Income Distribution and Economic Growth: A Complementary Cross Country Study to the Kuznets Curve*

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Abstract

This study aims to analyze the relationship between income distribution and economic growth using cross country data. The study also investigates whether there is a certain level of Gini coefficient which maximizes GDP growth rate. The available data on Gini coefficients and GDP growth rates of 105 countries is used to test a nonlinear relationship between these two variables, namely Inequality-Growth Curve (IGC). The model is first estimated for 2001 and then the estimation is repeated for 2011. The Gini coefficient which maximizes GDP growth rate is estimated as 0,436 for 2001 and 0,464 for 2011. Also, IGC is compared with Kuznets Curve. This paper suggests that, being opposite to the common sense, developing countries should reduce income inequality to increase their GDP growth rates while developed countries should increase.

Key Words: *Income Distribution, Gini Coefficient, Economic Growth Rate, Inequality-Growth Curve, Kuznets Curve.*

Gelir Dağılımı ve Ekonomik Büyüme: Kuznet Eğrisi'ni Tamamlayıcı Ülkeler Arası Bir Yatay Kesit Çalışma

Özet

Bu çalışma, yatay kesit veri kullanılarak gelir dağılımı ile ekonomik büyüme arasındaki ilişkiyi analiz etmeyi amaçlamaktadır. Çalışma ayrıca ülkelerin GSYİH büyüme oranını maksimize eden Gini katsayısını araştırmaktadır. Çalışmada, bu iki değişken arasındaki ilişkiyi test etmek için 105 ülkeye ait veriler

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kullanılarak doğrusal olmayan bir regresyon denklemi tahmin edilmektedir. Bu ilişki Gelir Dağılımı-Büyüme Eğrisi (IGC) olarak adlandırılmaktadır. Regresyon modeli önce 2001 yılı verileriyle tahmin edilmekte, daha sonra 2011 verileriyle süreç yinelenmektedir. GSYİH büyüme oranını maksimize eden Gini katsayısı 2001 yılı verileriyle 0,436 ve 2011 yılı verileriyle 0,464 olarak tahmin edilmiştir. Ayrıca IGC, Kuznet Eğrisiyle karşılaştırılmaktadır. Bu çalışmadaki bulgular, genel kanının aksine, ekonomik büyüme oranını artırmak için gelişmekte olan ülkelerin gelir dağılımı eşitsizliğini azaltan politikalar uygulaması gerektiği, gelişmiş ülkelerin ise gelir dağılımı eşitsizliğini azaltan politikalardan uzak durması gerektiği sonucuna varmaktadır.

Anahtar Kelimeler: *Gelir Dağılımı, Gini Katsayısı, Ekonomik Büyüme Oranı, Gelir Dağılımı-Büyüme Eğrisi, Kuznets Eğrisi.*

Introduction

Income distribution is one of several factors affecting economic growth as many studies reveal. But the studies are split about the shape of relationship between income distribution and economic growth. Some studies[1] reveal that income inequality induces economic growth. In this case, income inequality can provide incentives for innovation and entrepreneurship and can also increase saving and investment. Some other studies, in contrast, reveal that income inequality reduce economic growth because inequality can prevent the building of human capital (causing insufficient education and health) and inequality also leads to political and economic instability that discourages investment. In the case of large income inequality, economy makes use of resources of country to provide the luxury needs of small rich group of country instead of providing basic needs of large poor group. It is argued that while income inequality increases, economic growth decreases as a result of disappearance of peace and increase of social problems. On the other hand, it is also argued that income equality also negatively affects economic growth since lack of motivation becomes a barrier to economic growth. The other studies reveal that the relationship between income distribution and economic growth may be nonlinear. It means that increases in income inequality from low levels can enhance economic growth, but as income inequality rises beyond a certain level it reduces economic growth. So, what the optimal level of income distribution should be, which induces economy to maximum growth level, is the main question of this study.

The rest of the study is organized as following: The second section reviews the literature, the third section introduces data sources and

[1] Studies are all mentioned in the literature review.

methodology, the fourth sections reveals empirical results, and the last section ends with a conclusion.

1. Literature Review

Income distribution and its impact on the economic growth has been studied particularly since the 1950's. It has been continued to be an important study topic since then. It began with Simon Kuznets' studies (1955; 1963) on an inverted-U shaped relationship between income inequality and per capita GNP. Kuznets suggested that as per capita income rise in the early stage of development, income inequality also rise, then reaches a maximum, and at last declines as income levels rise further in the later stage of development periods. Kuznets developed his hypothesis studying data estimating income distribution in a few rich and a few poor countries and studying trends in distribution in few European countries over time (Perkins at all, 2001: 129). Following this path breaking hypothesis, many developing countries tolerated rising income inequality believing that income would become more equally distributed with advanced development. Some later studies [Galor and Zeira (1993); Brueckner and Lederman (2015)] using income distribution and per capita income confirm Kuznets hypothesis. Unfortunately, some other studies particularly using income distribution and economic growth instead of per capita income reveal conflicting results. Some of these studies find a negative relationship between income inequality and economic growth [Persson and Tabellini (1994), Alesina and Rodrik (1994), Clarke (1995), Perotti (1996), Benabou (1996), Gottschalk and Smeeding (1997), Deininger and Squire (1997), Aghion at all. (1999)] while other studies find a positive relationship between them [Adelman and Robinson (1989), Li at all (1998), Forbes (2000)].

