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Income Inequality, Poverty and Growth

Gelir Eşitsizliği, Yoksulluk ve Büyüme

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Gelir Eşitsizliği, Yoksulluk ve Büyüme[1]

Öz

Günümüzde küresel eşitsizliğin ve yoksulluğun en önemli nedenlerinden biri ekonomik büyümedeki artışın ülkeler ve bölgeler arasında eşit olmayan bir şekilde paylaşılmasıdır. Gelir eşitsizliğindeki artış yoksulların payını azaltması nedeniyle ekonomik kalkınmanın önünde bir engel oluşturmaktadır. Dolayısıyla, yoksulluğun ve gelir eşitsizliğinin azaltılması kalkınma sürecinde temel bir politika hedefi olmaktadır. Çünkü yoksulluğun azaltılması için büyümenin yanı sıra adil bir gelir dağılımının sağlanması daha etkili sonuçların elde edilmesi açısından önem arz etmektedir. Bu nedenle çalışmada küresel gelir eşitsizliği boyutu ve ne yönde değişim gösterdiği parametrik olmayan koşullu yoğunluk tahmin yöntemi kullanılarak analiz edilmektedir. Analizde 1995-2017 yılları arasında küresel gelir eşitsizliğinin azalış göstermediğini destekleyen kanıtlar elde edilmektedir. Bu sonuç gelirin eşit dağıldığı ülkeler ve gelirin daha adaletsiz dağıldığı ülkeler arasında farkın arttığına işaret etmektedir. Bununla birlikte, çalışmanın diğer bir amacı ise, gelir eşitsizliği, yoksulluk ve ekonomik büyüme arasındaki ilişkinin araştırılmasıdır. Bu kapsamda ülkeler gelir gruplarına göre sınıflandırılarak yatay kesit veri tahmin yöntemi ile incelenmektedir. Çalışmanın genel bulguları teorik literatürle uyumlu olarak gelir gruplarına göre çeşitlilik göstermektedir. Elde edilen sonuçlara göre, bütün gelir gruplarında gelir eşitsizliğindeki artış yoksulluğu arttırmakta, ekonomik büyüme ise yoksulluğu azaltmaktadır. Bu bağlamda ülkelerin yoksulluk sorunlarıyla etkili olarak mücadele edebilmesi, artan gelir eşitsizliği olgusunun dikkate alınmasını gerektirmektedir. Çünkü ekonomik büyümenin yoksulluk üzerindeki olumlu etkisi, genel olarak ülkelerde gelir eşitsizliği seviyesine bağlı olmaktadır. Bununla birlikte, orta gelir grubunda gelir eşitsizliğinin artması büyümeyi arttırırken, yüksek gelir grubunda büyümenin artmasının eşitsizliği azalttığına yönelik sonuçlar elde edilmektedir.

Anahtar Kelimeler: Gelir Eşitsizliği, Yoksulluk, Büyüme, Parametrik Olmayan Koşullu Yoğunluk Tahmincisi, Yatay Kesit Veri Analizi

Income Inequality, Poverty and Growth

Abstract

Today, one of the most important causes of global income inequality and poverty is the unequal sharing of the increase in economic growth between countries and regions. The increase in income inequality creates an important obstacle to economic development as it reduces the share of the poor in economic growth. Therefore, reducing poverty and

[1] This article is derived from doctoral dissertation titled "Ekonomik Büyüme, Yoksulluk ve Gelir Eşitsizliğinin Dinamikleri: Farklı Gelir Grubu Ülkeleri Üzerine Karşılaştırmalı Bir Analiz" (Economic Growth, Poverty and the Dynamics of Income Inequality: A Comparative Analysis on Different Income Groups Countries).

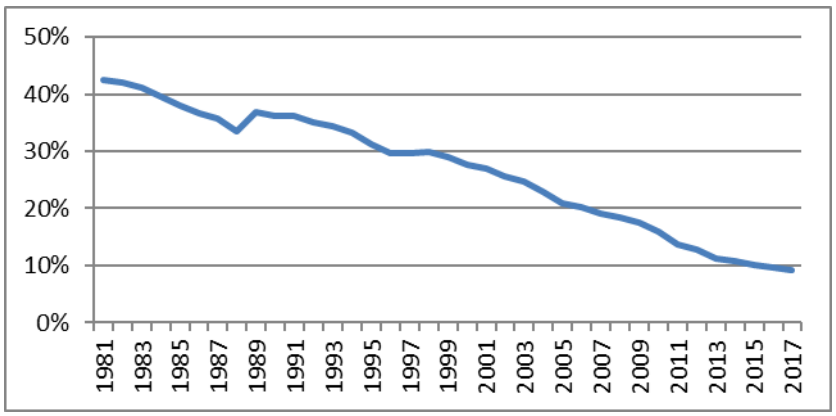
income inequality is a fundamental policy goal in the development process. Because in the process of poverty alleviation, providing a fair income distribution as well as growth is important in terms of obtaining more effective results. For this reason, the aim of the study is to analyze the direction of global income inequality and its change by using the nonparametric conditional density estimation method. The analysis provides evidence to support that global income inequality did not decrease between 1995 and 2017. This result indicates that the gap is widening between countries with more even distribution and countries with an unfair distribution of income. Besides, the other aim of this study is to investigate the relationship between income inequality, poverty and economic growth. In this context, countries are classified according to income groups and analyzed with cross-section data estimation method. The general findings of the study vary in income groups in accordance with the theoretical literature. According to the results for all income groups, economic growth decreases poverty and income inequality increases poverty. On the other hand, results show that while increasing income inequality in the middle-income group increases growth, in the high-income group the increase in growth decreases inequality.

