ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

RELATIONSHIP BETWEEN INCOME INEQUALITY AND ECONOMIC GROWTH IN ETHIOPIA

BY

TIGIST GIRMA

June, 2018

ADDIS ABABA

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A THESIS SUBMITTED TO SCHOOL OF GRADUATE STUDIES, ST. MARY'S UNIVERSITY INSTITUTE OF AGRICULTURE AND DEVELOPMENT STUDIES, FOR PARTIAL FULFILLMENT OF THE REQUIREMENTS OF MASTER OF ART IN DEVELOPMENT ECONOMICS

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As members of board of examining of the final MA thesis open defense, we certify that we have read and evaluated the thesis prepared by Tigist Girma under the title "RELATIONSHIP BETWEEN INCOME INEQUALITY AND ECONOMIC GROWTH IN ETHIOPIA" we recommend that this thesis to be accepted as fulfilling the thesis requirement for the Degree of Master of Art in Development Economics.

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DECLARATION

I, the undersigned, declared that this thesis is my original work and has not been presented for a first degree or master's degree in any other university, and that all source of materials used for this thesis have been duly acknowledged.

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ENDORSEMENT

This thesis has been submitted to St. Mary's University, school of Graduate Studies for examination with my approval as a university advisor.

_____ _____

Advisor Signature

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ACRONYMS

ADF	Augmented Dickey-Fuller
ARDL	Auto Regressive Distributed Lag Model
CUSUM	Cumulative sum of recursive residuals
CUSUMSQ	Cumulative sum of squares of recursive residuals
ECM	Error correction model
ERHS	Ethiopian Rural Household Survey
GDP	Gross Domestic Product
GMM	Generalized Methods of Moments
GNI	Gross National Income
HIDCs	High-income developing countries
KPSS	Kwiatkowski- Phillips-Schmidt-Shin
LIDCs	Low-income developing countries
LM	Langrangian Multiplier
MoFEC	Ministry of Finance and Economic Cooperation
NBE	National bank of Ethiopia
NDI	Net Disposable Income
NDP	Net Domestic Product
OLS	Ordinary Least Squares
PAs	Peasant Associations
PP	Phillips Perron
SSA	Sub Sahara Africa
WB	World Bank

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ABSTRACT

The main objective of this study is to investigate the relationship between income inequality and economic growth in Ethiopia. The study hypothesized the existence of long run and short run relationship between income inequality and economic growth. This research used secondary data for the years 2002-2017 and it employs Auto Regressive Distributed Lag Model (ARDL) in time series econometric framework. The study finds that in the long-run cointegration analysis income inequality is significantly and positively related to economic growth. The coefficient of Gini is 13.8 which is the income inequality elasticity of real GDP. It means that if we increase income inequality by one percent, real GDP will grow by 13.8 percent. In the short run the error correction model is statistically significant at the 5% significance level with negative sign which implies that the error correction process converges monotonically to the equilibrium path relatively quickly and such high significance of ECM (-1) is further a proof of the existence of established stable long run relationship between the variables. The positively relationship between income inequality and economic growth indicates that high income inequality increase growth which follow Kuznets hypothesis since Ethiopia is a low income country and this would make economic growth and income inequality to rise at the same time. To enhance the economic growth of the country, the government should address the dependence on rain-fed agriculture, enhancing the productivity of factors of production and the productivity of land, encourage foreign investment in manufacturing industry to achieve targets to become a low middle-income by transforming the country into a manufacturing hub as stipulated in the Growth and Transformation Plan II, and revenue generated from different sources should be used to improve the welfare of people in low income group.

Keywords: *Ethiopia, Economic Growth, income inequality, ARDL, ECM*

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The relationship between GDP and the distribution of income is an important topic in macroeconomics (Galor 2011). The role of income inequality plays in economic growth has also takes quite limit of attention in policy area and the press recently. According to Charles-Coll (2013), economic theories traditionally was focused on issues like productivity and efficiency, the role of income inequality in economic change has been present but not apparent for a long time. Economic growth is measured as the annual rate of increase in a country's gross domestic product (GDP). This is because high level of income inequality produces an unfavorable condition for economic growth and development (British Council, 2012). The focus on income inequality and economic growth starts in 1955 when Simon Kuznets presented his idea to the American Economic Association that of an inverted *U* relationship between per capita GDP and inequality in the distribution of income. He explained that the process of economic growth had reduced income inequality in most countries by increasing per capita income, which can go together with labor movements from the agricultural to industrial sectors.