There are three approaches which explain the relationship between income distribution and economic growth[2]. These are classical approach [Kaldor (1956)], modern approach [Benhabib and Russtichini (1991), Keefer and Knack (2000), Alesina and Perotti (1996), Alesina and Rodrik (1994), Bertola (1993), Persson and Tabellini (1994), Perotti (1996)] and the unified model [Galor (2000)]. According to the classical approach, it has been argued that income inequality and the accumulation of wealth in a small proportion of individuals would result in higher growth in the future. There may be three reasons for positive relationship (Dadkhah, 2006): First, the rich consume proportionately less of their income and a higher propensity to save stimulate a faster growth rate. Second, indivisibility of investment

[2] Three channels through which how income inequality affects economic growth are given in the Appendix.

project make the concentration of resources in a few hands a prerequisite for investment and growth. Finally, workers and employers require incentive to exert their utmost efforts. A society committed to equality would not provide the incentive system necessary for growth. However, there could be a negative impact of income inequality on growth as argued others (the modern approaches and the unified model). There may be three reason for negative relationship (Dadkhah, 2006): First, inequality reduces investment opportunities. Second, inequality worsens borrowers' incentives. Finally, inequality generates macroeconomic volatility. If a country experiences high income inequality, there is great pressure from the poor to redistribute the wealth accumulation. The high taxes levied to redistribute the wealth lower the rate of return on private assets, which restricts capital accumulation and decelerates growth (Clarke, 1995).

A case study (Benabou, 1996) displaying contrary relationship between income inequality and economic growth is that of South Korea and Philippines. These two countries looked quite similar in the early 1960's with regard to major macroeconomic variables such as GDP per capita, investment per capita, average saving rate, population, urbanizations, primary and secondary school enrolment. However, these countries differed in their income distribution. In 1965 South Korea's Gini coefficient was 0,34 while the Philippines' Gini coefficient was 0,51. They became 0,34 and 0,46 respectively in 1988. During the next thirty years, fast growth in South Korea resulted in a five-fold increase of the output level even though it has pretty income distribution, while the Philippines' output level barely doubled with its inequality in income distribution.

Deininger and Squire (1997), using cross country data, apply different approach to capture the relationship between income distribution and economic growth. They use land distribution as asset distribution instead of income distribution and find negative relationship with economic growth. They state: "Many economists have long believed that income disparities increase in the early stages of development, making the poor relatively worse off. Recent research suggests that an unequal distribution of income can hamper growth."

Krongkaew and Mat Zin (2006) attempts to find the relationship between rapid economic growth and income inequality in eight East Asian countries. These countries are China, Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand and Vietnam. The study states that "income distribution associated with the different patterns of growth differs from one country to another, making the relationship between economic growth and income inequality non-uniform. Some may achieve the Kuznets type growth,

that is, income inequality increases as the country grows, but some may have the opposite effects".

Wells (1988: 28) states that income inequality prevents a large portion of the population from improving their knowledge and skill through education which slows the social development. However, social development is very important for social capital accumulation.

Samanta and Heyse (2006) study on the relationship between income inequality and economic growth based on panel data over the period 1966-1991 in developing countries. The study reveals that developing countries with higher income inequality do not grow slower than developing countries with a more equal income distribution.

Barro (2000) presents empirical evidence that indicates higher inequality reduces growth in poor countries and increase growth in richer countries. He also presents theoretical analysis of the macroeconomic mechanisms, including credit market imperfections, political economy, socio-political unrest, saving rates, in which income inequality relates to economic growth. Barro explains situations that could have either positive or negative effects on growth. The uncertain effect of all the interrelated factors can be seen through the empirical study.

Birdsall (2007) states that high levels of income inequality (at or above a Gini coefficient of 0,45) is more likely to harm economic growth in countries at low levels of income. Theory and evidence suggest that high income inequality affects economic growth first, "through interaction with incomplete and underdeveloped markets for capital and information"; second, "by discouraging the evolution of the economic and political institutions associated with accountable government"; third, "by undermining the civic and social life that sustains effective collective decision-making".

The studies on relationship between income distribution and economic growth claim that high level of income inequality affects economic growth negatively. One reason for this is that high level of income inequality prevents the formation of political and economical institutions necessary for investment and economic growth. Another reason is that high level of income inequality leads to alienations among people. And some other studies also indicate that income inequality associated with underdeveloped markets and institutions prevent economic growth (Derviş, 2007).

2. Data Sources And Methodology

This study uses the Gini coefficients data as income distribution and GDP growth rates data as economic growth[3]. Data on the Gini coefficients, GDP growth rates and per capita income for 105 countries is taken from World Development Report 2000-2001 and World Bank web site[4]. World Bank separates countries in three sub-groups depending on their per capita GNP[5]. These sub-groups are;

- High Income Countries ($9266 or over)
- Middle Income Countries (from $755 to $9265)
- Low Income Countries ($755 or lower)

Since it is convenient, meaningful and generally accepted, the countries in high income group are taken as developed countries while those in low income and middle income groups are taken as developing countries (WDR, 1998-1999: 251).