Keywords: Income inequality, Poverty, Growth, Nonparametric conditional density estimation, Cross-section data analysis

Introduction

Today, eradicating absolute poverty and increasing the welfare of societies has become an important policy goal for governments and many international organizations. According to the World Bank data for 2019, extreme poverty rates, which are defined as the proportion of individuals living below $ 1.90 per day, have been showing a decreasing trend since 1980 (see Figure 1). This led to one of the Millennium Development Goals (MDGs), which is to halve the proportion of the population experiencing extreme poverty by 2015. However, this progress has been due to the decline of extreme poverty with the increasing wealth of many developing countries in East Asia and the Pacific regions, along with the economic rise of China in the past years. These two regions have made significant progress within the scope of enhancing the common welfare in order to enable the poor in societies to participate and benefit from economic success, which is the other main goal of the World Bank. In spite of these positive developments, poverty still persists in various regions of the world, and many developing countries still face great difficulties in combating poverty. For this reason, fighting extreme poverty is far from coming to an end. One of the most important reasons for this situation is inequality. A large part of the global income continuously increases the income in the upper part of the income group and makes the situation of those in the lower parts of the income group more evident. This situation can be seen in Figure 2. While the share of the global top 10% from global income is approximately 51% since 1980, the share of the global bottom 50% from total income is around 9%. This situation shows that the problem of inequality maintains its importance in the world.

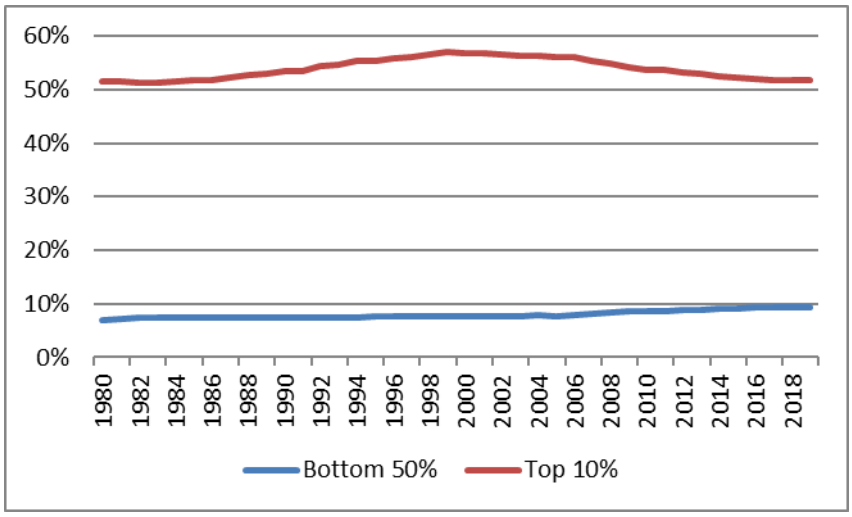
Figure 1. Global Poverty Rate (1981-2017)



Source: PovcalNet, World Bank

The number of poor people in the world is quite high and the benefits of economic growth are also shared unequally between regions and countries. While extreme poverty is declining globally, poverty is deepening in some regions, particularly in countries with violent conflict and weak institutions (Acemoğlu & Robinson, 2012). Therefore, inequality and poverty are a problem for all developed and developing countries. However, several developing countries experiencing high economic growth have noticed that the growth benefits low-income individuals very little. One of the most important reasons for this is that economic growth and an increase in income inequality are seen simultaneously. High-income inequality is an obstacle to growth as economic growth reduces the benefits for the poor. Therefore, reducing poverty and income inequality has become the main goal of most economic growth policies. Economic growth makes a significant contribution to improving the lives of many people around the world. In addition, sustainable growth plays an important role in reducing inequality both between countries and within countries (Lucas, 2003, p. 20). However, growth is not sufficient only to reduce poverty, it is possible to achieve more effective results with fair income distribution. For this reason, it is important to investigate whether the poor benefit from economic growth and the relationship between income distribution and poverty alleviation. Therefore, it is important to determine global income inequality. Because global inequality reflects the combined effect of inequality within and between countries (Atkinson, 2015, p. 46). Another way of looking at global inequality is to go beyond a country's borders and look at inequality between all individuals and countries in the world (Milanovic, 2013, p. 198). In this context, first of all, the study aims to determine the density of income inequality with the non-parametric conditional density estimation method (CDE) in order to reveal the extent of inequality as well as providing a different perspective to income inequality studies. After determining the dimension of global income inequality, countries are divided into different income groups according to the World Bank classification, and it is aimed to analyze and compare the relationship between income inequality, economic growth and poverty empirically.

Figure 2. Global Top 10% and Bottom 50% Income Shares, 1980-2019



Source: WID.world (2020)

While there is a general view of the empirical literature that inequality and growth have an important impact on poverty, the relationship between growth and inequality varies. However, there is an important relationship between growth and inequality. Growth often creates inequality, and there are aspects of inequality that are sometimes constructive (inequality can guide individuals or have an incentive to catch up with those in the front), sometimes useless (people who escape inequality and poverty keep their positions by closing their escape routes) (Deaton, 2013, p. 9). There is an important theoretical literature in which income inequality, which is explained in detail in the next section, is regarded as either positive or negative for economic growth.

The study contributes to the debate on economic growth, income inequality and poverty by providing empirically comprehensive analyzes on income inequality, growth and poverty reduction. The study is organized as follows: In section 2, the theoretical background of the relationship between income inequality, poverty and economic growth is mentioned. In section 3, the literature review is given. In section 4, empirical analyzes made to determine the dimension of global income inequality are included, while in section 5, countries are divided into income groups and the relationship between income inequality, poverty and economic growth is investigated and results are given. Finally, there is the conclusion part of the study.

Theoretical Background

Empirical and theoretical studies to determine the relationship between inequality, economic growth and how these factors affect the poverty level have led to the development of different models. "Poverty-Growth-Inequality triangle" known as Bourguignon triangle is an important example of this situation (Bourguignon, 2004, p.4). This model emphasizes the relationship between poverty, inequality and economic growth. In this context, changes in poverty level result from changes in growth and inequality. The Bourguignon triangle model is shown in Figure 3. The upper part of the

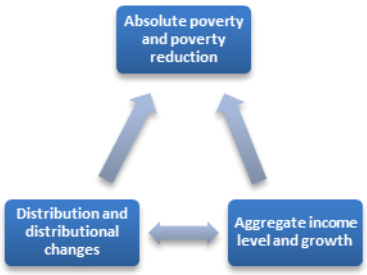
model represents poverty or poverty reduction. The lower-left corner represents inequality or income distribution. The lower right corner of the triangle represents the total population income and growth. There is a two-way relationship between growth and inequality in the model.