Field (1980) connected income inequality with three types of economic growth. The first one is *modern-sector enlargement growth* where the economy develops by enlarging the modern sector. He grouped the modern sector as industrialized sector that uses considerable amount of capital in production. Examples include advance economies and to some extent Asian economies like China and Taiwan. This type of growth increases absolute incomes and reduces poverty levels. The effect of modern sector growth on income inequality in the initial stages depends upon whether the rich or the poor benefit from the increase in economic growth. As the modern sector expands, there is a redistribution of labor as workers move from the traditional sector or low income to the modern sector or upper income, and reducing income inequality and poverty levels. The second is *modern-sector enrichment growth* where growth is limited to certain groups of people in the modern sector with the traditional sector experiencing little or no growth. Though this type of growth tends to raise average incomes and it leads to decreasing income inequality and few or no change in poverty levels. This type of growth has mostly practice in Latin American and sub-Saharan African. The last sector is *traditional sector enrichment growth*

which occurs when aggregate incomes increases in the traditional or subsistent sector, with little or no income increase in the modern sector. Field explained that countries with this type of growth achieve reductions in absolute poverty even at very low incomes because they focus policies on poverty reduction. This type of growth leads to a more equal distribution of income and a significant reduction in poverty levels.

According to Sudip (2017) studies about Global Income Inequality Trend that the global income inequality, on average, increased from 38.6 to 41.8 during the period 1990-2014. The results further highlight the existence of variations in the level of income inequality across regions and group of countries. The reduction in income inequality, among others, remains one of the key challenges of the 2030 Agenda for Sustainable Development. Some of the most unequal economies in the world are in Africa. The average Gini coefficient in Africa is 0.43, which is 1.1 times the coefficient for the rest of the developing world, at 0.39 and the upper bound of the continent's range of Gini coefficient is greater than of the developing world. This indicates that the presences of extreme inequality in Africa. The other method measuring income inequality the average top 20 per cent of income earners in Africa have an income of over 10 times that of the bottom 20 per cent (World Bank, 2014).

According to Bhorat et al (2015) and Beegle et al (2016) SSA countries has the second highest levels of income inequality next to Latin America and the Caribbean. Despite relatively high overall growth in recent years, inequality appears to have remained broadly unchanged, although there is quite a bit of variation across countries.

Ethiopia is an interesting case to study because with GDP growing at 10.5 per cent per year since 2005, the country is one of the fastest growing economies in the world (Seid et al., 2015) and targets to become a low middle-income country by 2025 (MoFED, 2015). Ethiopia has also managed to keep income inequality at a relatively lower level since the early 1990s. With a Gini coefficient of 0.30 in 2011, it is one the least unequal nations in the world (MoFED, 2013; World Bank Group, 2015). Despite this the country is one of the poorest nations in the world. Around 31 per cent of the population lives below the international poverty line of 1.25 PPP a day (World Bank Group, 2015) and also according to Alemayehu et al. (2009), the evidence on the state and

path of inequality over the decade obtained from the national household income and consumption surveys, as well as the panel data, indicate that it has been clearly rising in urban areas, and remained more or less at its initial level in rural areas though it exhibited considerable variation across time according to the panel data. In searching of how to deal with income inequality and economic growth many studies have investigated to show how they are correlated. Jihène and Ghazi (2013) argued that economic growth is a powerful force to reduce income inequality and then poverty. In recent years, a lot of empirical studies have tried to investigate the relationship between income inequality and economic growth. However different findings have got different relationship such as positive, negative, no relationship and Inverted U-shaped relationship. In general understanding the relationship between income inequality and economic growth is essential for members of the country in different ways, especially to acknowledge how income is distributed among nations and kinds of inequality- growth relationship in the country.