There are various methods to measure income distributions such as the Coefficient of Variation, the Theil's Index, and the Gini coefficient (Clarke, 1995). The most used method is Lorenz Curve and Gini coefficient. Lorenz Curve can be obtained by adding percentage of national income on the vertical axis and each 20% of population from the poorest to the richest on the horizontal axis cumulatively. We can compare the average Gini coefficients of developed and developing country groups to see the difference.

The study attempts to evaluate income inequality and economic growth using data of 105 countries for the years 2001 and 2011. First, the difference between 23 developed and 82 developing country groups is investigated in terms of income distribution using Lorenz Curves. If the Lorenz Curves of developed and developing countries differ from each other, then, one may assume that income distribution is one of the main determinants of the difference in economic growth between developed and developing country groups. If such a relationship exists, one may look for a certain level of income distribution for a country which maximize its economic growth rate. Then, the relationship between income distribution and economic growth may be investigated and estimated by using nonlinear regression model. In this study, a nonlinear regression model is used for

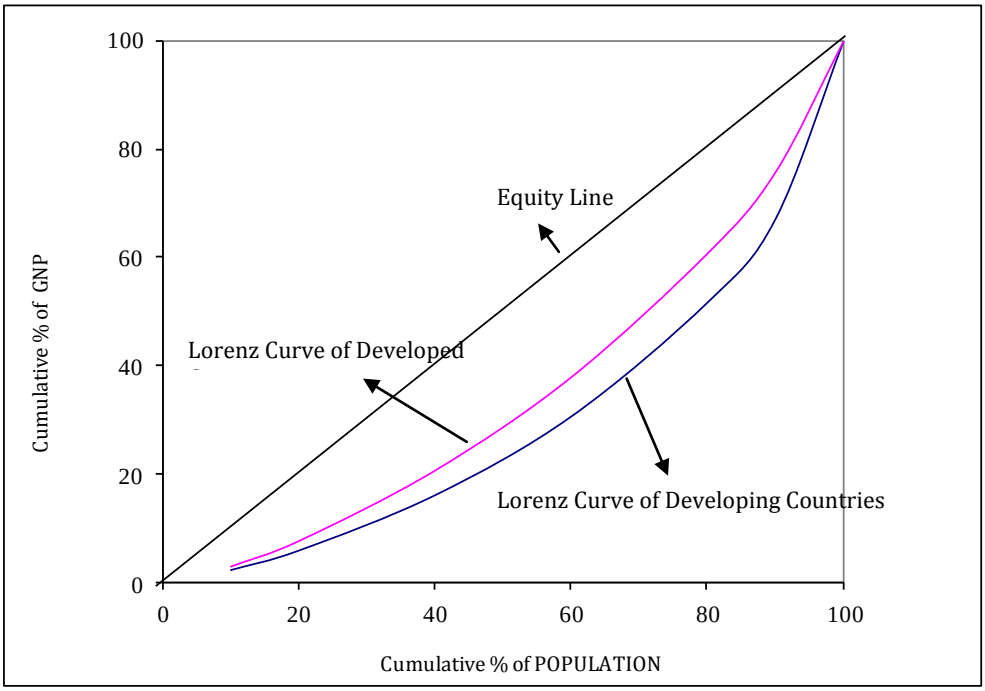
[3] Kuznets uses per capita income data of countries to capture the stages of development.
[4] http://data.worldbank.org/indicator/NY.GNP.PCAP.CD (Access date: 12.12.2015)
[5] World Bank has changed its country classification later on, but using old classification doesn't cause any serious problem in this study.

investigation of the relationship between income distribution and economic growth.

3. Empirical Studies And Results

The Lorenz Curves of developed and developing country groups are plotted at the Figure 1. The curve close to the equality line belongs to the developed countries while the other one belongs to the developing countries. It is seen in the Figure 1 that in developing countries income inequality is higher than developed ones.

Figure 1: Lorenz Curves of Developed and Developing Countries



Source: The figure was formed by the author.

The Table 1 below supports the Figure 1. There are percentage shares of income for the poorest and the richest 20% of the selected high inequality and low inequality countries in the Table 1. In the high inequality countries (Guatemala, Paraguay, Brazil, Swaziland and New Zealand), the percentage share of income of the poorest 20% of the population changes between 2.1 and 2.7, while the same percentage share of income of the low inequality countries (Slovak Republic, Japan, Austria,

Czech Republic and Finland) changes between 10.0 and 11.9. The percentage share of income of the richest 20% of the population for the high inequality countries changes between 46.9 and 64.4, while the same percentage share of income of the low inequality countries changes between 31.4 and 35.7. High inequality countries are mostly developing countries while low inequality countries are mostly developed countries.