Bourguignon (2003) shows that poverty trends are not only dependent on economic growth but can also be associated with inequality in the economy. According to Bourguignon (2004, p.20), the effect of growth on poverty depends on income distribution. The model highlights the importance of redistribution as a complement to growth to achieve a significant reduction in poverty in the short and long term (Cingano, 2014, p.10). In the model, growth and poverty are accepted as determinants of the development strategy. In this context, the aim of optimal growth-distribution strategies is to reduce poverty (Bourguignon, 2004, p.10-11). For example, the target for middle-income countries should be to reduce inequality, while for low-income countries the target should be to promote growth. The model shows that development strategies cannot only reduce poverty. That is to say, the growth policy ignoring income distribution fails to achieve the target of poverty reduction. Otherwise, inequality can be a source of social problems such as tension and violence (Bourguignon, 2004, p.17).

While there is general consensus on the impact of income inequality and growth on poverty in theoretical approaches, there is no consensus on the direction of income inequality and economic growth. The relationship between income inequality and economic growth has been the subject of many theoretical and empirical studies, especially since Kuznets's study in 1955. In this context, Kuznets (1955) suggests that according to the hypothesis, income inequality increases in the early stages of economic development and decreases in the later stages of development. This hypothesis is generally known as the "inverted U-curve model of income inequality" and firstly the inequality increases and then decreases with economic development. The hypothesis emphasizes the structural change that occurred during the economic development process. As an economic progress, it tends to shift from the primary agricultural sector to the modern industrial sector, which involves services and manufacturing. Labour productivity in the agricultural sector is lower than in the modern sector, so per capita income of the agricultural sector is also predicted to be lower during this economic transition. Consequently, inequality between these sectors increases in the initial stages of economic development and then decreases. Briefly, this hypothesis assumes that labour and resources shift from the rural sector to the urban sector in the initial stages of economic development and this situation increases the total inequality. After this initial increase in inequality, inequality is assumed to decrease as the progress of economic (Ravallion, 2005, p.4).

Lots of studies have started to investigate the validity of this nonlinear relationship after Kuznets stated that the effect of economic development on income inequality is inverted-U shaped. Studies on this issue still show that there is no consensus. In addition, while examining the effect of economic growth on inequality, the other aspect of the relationship is also examined, since both variables are important. Theoretical studies suggest that there may be a negative, positive or no significant relationship between income inequality and economic growth

Figure 3. Bourguignon Triangle



Source : Bourguignon (2004, p.4)

The classical approach suggests that inequality can be beneficial for growth in the post-industrial period of the economy (Galor, 2011, p.1). It is expressed that income inequality increases economic growth due to the relationship between inequality and propensity to save. In other words, the approach is based on the increase of marginal propensity to save as wealth increases through the saving function. In this case, resources are transferred to individuals with high marginal propensity to save, and total savings gradually increases. Therefore, economic growth increases with the accumulation of capital. The fact that the marginal propensity to save of rich individuals is higher than poor individuals also indicates that economies with unequal income grow faster than countries with equal income (Kakwani et al., 2000, p.5). On the other hand, the neoclassical approach states that income distribution does not play an important role in economic growth. It states that the relationship between inequality and economic growth is indirect and does not accept heterogeneity for macroeconomic analysis (Galor, 2009, p. 2)

Modern approach theories claim that income inequality negatively impacts economic growth. These theories are explained with various approaches. The first is the credit market imperfections approach (Galor and Zeira, 1993; Banerjee and Newman, 1993). According to this approach, if the rate of interest applied to borrowers is higher than the interest rate of lenders, inequality results in insufficient investment in human capital. Thus, inequality may negatively affect macroeconomic activities and economic development in the short term, besides affect economic development in the long run due to the effects on intergenerational transfers and the continuity of inequalities (Galor, 2009, p.3). Hence, high inequality restricts low-income households' access to banking services and prevents investments that contribute to growth (Baradaran, 2015).

The second approach is the social instability approach. According to the approach, resources and efforts directed towards unproductive activities have a negative impact on economic growth. Because any increase in unproductive assets appears as a price increase and can only lead to a property or asset bubble instead of promoting more employment or productivity (Stiglitz, 2016, p.136). In addition, inequality is seen as a driving force in increasing social unrest and this situation directly increases political instability (Acemoğlu and Robinson, 2001). Increasing unrest in society increases criminal activities and negatively affects investments. This situation adversely affects economic

growth (Alesina and Perotti, 1996, p.1204). Another approach is the political economy approach. The first empirical studies involving the approach (Alesina and Rodrik, 1994; Persson and Tabellini 1994) state that high inequality leads to low growth. Persson and Tabellini (1994) state that inequality has an indirect impact on growth. The approach explains the relationship between inequality and economic growth with redistributive taxation. Because inequality leads to tax and regulatory policies that negatively affect growth. Namely, in the voting model of the economy; It is argued that the concentration of voters below the average income will encourage the redistribution of resources from the rich to the poor. Accordingly, financing the redistribution with high-income tax affects the investments negatively. Political decisions in societies with high inequality are likely to result in policies that result in lower accumulation and lower growth (Persson and Tabellini, 1994, p.600). Similarly, Alesina and Rodrik (1994) assert that there is a negative relationship between income inequality and economic growth. In their studies, it is stated that inequality does not have a direct effect on growth and high inequality results in a higher demand for redistribution, which is negative for growth. Thus, the fact that inequality causes growth-restricting policies is explained based on the median voter theory.

