18.71(0.0243)
8	5.90	6.33	8.124(0.550)	10.07(0.8511)

Note: * and ** denote 1% and 5% significance level, respectively. Probability values are shown in brackets.

Based on the outcomes attained through Schwartz and Akaike information criteria, the lag length showcasing the smallest values is identified as 5. However, according to the autocorrelation test conducted using the BREUSCH-GODFREY test, a problem of autocorrelation is evident at a lag length of 5. Consequently, 4 was selected as the lag length, as this second smallest value didn't exhibit any autocorrelation issues. Subsequent to determining the lag length, the boundary test analysis progresses to scrutinize the presence of a cointegration relationship. In this regard, if the result of the F-statistics test surpasses the upper limit of the F-statistic, a conclusion regarding the existence of a cointegrating relationship among the variables is drawn. If not, the null hypothesis is upheld. When the acquired F value resides between the lower and upper limit values, it remains uninterpretable. The results of the F statistic are displayed in Table 8.

Table 8: F Statistics Test Results (Wald Test)

Critical Values at 10% Significance Level			
k (number of dependent variables)	f stat.	Lower limit I(0)	Upper limit I(1)
	7,11	3,12	4,14

According to the results of Table 8, the F statistic is above the upper limit and there is a long-term relationship between the variables. The results of the Boundary Test and the predicted long-term ARDL models can be viewed in Table 9.

Table 9: Estimation Results of Long-Term ARDL Models

Variables	Coefficient	t stat.
logFDI	0,074	10,431 *
$logFDI^2$	-0,011	- 12,671*
logGDP	12,712	9,212*
$logGDP^2$	-4,890	-0,710
loglon	-0,081	-8,114*
loginv	0,076	5,333*

Note: * denotes the significance at 1% significant level

Based on the findings presented in Table 8, all the coefficients, aside from the square of GDP, are significant at the 5% level. The variables FGE and the square of FGE are statistically significant at the 5% level. Moreover, the FGE variable has a positive value, while its square has a negative value. These outcomes validate the Financial Kuznets Curve hypothesis in Turkey, indicating an inverted-U-shaped relation between financial development and disparities in income distribution. Within the Turkish economy, the disparity in income distribution escalates alongside financial development until it reaches a certain threshold, after which enhancements in financial development diminish income distribution inequalities.

Furthermore, in exploring the Classical Kuznets Curve hypothesis, the GDP variable is significant at the 5% level, while the coefficient of the GDP variable's square is not significant. This demonstrates the absence of an inverted-U-shaped relationship between economic growth and inequality in income distribution in Turkey. Additionally, credit utilization is found to positively impact income distribution, while it is evident that foreign direct investments exacerbate injustices in income distribution.

Table 10: Diagnostic Tests for Long-Term Estimates

Diagnostic Tests				
$R^2 = 0{,}77$	*F Stat: 5,440(0,01)*	$Breusch - Godfrey\ LM$: 0,36(0,08)	*Ramsey Reset:1,88(0,01)*	
$Adj\ R^2 = 0{,}71$	*ARCH-LM:2,39(0,10)*	*Jarque-Berra Normality:0,043(0,60)*		

When the Diagnostic tests in Table 10 were examined, the autocorrelation problem was tested with the Breusch-Godfrey LM Test and no autocorrelation problem was found. In addition, it was understood that there was no problem of varying variance with the ARCH LM Test, and that there was no problem of model building with the Ramsey Reset test. In addition, the Jarque-Bera Normality test indicates that the error term has a normal distribution.

Short Term Relationship

The model used for the analysis of the short-term relationships between the error correction model and the variables can be seen in equation (7).

$$\Delta GINI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1 \Delta GINI_{t-1} + \sum_{i=0}^{n} \alpha_2 \Delta GDP_{t-1} + \sum_{i=0}^{n} \alpha_3 \Delta loan_{t-1} + \sum_{i=0}^{n} \alpha_4 \Delta FDI_{t-1} + \sum_{i=0}^{n} \alpha_5 \Delta inv_{t-1} + \beta_1 GINI_{t-1} + \beta_2 GDP_{t-1} + \beta_3 loan_{t-1} + \beta_4 FDI_{t-1} + \beta_5 inv_{t-1} + ECT_{t-1} + \varepsilon_t \quad (7)$$

In Equation (7), the error correction term (ECT) represents the one-term lagged value of the series of error terms obtained from the long-run relationship. The value is expected to be negative and between 0 and 1. Short-term forecast results can be viewed in Table 11.