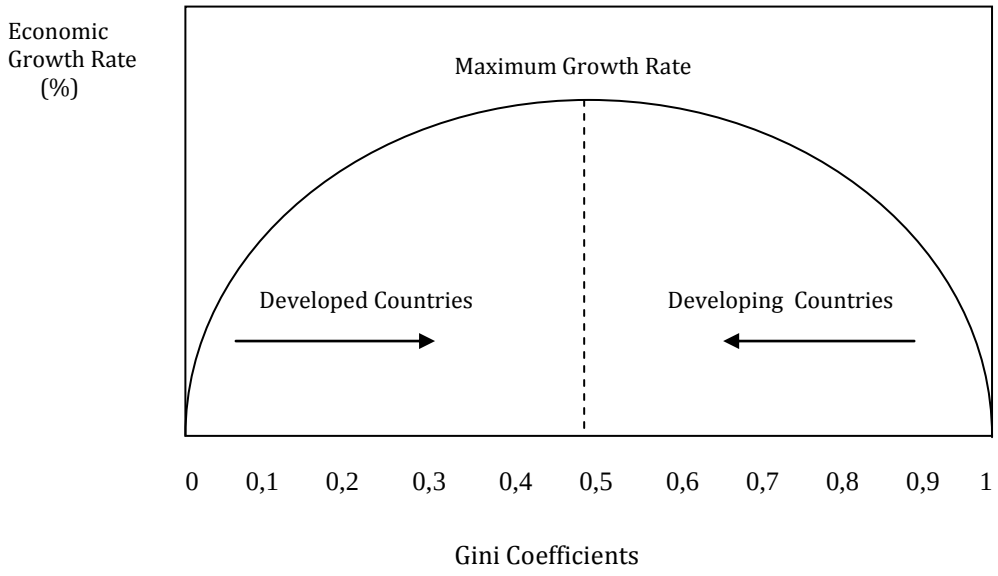
Table 1: Percentage share of income (poorest and richest 20 percent of the population)

High Inequality Countries	***Lowest 20%***	***Highest 20%***	***Low Inequality Countries***	***Lowest 20%***	***Highest 20%***
Guatemala	2.1	63.0	Slovak Republic	11.9	31.4
Paraguay	2.3	62.4	Japan	10.6	35.7
Brazil	2.5	63.8	Austria	10.4	33.3
Swaziland	2.7	64.4	Czech Republic	10.3	35.9
New Zealand	2.7	46.9	Finland	10.0	35.8

Source: World Bank, World Development Indicators 2000.

Studies reveal both positive and negative relationships between income distribution and economic growth rate. The relationship between income distribution and economic growth rate could be similar to the one at Figure 2.

Figure 2: The Inequality and Growth Curve (IGC)



Source: The figure was drawn by the author.

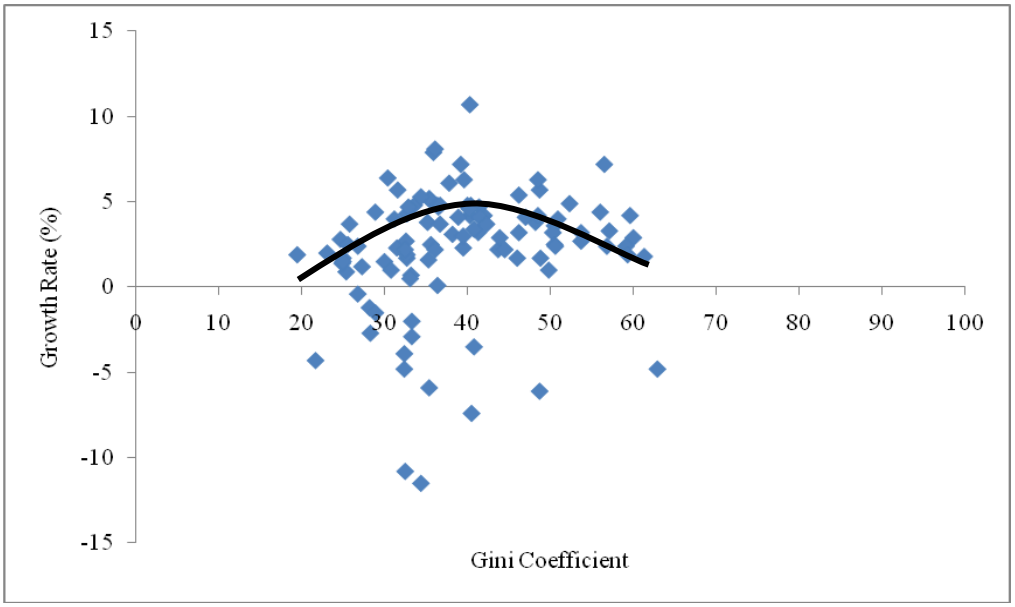
It is expected that income distribution and economic growth have a nonlinear relationship. In the extreme case of perfect income inequality, Gini coefficient is 1, which means one gets all while the rest gets nothing. In this extreme case, there is no economic growth because of the lack of demand for goods and services. In the other extreme case of perfect equality, Gini coefficient is 0, which means everybody gets the equal amount of income, but there is insufficient growth because of the lack of production and supply as a result of the lack of motivation as well as low productivity. Between 0 and 1, it is expected that economic growth rate gets higher and higher to the optimum level of income distribution which may also change depending on the stage of economic development and other factors (political system, demography, social, religious, geographic factors, etc.) of each country.