Finally, the unified approach includes the studies of Galor and Maov (2004). In this approach, the classical approach emphasizing the positive relationship between inequality and growth and the modern approach emphasizing the negative relationship are evaluated together. In this context, it suggests that the Classical approach exists at low-income levels but does not occur in later stages of development. In the initial stage of development, inequality promotes growth. Because real capital is less at this stage and requires capital accumulation savings. Hence the return on real capital is higher than the return on human capital, and further development processes are mainly due to capital accumulation. However, in the later stages of economic development, as the return of human capital increases because of capital-skills complementarity, human capital becomes the main factor of growth. Moreover, credit constraints become less binding as wages rise and the negative impact of income inequality on human capital accumulation decreases. Thus, the effect of inequality on the growth process becomes insignificant (Iradian, 2005, p.6).

Literature Review

This section examines the empirical literature on the relationship between economic growth, income inequality and poverty. The results of the studies analyzing the relationship between income inequality, growth and poverty in the literature vary by country. In the literature, growth is important in order to eliminate absolute poverty and reduce income inequality. The basis of this view is the inverted-U hypothesis proposed by Kuznets (1955). The inverted-'U' hypothesis has been the subject of several studies on the relationship between economic growth and income inequality. Although the effect of economic growth in reducing poverty levels is widely agreed, the effect of economic growth on income inequality is not known precisely. This is because there are opposing views on the relationship between economic growth and income inequality. While some studies in the literature suggest that income inequality negatively affects economic

growth (Alesina and Rodrik, 1994; Persson and Tabellini, 1994; Psacharopoulos et.al., 1995), other studies suggest that income inequality is an incentive for economic growth (Partridge, 1997; Perotti, 1996). Besides, many studies in the literature find a negative relationship between poverty levels and economic growth, and growth is related with a decline in poverty levels. But the relationship between income inequality and economic growth remains inconclusive. The relationship between poverty, inequality and economic growth is summarized in Table 1 by classifying them under different country groups.

Table 1. Literature summary

Author (s)	Scope of the Study	Methodology	Findings
Barro (2000)	100 Countries; 1960-1995	Neoclassical Growth Model	There is a weak positive relationship between income inequality and economic growth in rich countries. There is a negative relationship between inequality and economic growth in poor countries.
Gries & Redlin (2010)	101 developing countries; 1981-2005	GMM, Panel Causality test	There is a positive relationship between inequality and poverty. It requires an effective redistribution policy to reduce poverty. Growth reduces poverty, so there is a negative relationship between growth and poverty.
Guiga &Rejeb (2012)	52 Developing Countries; 1990-2005	GMM	There is a positive relationship between inequality and poverty. The relationship between inequality and growth is negative.
Khan et al., (2014)	138 countries; 2005-2010	Principal Components Analysis	While inequality increases poverty; poverty also increases income inequality. There is a positive relationship between income inequality and economic growth. This supports the Solow (1959) hypothesis. There is a negative relationship between poverty and economic growth
Niyimbanira (2017)	18 South African Cities; 1996-2014	18 South African Cities; 1996-2014	There is a positive relationship between inequality and growth. Hence, growth does not reduce income inequality. There is a positive relationship between growth and inequality. Hence, growth does not reduce income inequality.
Soava et al., (2020)	11 Developed and 9 Emerging EU Countries;	Fixed Effects Model	There is a positive relationship between growth and inequality in the developing EU country. Growth increases income inequality. Also, there is a positive relationship between poverty and inequality. There is a negative relationship between growth and income inequality in the developed EU

	2005-2016		country. Growth reduces income inequality. Overall, the results support the Kuznets hypothesis.
Zaman et al., (2020)	124 Countries; 2010-2013	Pooled Mean Group Estimator, Unbalanced Panel Data Analysis	There is a positive relationship between inequality and poverty. Economic growth also increases inequality. Income inequality also increases economic growth. The high level of inequality poses a major obstacle to pro-poor growth. Increasing poverty rates adversely affect economic growth

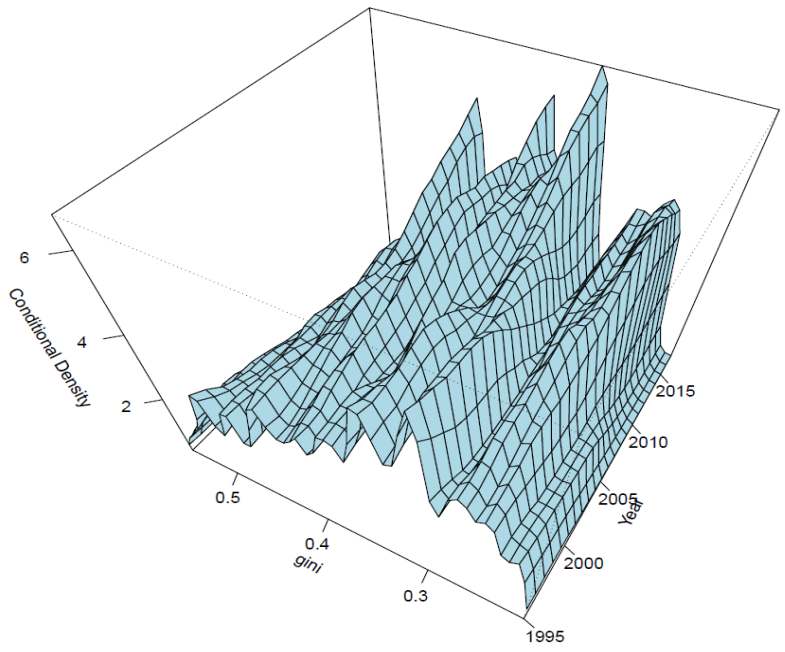
Modeling an Income Inequality Panel

Today's globalization has seen rising prosperity alongside rising inequality. Countries such as China, India, Korea and Taiwan have achieved rapid growth by taking advantage of globalization, and this growth has been much faster than rich countries. At the same time, the gap with poor countries, mostly in Africa, has grown. This situation causes inequality to deepen (Deaton, 2013, p.15-16). Shift of focus on income distribution issues from the national level to the world stage is indicative of the concern for global inequalities. For this reason, many studies in the literature analyze income distribution. But studies using density functions as a method in the statistical description of the income distribution are limited. However, since the equation of the Lorenz curve is derived from the density function of the income distribution, density functions can be used in income inequality analysis. Therefore, it is suggested by Kakwani (1980, p.129) as an alternative approach. This situation constitutes the starting point for using the conditional density method for income distribution and income inequality analysis. In this context, it is aimed to express a clear picture of the dimension of inequality by using nonparametric conditional density methods as stated in many studies such as Quah (1997), Racine (2008) and Millanovic (2013).