Table 11: ARDL (4,1,0,1) Error Correction Model Results

Variables	Coefficient	t Stat.
logFDI	fdı	2.102(0.00)***
$logFDI^2$	-1.011	-2.49(0.02)
logGDP	10,.008	-2.610(0.00)***
$logGDP^2$	-1.121	3.111(0.00)***
logloan	-1.221	2.032(0.60)*
loginv	0.241	1.601(0.00)**
ECT	-1.09	-3.71(0.00)***
C	0.004	-0,0323(0,889)

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

The fact that the ECT (Error correction term) is between (-1) and (-2) values indicates that the process has been reached with decreasing fluctuations around the long-term equilibrium values, while a smaller or positive value of the error correction term than (-2) indicates that the balance has been moved away (Eriçok and Yılancı,2003). The resulting error correction term (-1.02) indicates that the short-term imbalances are eliminated in the long-term. Diagnostic tests for short-term predictions can be viewed in Table 12.

Table 12: Diagnostic Tests for Short-Long-Term Estimates

Diagnostic Tests				
$R^2 = 0{,}75$	*F Stat. 5,555(0,00)*	$Breusch-Godfrey\ LM$: 0,34(0,07)	*Ramsey Reset:1,88(0,01)*	
$Adj.R^2 = 0{,}72$	*ARCH-LM:2,41(0,10)*	*Jarque-Berra Normality:0,043(0,70)*		

When the Diagnostic tests in Table 12 were examined, the autocorrelation problem was tested with the Breusch-Godfrey LM Test and no autocorrelation problem was found. In addition, it was understood that there was no problem of varying variance with the ARCH LM Test, and that there was no problem of model building with the Ramsey Reset test. In addition, the Jarque-Bera Normality test indicates that the error term has a normal distribution. Brown et al. (1975) carried out Cusum and CusumQ analyzes to measure whether the long-term coefficients included in the analysis are stable to reach the error term in econometric analysis. Cusum and CusumQ graphs can be seen in figure 2.

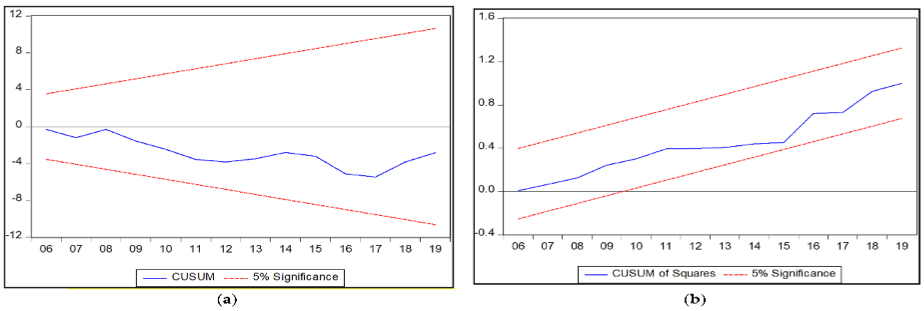

Figure 2: Cusum and CusumQ Charts

In Figure 2, CUSUM (left graph) and CUSUMQ (right graph) are between dashed lines, indicating that the model is stable.

4. Conclusion

In this research, the presence of an inverted-U-shaped correlation between financial development and income distribution inequality in the Turkish economy is scrutinized. Based on the econometric analysis results, it's concluded that the Financial Kuznets Curve hypothesis holds true in Turkey, showcasing an inverted-U-shaped connection between financial development and disparities in income distribution. Furthermore, the analysis reveals that the incorporation of credit amplifies the impact on income distribution, while direct capital investments distort income distribution. The Classical Kuznets Hypothesis, using Gini coefficient-GDP variables, was also probed in this study, and no evidence was found of an inverted-U-shaped relationship in Turkey. The insights derived from the econometric analysis are deemed crucial for informing the creation and execution of economic policies. Given the validation of the Financial Kuznets Curve hypothesis in the Turkish economy, it is perceived that focusing on enhancing financial development as a policy to mitigate income inequality and disparity would be more rational and effective than solely emphasizing economic growth. Assessing the results collectively, it's discerned that financial development is a pivotal component of economic development in the Turkish economy. In nations where the financial system operates efficiently and effectively, a probable reduction in income inequalities is anticipated, thereby elevating the populace's welfare levels. For upcoming research in this domain, it is posited that more dependable conclusions can be drawn by constructing an optimal dataset incorporating variables like financial scale and institutional quality, which are anticipated to augment the efficacy of financial markets.

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