Cornia and Court (2004)concludes that extreme equality and inequality in income cause slow growth. Extreme equality leads to eroding working incentive, increasing free riding behavior, increasing high supervision costs, increasing labor shirking and corruption in the redistribution system while extreme inequality leads to erosion of social cohesion, increasing social unrest, social conflicts, rent seeking, decreasing progress in education and accumulation of human capital, and uncertain property rights. Therefore there should be an "efficient inequality range" between 0 and 1.

As it is seen at the Figure 2, there are two different Gini coefficients which provide the same rate of economic growth. How could this be possible? The answer may be the difference in characteristic properties of the developed and the developing countries: The developed countries have lower Gini coefficients than the developing countries. Therefore, the developed countries are at the left side of optimal Gini coefficient, while the developing countries are at the right side of it . There are some different dynamics in the developed and developing countries that drive the countries to the optimal Gini coefficient that guarantees the highest economic growth rate. One may argue that, while internal dynamics of market economy, in the developed countries, raise inequality by creating the rich and the poor, the developed civil society and its pressure on the parliament in democratic environment decreases the inequality from the optimum level to the left. On the other hand, in the developing countries, the income inequality is higher than the optimal level because of the lack of institutional structures. But as the civil society develops, its pressure on the parliament reduces the inequality to the optimal level.

Gini coefficients and economic growth rates of 105 countries are plotted at the Figure 3 to see if such a relationship exists. Since, there is no such extreme Gini coefficients less than 0,20 and more than 0,70 in real world, observed part of the theoretical nonlinear curve is the part of Gini coefficients between 0,20 and 0,70. There are some negative growth rates since many other factors also affect the economic growth of each country.

Figure 3: Income Distribution and Economic Growth of 105 Countries (2001)



Source: The figure was prepared by the author.

After excluding 16 countries with negative growth rates[6], a nonlinear regression model is run using data of the rest 89 countries for 2001. After excluding 9 countries with negative growth rates, a nonlinear regression model is run using data of the rest 96 countries for 2011.

Using the second degree nonlinear regression model ($y = a\,x^2 + b\,x + c$), which is:

[6] Some other factors probably cause negative growths in some countries. These countries are excluded from the rest as outliers.

$$\text{Economic Growth Rate} = \beta_0 + \beta_1 \text{ Gini Coefficient} + \beta_2 \text{ Gini Coefficient}^2 + \varepsilon$$

The Estimation results of nonlinear regression models are reported at the Table 2 for 2001 and 2011 as below.

Table 2: Estimation Results of Nonlinear Regression Models for 2001 and 2011

	2001	2011
	Economic Growth Rate	Economic Growth Rate
Constant	-6,4561 (-2,2596) [0,0264]**	-10,1123 (-2,0166) [0,0466]**
Gini Coefficient	0,4886 (3,4374) [0,0009]***	0,6861 (2,7419) [0,0073]***
Gini Coefficient^2	-0,0056 (-3,3018) [0,0014]***	-0,0074 (-2,4599) [0,0157]**
R^2	0,13	0,11
F	6,2162 [0,0030]***	6,01 [0,0035]***
Optimum Gini Coefficient	0,436	0,464
Maximum Growth Rate	%4,2	%5,8

The values in the parentheses are t-statistics.
The values in the square brackets are p-values.
*** % 1 significance level, ** % 5 Significance level, * %10 significance level.

Solution of the first equation for optimum Gini coefficient gives 0,436 which provides maximum growth rate %4,2 for 2001. The same way, solution the second equation for optimum Gini coefficient gives 0,464 which provides maximum growth rate that is %5,8 for 2011.

Both model pass stability test (CUSUM Test), the models are stable. Residuals of the models have no serial correlation (Breusch-Godfrey Serial Correlation LM Test - Observed R-squared Chi-Square p-value 0,1827 (2001); 0,1364 (2011)) and no heteroskedasticity (Breusch-Pagan-Godfrey Heteroskedasticity Test - Observed R-squared Chi-Square p-value 0,2406 (2001); 0,4074 (2011)) but they are not normally distributed (Histogram Normality Test - Jarque-Bera statistics p-value 0,0001 (2001); 0,0000 (2011)).