The study examines how income distribution changed between 1995 and 2017 in 93 countries using the conditional density estimation method. In the analysis, accessibility to data is the main criterion for choosing the years and countries. The Gini coefficients for countries are obtained from the Standardized World Income Inequality Database (SWIID), which covers a larger data set than other available sources (Solt, 2019). The model includes two variables named "Gini" and "years" with a total of 1,909 observations. The Gini coefficient is considered as a continuous variable and the year as an ordered variable. Then the density of income inequality is estimated depending on the year. The conditional density estimate, f (Gini coefficient | year), using the cross-validation approach for bandwidth selection, is shown in Figure 4. Figure 4 shows the Gini coefficient per year for 83 countries. In the table, zero on the vertical axis indicates income equality. Time is respectively along the axis marked in years. The figure is important as it shows how the distribution of income in the world changed between 1995 and 2017. In the figure, the density of the country group, which expresses the income inequality with a Gini coefficient of 0.30, is around 2 in 1995. This number has increased over time. In this

context, there is a concentration in the country group with a Gini coefficient below 0.30. However, a similar concentration is observed in the country group with income inequality between 0.40 and 0.50. On the contrary, it is observed that concentration decreases in the country group with income inequality between 0.30 and 0.40. This is because the two groups become more prominent in the income inequality distribution. That is to say, while some of the countries with income inequality between 0.30 and 0.40 tend to fall below 0.30 due to the progress in income distribution; the income distribution of other countries in that group has increased to the 0.40-0.50 range due to becoming more unequal. In short, countries with a more even distribution of income and countries with an unfair distribution of income are seen in two poles.

Figure 4. Nonparametric Conditional Density Estimation

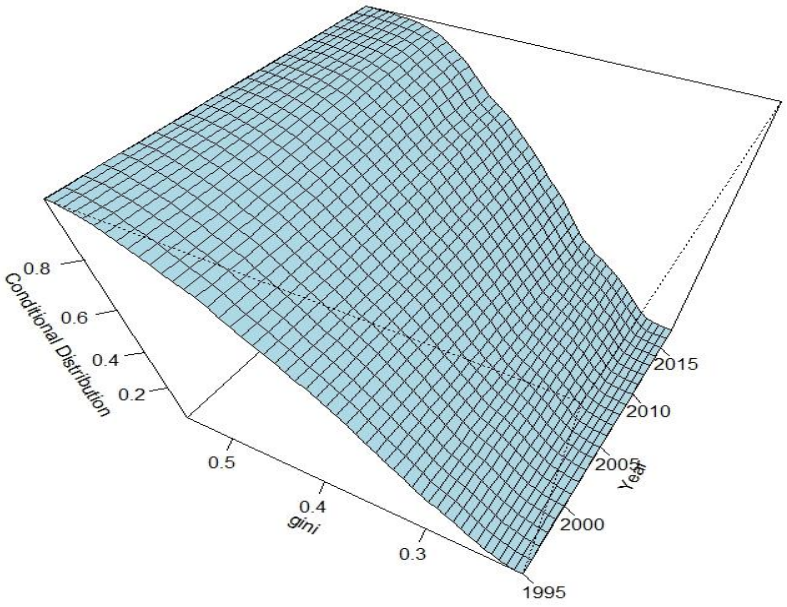


Li and Racine (2007) suggest a nonparametric conditional CDF kernel estimator that expresses a combination of discrete and categorical data as well as a related nonparametric conditional quantile estimator (Racine, 2008, p.28). In this context, nonparametric conditional CDF estimation for income distribution among countries is included in Figure 5. Figure 5 shows the information expressed in Figure 4. Also, conditional quantile functions express a comprehensive picture of the conditional distribution of a dependent variable. Therefore, when conditional CDFs such as those presented in Figure 4 are estimated, it is important to estimate conditional quantiles as well. The conditional quantile estimation results showing the change in income distribution of 83 countries over time are given in Figure 6. An important feature of this method is that the explanatory variable is ordered and there is more than one observation per year. The figure shows 0.25, 0.50 (median) and 0.75 conditional quantiles and box plots for the income distribution model. Income inequality quantiles take place on the

vertical axis, and box plots indicate where countries are ranked in income inequality. The box in the middle of each box plot describes the mean trends of the distribution and the thin line inside the box represents the median.

When the figure is analyzed, it is noteworthy that there is no significant improvement in income inequality in the world. That is to say, half of all countries are included in each box plot; The line in the middle of the boxes, the median, did not change significantly between 1995 and 2017. The median is around 0.36. There is no progress in the income distribution of the countries in the median level. On the other hand, lines above and below the box plots are drawn to represent all countries. In the figure, it is seen that the income distribution is unevenly distributed among countries, as the dimensions of the box plots are similar over time. When this situation is analyzed with the conditional density estimation chart in Figure 4, it reveals that the income distribution did not show a significant improvement between 1995 and 2017 and the two-income groups became more concentrated. Therefore, it draws attention that poor countries cannot catch up with rich countries and there is no decrease in inequality between countries.