1.2 Statement of the Problem

The relationship between income inequality and economic growth is one of the most interesting, important and challenging areas in modern society. Income inequality refers to unequal distribution of national income among households. There is a growth of concern that income inequality within and between countries has been increasing and why academic, public, policy makers and development agencies are highly concerned with inequality. The reasons for high concerns are; inequality matters of poverty, growth, individual's rights, crimes and social security (McKay, 2002).

According to Oxfam (2014), 1 per cent of households own 46 per cent of the world's wealth and the bottom half of the world's population combined owns less than the 85 richest people in the world. The wealth of the one per cent of richest people in the world amounted to $110 trillion, almost 65 times the total wealth of the bottom half. According to World Bank (2014) African distribution of Gini coefficients in average levels of inequality are higher than other developing countries, that is, 60 per cent or 30 out of 50 of the African countries are fall above the median Gini coefficient of all developing economies.

Tassew et al. (2009) analyzed poverty and inequality in Ethiopia and they found that inequality increased in urban areas and remain unchanged in rural areas. In Ethiopia, income growth reduces poverty and increases in inequality increase poverty. According the authors there is growth in urban areas but the increase in inequality in urban areas removed the poverty-reducing effects. And the increase in the Gini coefficient of urban areas and remain unchanged in rural areas indicates that the overall increase in income inequality. Alemayehu et al. (2009) studied about Growth, Poverty and Inequality by using household panel data. Their results showed that there is a strong correlation between growth and inequality. They further estimated that over ten years, as growth per capita increases by four percent, poverty would decline from forty-four to twenty-six percent, but with no change in the aggregate income distribution. Alemayehu and Addis (2014) also examined the relationship between *g*rowth, poverty and inequality in Ethiopia. They found growth and distributions as important determinants for change in poverty. In rural areas poverty reduction is fully accounted by growth (inequality was not significant). While in urban areas the poverty reduction effect of growth is more than wiped out by the inequality that has accompanied it, and this underscores the need to address the challenges of inequality.

Very few studies have been done on this topic in Ethiopia. Most of them (see example: Tassew et al. (2009), Alemayehu et al. (2009) and Alemayehu and Addis (2014)) are studied about relationship between poverty, inequality and economic growth and are concentrated on relationship between poverty and growth. But this study concentrates on relationship between inequality and growth. Because of that both measures of poverty and inequality can be calculated from income/expenditure. That is poverty measures depend on the average level of income and the distribution of income in a country and it focuses only on those whose standard of living falls below a poverty line. But inequality focuses on variations in living standards across a whole population and income distribution among nations. It is a broader concept than poverty that it is covers the overall population (Boccanfuso and Kabore, 2000).

Studies done in cross countries by Perotti (1996), Forbes (2000), Delbianco et al. (2014) and Lee et al. (2015) showed that the positive relationship between income inequality and economic growth and the studies made by Herzer and Vollmer (2012), Castelló-Climent (2010), Zouheir and Imen (2012), Malinen (2013) and Fawaz et al (2014) shows a negative relationship.

Whereas other studies made by Barro (1999), Voitchovsky (2005), Fields (1988), Jong (2010), Halter et al. (2014), Binatli (2012) and Markus and Daniel (2017) shows positive relationship at high income level and negative at lower income level. Moreover, the study made by Tian (2012) in China, Hsing (2005) in the US and Maina (2006) in Kenya show negative relationship between income inequality and economic growth. The study made by Dahan and Tsiddon (1998) and Morteza and Ghasem (2015) showed that follow an inverted U-shaped dynamics.

The empirical studies conducted on the relationship between income inequality and economic growth in different countries showed contradictory findings with inconclusive outcomes. In a situation of inconclusive outcomes, there is a need to do more research in different contexts, and inform policies for particular country contexts accordingly. This thesis is thus an effort to fill up this lacuna in knowledge by investigating the relationship between income inequality and economic growth in Ethiopia using a macro level data and by adopting relevant analytical methodology. This study covers the period 2002 to 2017. The goal is to examine the direction of causality between income inequality and economic growth in Ethiopia.