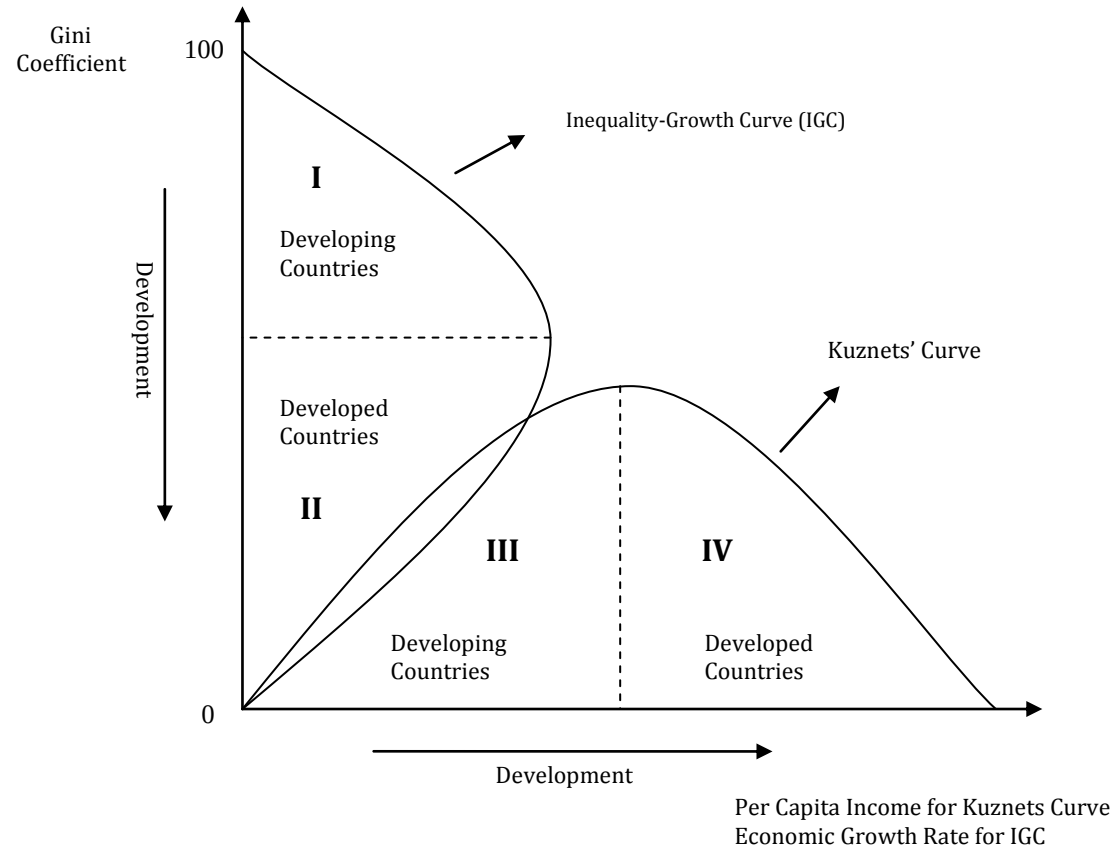
The Kuznets' Curve and a complementary curve are drawn together below to compare. On the vertical axis Gini coefficient is placed, on the horizontal axis per capita income for the Kuznets' curve and economic growth rate for the complementary curve are placed. The aim of drawing two curves together is to shed light on how conflicting findings might be obtained as mentioned in the literature review. At the Figure 4, the complementary curve shows positive and negative relationships between income distribution and economic growth rates as the Kuznets' curve shows positive and negative relationships between income distribution and per capita income regarding to whether the countries are developed or developing ones.

The complementary curve states that there is a negative relationship between income distribution and economic growth rate for the developing countries which are at high inequality levels (Figure 4, Part I) while there is positive relationship between income distribution and economic growth rate for the developed countries which are low inequality levels (Figure 4, Part II).

As it is mentioned earlier, Kuznets explains the positive and negative relationships between income distribution and per capita income depending on the stages of economic development. Countries, in the early stages of economic development (the developing countries), have increasing

per capita income with increasing income inequality (Figure 4, Part III). But, countries, at the later stages of economic development (the developed countries), have rising per capita income with decreasing income inequality (Figure 4, Part IV) (Kuznets, 1955).

Figure 4: Comparison of the Kuznet's Curve with the Inequality-Growth Curve

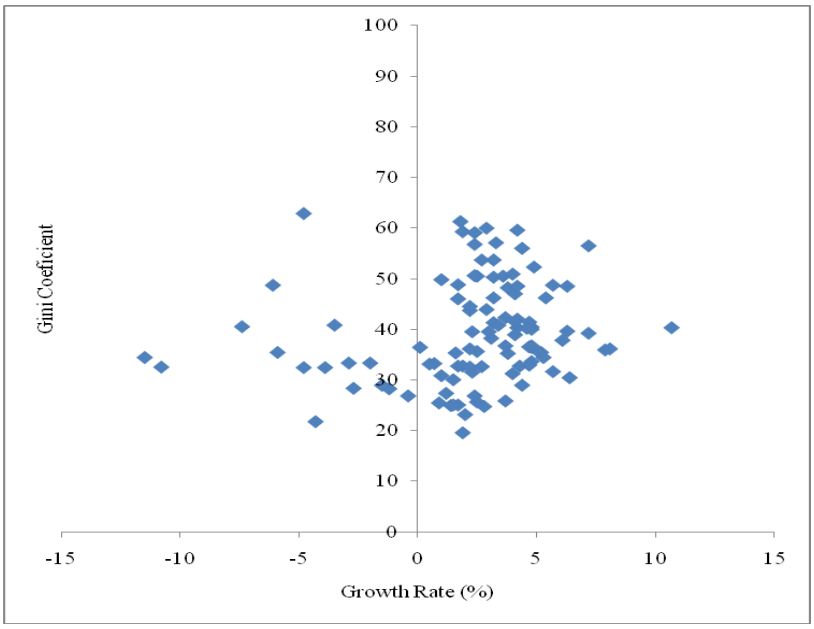


Source: The figure was drawn by the author.