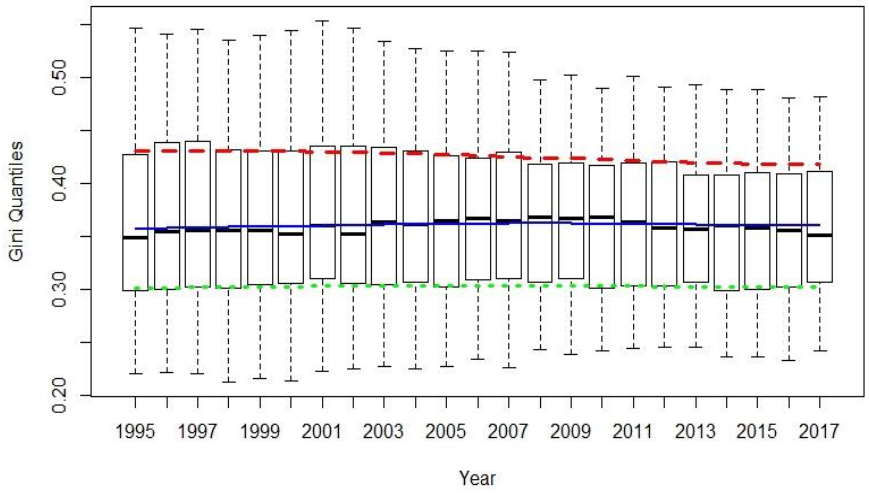
Figure 5. Nonparametric Conditional Cumulative Distribution Estimation



Nonparametric kernel methods are often used to estimate common density distributions. In this context, the common density function is modelled with a mixture of continuous and discrete data. Figure 7 shows the common density estimation for the Gini coefficient and the year variable, which are two variables in the n = 1909 observed income inequality model. When findings are evaluated in general, the Gini coefficient provides important information about income distribution densities. That is, the Gini coefficients of more equal societies are 0.3 or less. Sweden, Norway and Germany are some of these countries. However, the Gini coefficients of societies with the highest level of inequality are about 0.5 and above. These countries include some countries of Africa and Latin America

(Stiglitz, 2012, p.73). Countries in the analysis are seen to be divided into two different groups in the world due to the concentration of the Gini coefficient below 0.3 and between 0.4-0.5. The reason for this is that countries with income distribution between 0.3 and 0.4 tend to shift up and down over time. In other words, the widening of the distance between the two groups indicates a situation in which the rich are richer and the poor are poorer, pointing to the concept of bipolarization in the literature. In this context, Ravallion and Chen (1997) made comparisons between countries and concluded that there is a close relationship between the concepts of Gini coefficient and polarization.

Figure 6. Nonparametric Conditional Quantile Estimation Results

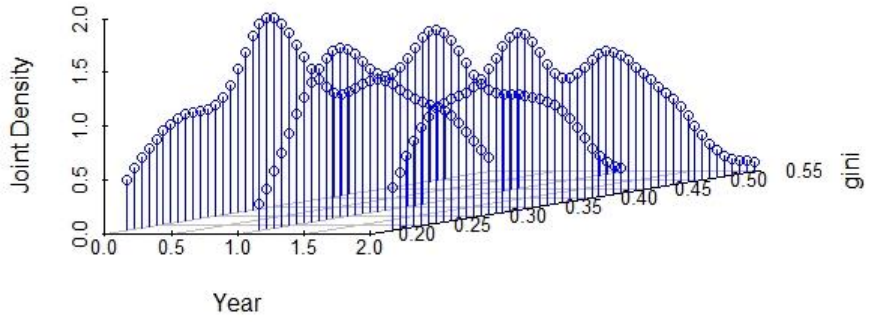


Polarization refers to the current situation between two distinct groups or how income is distributed among two different groups. Bipolarization refers to the situation in the world where there is a significant number of individuals with very high income besides the low-income population. It can also be thought that the distribution of income is related to the distance between two different income groups, like non-poor or poor. Increasing the distance between diverse groups increases both polarization and inequality (Atkinson and Bourguignon, 2014, p.304). This situation related with the size of countries in the middle part of the income distribution. In the literature, many studies, especially Quah (1997), found that the middle class is narrowing in income distribution. Because a smaller middle-income group is related to a greater distance between groups that make up the lower and upper parts of the income distribution.

The size of the countries in the middle part of the income distribution is important for many economic and social aspects of global development. In this context, there should be a larger middle-income group and societies that are less polarized in income distribution. The large size of the middle class empirically means higher growth and incomes, as well as more education, better healthcare, better infrastructure, better economic policies, less political instability, more social modernization and more

democracy. Thus, a more stronger global economic development is achieved by ensuring economic and social cohesion.

Figure 7. Nonparametric Kernel Estimation of Joint Density



Modeling the Relationship between Inequality, Poverty and Growth

In the study, the relationship between economic growth-poverty-income inequality triangle expressed by Bourguignon (2003) is examined empirically. Countries are evaluated in different panels according to the income classification of the World Bank. However, the limitations experienced in accessing data on inequality and poverty in country groups are effective in the selection of the method used. Data accessibility has been the main criterion in choosing the time period and countries in the analysis. For this reason, the cross-section estimation method is applied in the study. This method is preferred by using the annual averages of the variables in order to include a large number of countries in the model for each income level. In the literature, if the relevant variables are within a certain index range over the years and there is a lack of data, it is deemed appropriate to take the average of the variables (Li & Zou, 2002; Tridico, 2010; Dhongde & Miao, 2013; Ogbeide-Osaretin, 2018; Breunig & Majeed, 2020). In this context, 93 countries with available data between 1995 and 2017 are included in the analysis by separating them by income groups within the scope of the World Bank classification criteria. In the study, 31 high-income group, 42 middle-income group and 20 low-income group countries are analyzed.

In the model, GDP per capita at constant prices according to purchasing power parity (PPP) is used as the economic growth indicator. The headcount index (the percentage of the population living in households with per capita income below the poverty line) is used as an indicator of poverty. The poverty line is 1.90 dollars per day in 2011 PPP. Poverty rates data are obtained from the World Bank Povcal Net database. In the empirical literature, income inequality is generally measured by the Gini index. For this reason, the Gini coefficient is preferred as an indicator. Gini coefficient data, which is an indicator of income inequality, is obtained from the Standard World Income Inequality Database (SWIID) (Solt, 2019). Bourguignon (2004) concluded that the main challenge in formulating development strategy to reduce poverty is the relationship between poverty and growth, poverty and inequality, as well as the relationship between inequality and growth. Therefore, in the study, the econometric models used to analyze the relationship

between economic growth, income inequality and poverty are formed as follows by considering the literature (Guiga & Rejeb, 2012; Chemli & Smida, 2013; Dhrifi, 2013; Khan et al., 2014; Niyimbanira, 2017; Akinyemi et al., 2019).