1.3 Objective of the Study

1.3.1 General Objective of the Study

The main objective of this study is to investigate the relationship between income inequality and economic growth in Ethiopia between the periods 2002 to 2017.

1.3.2 Specific Objectives of the Study

1) Study the cause relationship between income inequality and economy growth
2) Analyze the trend of Ethiopia's income inequality
3) Examine whether the relationship between income inequality and economic growth follow a Kuznets curve (or test Kuznets's hypothesis for Ethiopia)

1.4 Significance of the Study

The study gives a modest benefit to the body of empirical knowledge by identifying the relationship between income inequality and economic growth in Ethiopia. The information gained from identifying the relationship will contribute to the policy makers and peoples of the country; it will gives important contribution for different actors like researchers, academicians, politician, government, etc. as an input for the purpose they intended to use. It also serves as a base for the researchers who want to do further research on relationship between income inequality and economic growth and this research may uses to the current literature in Ethiopia. Moreover, the study may benefit government, people and other economic agents by providing relevant information regarding to income inequality and economic growth and it may use to designing proper policy and fill the knowledge gap.

1.5 Scope and Limitation of the Study

The geographical scope of the study is bordered to the political boundary of Ethiopia. It considers only the relationship between income inequality and economic growth (the correlation of the two variables only) in Ethiopia. The study covers the time period from 2002 to 2017 by using time series data from different sources. The variables used in this study are real GDP and income inequality. The limitation of this study was the one associated with data availability. There was a shortage of data on income inequality. The other problem is shortage of time in order to undertake the research. However, the researcher tries to fix the problems as much as possible in order complete the research on time.

1.6 Organization of the Thesis

The paper consists five parts with different sections and sub sections. The rest of the paper was organized as follows: the Chapter Two presents the theoretical and empirical literature reviews related to economic growth. Chapter Three gives insight on the methodological aspect of the study which includes source and type of the data used, model specification, estimation procedure and definition of the variables. Chapter four contains results and discussion which is the regression result and its interpretation. Finally, chapter five provides the summary, conclusion and policy recommendation emanating from the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In this section theoretical and empirical evidences and the approach of the study are discussed. Several theoretical and empirical studies have shown that rising inequality prevents growth on the one hand and holding back poverty reduction on the other hand, while others showed the opposite. This chapter provides discussion on the various theories and studies pertaining to the subject.

2.2 Concept of Economic Growth

Economic growth is the increase in output of a country. It is the process by which a nation's wealth increases over time. It occurs when the productive capacity of a country increases. Economic development takes place when there is accelerated economic growth accompanied by major changes in social structures, popular attitudes and national institutions, reduction of inequality and eradication of poverty (Todaro, 1994). Economic growth is not a solution for the country's problems, but it facilitates the implementation of public policies that complement the shortcomings of growth. In short growth is a necessary condition but not sufficient to ensure social welfare (Mamoudou, 2011).

Economic growth can be: positive, zero, negative. Positive economic growth is recorded when the annual average rhythms of the macro indicators are higher than the average rhythms of growth of the population. When the annual average rhythms of growth of the macroeconomic indicators, particularly GDP, are equal to those of the population growth, we can speak of zero economic growth. Negative economic growth appears when the rhythms of population growth are higher than those of the macroeconomic indicators. Economic growth is a complex, long run phenomenon, subjected to constraints like: excessive rise of population, limited resources, inadequate infrastructure, inefficient utilization of resources, excessive governmental intervention, institutional and cultural models that make the increase difficult, etc. There are situations when economic growth is confounded with economic fluctuations. The application of expansionist monetary and tax policies could lead to the elimination of recessionary gaps and to increasing the GDP beyond its potential level. Economic growth supposes the modification of the potential output, due to the modification of the offer of factors (labour and capital) or of the increase of the productivity of factors (output per input unit). When the rate of economic growth

is big, the production of goods and services rises and, consequently, unemployment rate decreases, the number of job opportunities rises, as well as the population's standard of life (Petronella, 2012).