At the Figure 4, the developed countries have increasing inequality with increasing economic growth rate (Part II, positive relationship) in the short run while they have decreasing inequality with increasing per capita income (Part IV, negative relationship) in the long run. On the other hand, the developing countries have decreasing inequality with increasing economic growth rate (Part I, negative relationship) in the short run, but they have increasing inequality with increasing per capita income (Part III, positive relationship) in the long run. There is a conflicting result saying that increasing inequality reduces economic growth in developing countries. If this is the fact, developing countries never get developed unless they reduce income inequality. But this result contradicts to the Kuznet's hypothesis. This findings coincides with Deininger and Squire (1996; 1998)'s findings.

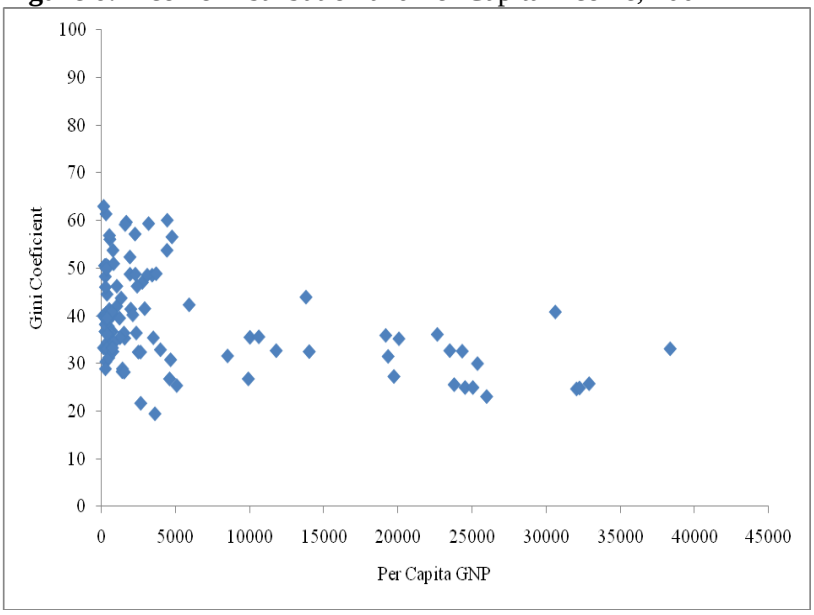
The scatter plot of Gini coefficients versus economic growth rates and Gini coefficients versus per capita income are shown at the Figure 5 and the Figure 6, respectively. Also, country groups as developed and developing are separated and plotted similar to Figure 5 and Figure 6 but not reported in the paper. As expected, the developed countries clustered in the Part II and Part IV confirming the inverted U shape curves.

Figure 5: Income Distribution and Economic Growth, 2001.



Source: The figure was prepared by the author.

Figure 6: Income Distribution and Per Capita Income, 2001



Source: The figure was prepared by the author.

There should be a separation between the two different relationships namely the relationship between income distribution and economic growth rate, and the relationship between income distribution and per capita income. The first relationship is short run issue while the second relationship is long run issue for countries. The reason for this separation is that economic growth rate which is short run phenomena increases per capita income in the long run. In other words, economic development starts with economic growth first and then in a period of time, economic growth increases per capita income. Therefore, there may be a relationship between income distribution and economic growth rate in the short run as drawn at Figure 4, different from the Kuznets Curve which shows the long run relationship between income distribution and per capita income. Overall results in terms of relationships are summarized at the Table 3 below:

Table 3: Short Run Relationship Between Income Distribution and Economic Growth versus Long Run Relationship Between Income Distribution and Per Capita Income

	Developing Countries	Developed Countries
SHORT RUN Relationship Between *Income Distribution & Economic Growth Rate* (The Inequality-Growth Curve)	Negative Relationship (economic growth decreases while inequality increases)	Positive Relationship (economic growth and inequality both increase or decrease)
LONG RUN Relationship Between *Income Distribution & Per Capita Income* (The Kuznets Curve)	Positive Relationship (inequality and per capita income both increase or decrease)	Negative Relationship (inequality decreases while per capita income increases)

Source: The table was prepared by the author.

This classification in the Table 3 may clarify the conflicting findings of the studies on the topic in the literature. Clarification of the conflicting results still remains to new studies by investigating the short run relationships between income distribution and economic growth rate, and the long run relationships between income distribution and per capita income, respectively.

Conclusion

Studies on the relationship between income distribution and per capita income during stages of economic development begin with Kuznets in 1950's. However, some later studies using economic growth rate instead of per capita income reveal conflicting results between income distribution and economic growth. Some of the studies find a negative relationship while other studies find a positive relationship.

This study states the fact that income distribution in the developed and developing countries is significantly different from each other. It seems that inequality decreases in developed counties as a consequence of economic and social policies, economic and social institutions while developing countries are far away from equality probably because of prevailing various political, economic and social problems, and lack of political, economic and social institutions.

In this study, the IGC is compared with the Kuznets Curve. The IGC curve shows sort run relationship between income distribution and economic growth rate while the Kuznets Curve shows the long run relationship between income distribution and per capita income. The reason for this separation is that economic growth in the short run increases per capita income in the long run.