The first model is the poverty model that analyzies the effect of economic growth and inequality on poverty. The poverty model is written as follows:

$$Pov_i = \beta_0 + \beta_1 gdp_i + \beta_2 Ineq_i + \varepsilon_i \qquad (1)$$

The sign of the coefficient β_1 is expected to be negative. This is because growth reduces poverty when the income distribution is almost equally distributed. However, β_2 is expected to be positive. In this context, equation (1) states that the impact of growth on poverty is related to the level of inequality.

The second model is the income inequality model to be used to analyze the effects of economic growth and poverty on income inequality. Based on the literature, the income inequality model is written as follows:

$$Ineq_i = \beta_0 + \beta_1 gdp_i + \beta_2 Pov_i + \varepsilon_i \qquad (2)$$

In income inequality model, the coefficient measuring the effect of growth on inequality cannot be determined in advance. The reason for this is that while many studies in the literature argue that growth reduces income inequality; Other studies suggest that economic growth can either increase income inequality or have no significant impact. If economic growth advantages the poor less than the rich, income inequality worsens. Otherwise, if economic growth advantages the poor more than the rich, income inequality improves. Thus, β_1 cannot be predicted in advance.

The last model of the study is the economic growth model. In this context, the impact of inequality and poverty on economic growth is written as follows (Barro, 2000; Kraay, 2015; Marrero and Servén, 2018):

$$gdp_i = \beta_0 + \beta_1 Ineq_i + \beta_2 Pov_i + \varepsilon_i \qquad (3)$$

$\beta_2$expresses the impact of poverty on growth. If poverty is a factor that hinders growth, it becomes negative. In contrast, $\beta_1$reflects the direct impact of inequality on growth. However, the overall impact of inequality on growth also depends on how inequality affects poverty.

Empirical Analysis

In this section, results obtained from econometric models are presented. Diagnostic tests should be applied for models to be reliable and effective. In this context, the use of cross-section data generally causes heteroscedasticity in studies. Therefore, the White estimator is generally used to solve this problem in models (Wooldridge, 2001, p.55). Also, R^2 is generally calculated as 0.3 or less in studies using cross-section data. However, it can be stated that the R^2 values are not low in the estimated models. It is also known that a R^2 value of approximately 0.50 in cross-section data is a good result (Studenmund, 1992,

p.47). Firstly, the poverty model, income inequality model and economic growth model estimation results of 31 high-income countries for the years 1995-2017 are listed in Table 2, respectively. F test statistics of models are statistically significant. It is seen that inequality and growth variables are significant in the poverty model. The income inequality coefficient has a positive sign. Therefore, increased income inequality leads to an increase in poverty rates. Otherwise, the elasticity of the poverty rate in growth is negative and statistically significant. These findings are compatible with the literature results suggesting that economic growth plays a significant role in decreasing poverty (Ravallion and Chen, 1996; Dollar and Kraay, 2000; Bourguignon 2004; Lopez 2006). In general, income inequality has a greater share of increasing poverty than economic growth. The income inequality model is in column 2. Poverty has a statistically significant and positive impact on income inequality. The economic growth coefficient is negative and significant. This result shows that growth in high-income countries over the years has led to a reduction in the gap between the poor and the rich and a more even distribution of income. In addition, the findings that economic growth in the high-income group reduces income inequality is consistent with the Kuznets (1955) hypothesis. This hypothesis implies that the increase in per capita income in countries firstly increases income inequality, but causes a decrease in inequality with development in countries, and therefore an inverted U-shaped relationship between per capita income and income inequality. In this context, the negative relationship between growth and inequality supports the Kuznets hypothesis, as countries are developed (high-income countries). The economic growth model is in column 3. It is seen that the poverty coefficient is negative and significant. The increase in poverty rates in countries negatively affects economic growth. Regarding the other directional relationship from inequality to growth, the Gini coefficient has no significant impact on the growth rate.

Table 2. Estimation results: High-Income Countries

Variables	**Model I**	**Model II**	**Model III**
Dependent Variables	*Pov*	*Ineq*	*Gdp*
Explanatory Variables			
Pov		0.0211***	-.09763*
		(.00578)	(.0508)
Ineq	19.3759***		-1.2453
	(6.188)		(1.548)
Gdp	-.6979**	-.04087*	
	(.3442)	(.0238)	
Constant	1.9319	.75227***	10.7751***
	(3.644)	(.2457)	(.4626)
F test	5.88	8.27	12.42
	[0.000]	[0.000]	[0.000]
R^2	0.69	0.45	0.30

Note: Robust standard errors are in parentheses, probability values of test statistics are in square parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3 shows the findings of 42 middle-income countries. According to the poverty model in the first column, per capita income coefficient is statistically significant and negative. Therefore, economic growth contributes to a reduction in poverty. Growth improves the living standards of the poor and contributes to poverty reduction. The Gini coefficient, which represents income inequality, is positive and statistically significant. In the income inequality model, it is seen that the poverty coefficient is statistically significant and positive. Poverty increases income inequality as the poor lack access to fundamental issues such as freedom of expression, political freedom and the rule of law. It is also possible that poverty can be an obstacle to poverty reduction (Lopez, 2004, p.15). Economic growth affected the income distribution more negatively in the middle-income group than in the high-income group. Because growth does not reduce income inequality. These results are especially consistent with the findings showing that the income distribution consists of high levels of inequality. The reason for this situation is that growth enables the job creation and unemployed people to earn an income that can reduce the poverty level, however, this growth does not reduce the level of income inequality. Another reason is that growth is an increase in inequality due to lack of circulation by individuals.