Since there is a strong relationship between income distribution and economic growth rate in the short run, it could be suggested that one of the most important reasons of lower economic growth may be extreme income inequality for developing countries and extreme income equality for developed countries.

This study finds that, the optimum income distribution for the highest economic growth is the one that Gini coefficient is around 0,45 regarding the data. It is another argument how to reach this Gini coefficient. The first way may be governmental intervention for redistribution of income providing equal opportunity in economic activities for everyone. This paper suggest that, being opposite to the common sense, developing countries should decrease income inequality to the optimal level to increase their economic growth rates while developed countries should increase. The second way may be altruistic behaviour of individuals and social groups. The participation of other nongovernmental organizations or decision makers like local governments, labor unions, the civil organizations, associations, clubs, charitable foundations in decision making process may reduce inequality and stimulate economic growth and per capita income.

There are still many remaining questions about the relationship between income inequality, economic growth and per capita income. In other words, it seems that the relationship between income inequality, economic growth and per capita income is far from well understood yet.

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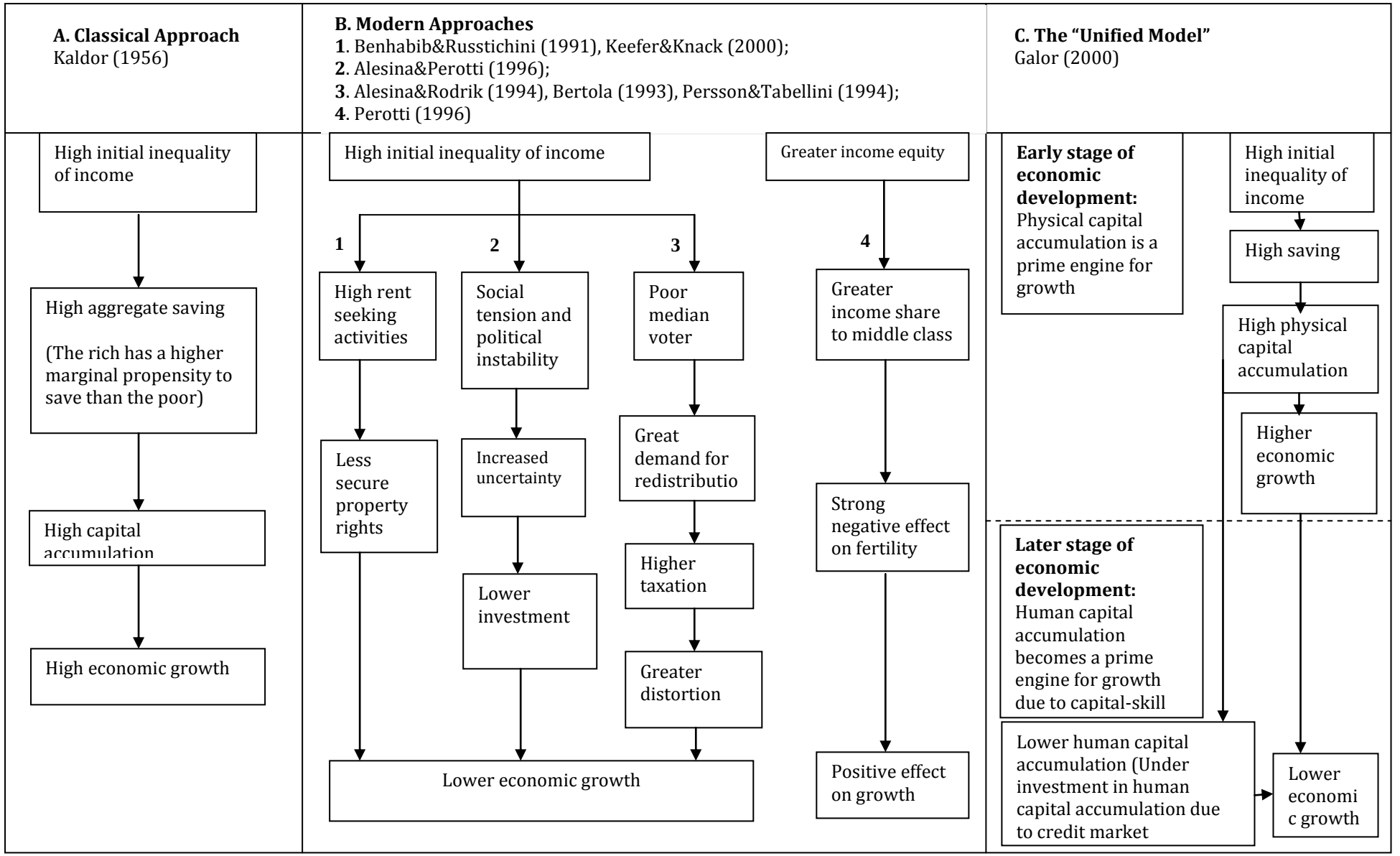
Appendix:
The Channels Through Which Inequality Affects Growth



Source: Thorbecke and Charumilind (2002: 1481).