Table 3. Estimation results: Middle-Income Countries

Variables	Model I	Model II	Model III
Dependent Variables	*Pov*	*Ineq*	*Gdp*
Explanatory Variables			
Pov		.0515***	-.4926***
		(.0141)	(.0592)
Ineq	5.219***		2.169***
	(1.3953)		(1.0070)
Gdp	-1.259***	.05479***	
	(.15220)	(.0224)	
Constant	11.055***	-.18705	8.933***
	(1.5499)	(.2141)	(.3967)
F test	47.50 [0.000]	6.63 [0.000]	35.49 [0.000]
R^2	0.69	0.27	0.62

Note: Robust standard errors are in parentheses, probability values of test statistics are in square parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In the economic growth model, the poverty coefficient is negative and the inequality coefficient is positive and statistically significant. Therefore, while increasing poverty decreases economic growth; increased income inequality increases growth. Thus, it has been concluded that increasing income inequality and even widening the gap between the rich and the poor increase economic growth. This situation is compatible with the classical approach mentioned earlier. Classical economists hypothesize that inequality is beneficial for economic development. There are two basic transmission mechanisms for this relationship. First, the link between growth and inequality emerges with savings

trends. In this context, as the propensity to save increases with wealth, inequality promotes total savings, capital accumulation and growth by directing resources to individuals with a higher marginal propensity to save. Second, inequality encourages individuals or society to work harder and contributes to savings and investing in both human capital and productive industries to increase incomes that have a positive impact on growth (Balcılar et al., 2019, p.3). When the models are examined in general, while growth increases inequality; inequality also increases growth. The main reason behind the increasing poverty trends in countries is the high level of inequality in the distribution of resources. It has been found that poverty stems from inequality. Thus, high growth rate in countries leads to high inequality, which leads to an increase in poverty.

Table 4. Estimation results: Low-Income Countries

Variables	Model I	Model II	Model III
Dependent Variables	*Pov*	*Ineq*	*Gdp*
Explanatory Variables			
Pov		.0794***	-1.1976***
		(.02919)	(.07210)
Ineq	2.865***		2.223
	(1.0339)		(1.4124)
Gdp	-.72153***	.0371	
	(.07688)	(.0276)	
Constant	8.0391***	-.1716	11.122***
	(.71184)	(.3176)	(.4480)
F test	49.89 [0.000]	32.54 [0.000]	207.67 [0.000]
R^2	0.91	0.40	0.89

Note: Robust standard errors are in parentheses, probability values of test statistics are in square parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4 shows the results of 20 low-income countries. There is a positive relationship between inequality and poverty in the poverty model. On the other hand, there is a negative and statistically significant relationship between growth and poverty. These results support the current literature that suggests that poverty reduction is strongly linked to the degree of inequality and that growth effectively reduces poverty. Therefore, changes in growth and income distribution are important for reducing poverty. In the income inequality model, similar to previous results, the effect of poverty on income inequality is positive. The results show that inequality prevents poverty reduction. In the economic growth model, the effect of poverty rates on economic growth is negative and statistically significant. The higher the rate of poor individuals in the economy, the lower the growth rate. On the other hand, there is no significant relationship between growth and inequality. However, lack of correlation does not mean that there is no relationship. There are three main reasons for making inferences about the relationship between growth and inequality. The first reason for this is that changes in inequality on average in

low-income countries are not fundamentally well measured. Second, the data reflect the averages within countries. Overall inequality or poverty can change relatively little over time, yet there are both winners and losers at all levels of life. Some of these may reflect measurement error. A third reason is that initial conditions vary between countries. Taking the average of this difference in initial conditions can easily hide its systematized effects (Ravallion, 2001, p.1810). These reasons support the low-income group results.

Conclusions and Policy Recommendations

The main aim of the study is to determine the relations between poverty, growth and income inequality. It is thought that economic growth is very important for poverty reduction and growth plays a direct role in increasing the income level of the poor. This is because the rapid economic growth seen in many countries in the 1990s helped millions of people out of poverty. But progress is not equal as always; some of the fastest-growing countries catch up with rich countries, but the gap between them and the countries they left behind is widening. These differences are mainly due to increased income inequality and the relationship between economic growth and inequality in countries. For these reasons, it is important to analyze the global dimension of income inequality and the relationship between poverty, income inequality and economic growth.

Firstly, the study uses a nonparametric conditional density estimation method to analyze the dimension of global income inequality and its change over time. As a result of the analysis, it is determined that there is no significant progress in the income inequality tendency and in this regard, two income groups have become more prominent. Namely, It is noteworthy that countries with a more even distribution of income and countries with a more unfair distribution of income are in the two poles. This result means that global inequality is increasing around the world and only certain groups benefit from the contributions of economic growth and development in countries experiencing high economic growth without reducing income inequality. It is expected that average incomes converge in rich countries, new ideas and new ways of doing business contribute to the growth and spread rapidly around the world. The striking situation is that poor countries cannot keep up with this situation. Secondly, the relationship between economic growth, poverty and income inequality is examined empirically. The analysis results show that the relationship between growth and inequality can vary across income groups. Although growth contributes to reduced poverty levels and improved living standards in countries as the cause of this situation, findings show that income inequality still causes an important constraint to this positive effect. Globally, higher income inequality tends to reduce the impact of growth on poverty. Because the fact that the gap between poor and rich individuals cannot be reduced, suppresses the goal of eliminating poverty. Absolute poverty is falling rapidly if conditions for individuals to enjoy opportunities equally. Therefore, in order for countries to successfully tackle poverty problems, they also need to address the issue of growing income inequality. Because the effect of growth on poverty related to the level of income inequality in countries. Therefore, the most important cause of poverty in the world is that it does not create a fair income distribution even in the case of growth. In line with the findings, governments should pay attention to macroeconomic stabilization, the

appropriate direction of development assistance and the efficiency of their spending as well as focusing on growth to reduce poverty. Also, in order to reduce inequalities, more effective tax policies should be implemented by ensuring that taxes are fair and tax rates are proportional to welfare. Finally, it is important to increase access to education and health services as the most effective way to reach a more equal society. The important thing is to reduce inequality between and within countries and increase access to equal opportunities.

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