There are different measures of national accounts of a certain economy. Some of these are GDP, Gross national income (GNI): GDP plus primary income of residents from the rest of the world minus primary income of non-residents from the economy, Net Domestic Product (NDP): GDP minus depreciation, Net Disposable Income (NDI): net national income at market prices minus taxes. However, most economies used GDP to measure their national accounts (Mankiw, 2010).

There are three methods of measuring GDP: the expenditures approach, the income approach, and the production value-added approach. The expenditures approach measures GDP as the sum of all expenditures involved in taking that total output off the market, while the income approach measures GDP (wages, salaries and supplements, gross operating surpluses, gross mixed income and indirect taxes less subsidies). The production value-added approach differs from the two other methods in that it estimates GDP by taking into consideration the contribution of each economic unit (value-add) by estimating the value of the output of goods and services after the value of inputs used in its production is subtracted. Therefore to calculate GDP using this approach, the gross value-added value of output is added to taxes associated with the product minus subsidies on the product. The most common method of measuring GDP is the expenditures approach in which GDP is calculated by summing consumer purchases of goods and services, gross investment spending by businesses, government purchases of goods and services and net exports in an open economy. Mathematically it is presented as follows:

$GDPt = Ct + It + Gt + (Xt - Mt)$

Where:

GDP_t= value of gross domestic product at time t;

C_t= value private household consumption at time t;

I_t= value of private investment at time t;

G_t= value of government expenditure at time t;

X_t= value of export at time t; and Mt= value of import at time t (Heijdra, 2002).

2.3 Concept of income inequality

Inequality is the degree to which distribution of economic welfare generated in an economy differs from that of equal shares among its nations (SID, 2004). According to Gehring and Kulkarni (2006), Income equality is the equal distribution of total income among the population. In a nation with perfect income equality, each and every individual has an equal share of the total income. This is opposite with perfect income inequality, where one individual has all of the total income. But neither of these extreme situations exists in any national economy. In practice nations income distributions occurs somewhere between the two extreme.

According to Todaro and Smith (2012) and Ray (1998) measures of income distribution for both analytical and quantitative purposes are:

1) The range: is given by difference in the income of the richest and the poorest individuals, divided by the mean to express it independently of the units in which income is measured. Thus the range R is given by

$$R = \frac{1}{\mu}(y_m - y_1)$$

Where: R= range, y_m = income of the richest, y_1= income of the poorest individuals and μ= mean. This is a rather crud measure. It pays no attention, what so ever, to people between the richest and the poorest on income scale. It is useful measurement when detailed information on income distribution is missing.

2) *The Kuznets ratio:* Simon Kuznets introduced these ratios in his pioneering study of income distributions in developed and developing countries. These ratios refer to the share of income owned by the poorest 20 or 40% of the population, or by the richest 10 %, or more commonly to the ratio of the shares of income of the richest *x* % to the poorest *y* %,Where *x* and *y* stands for numbers such as 10,20 or 40. The ratios are essentially "*pieces*" of the Lorenz curve and like the range, serve as a useful short hand in situations where detailed income distribution data are missing.
3) *The mean absolute deviation:* this is our first measure that takes advantage of the entire income distribution. The idea is simple: inequality is proportional to distance from the mean

income. Therefore, simply take all income distance from the average deviation as a fraction of total income. This means that the mean absolute deviation M is defined as

$$M = \frac{1}{\mu n}\sum_{i=j}^{m} n_j|y_j\text{-}\mu|$$

Where: the notations stands for the absolute value (neglecting negative signs). M is a measure of inequality that takes in to account the overall income distribution. Then a regressive income transfer from y_j to y_k certainly raises inequality as measured by M. This obvious from the formula, because the distance of both y_j and y_k goes up and no other distance is altered, so M unambiguously rises. However, the Dalton principle is meant to apply to all regressive transfer, not just those from incomes below the mean to incomes above the mean. For example any two incomes y_j and y_k that are both above the mean, and make a transfer from the lower of the two say y_j to the other (higher) one. Clearly of the transfer is small enough so that both incomes stay above the mean after the transfer there will be no difference in the sum of the absolute difference from mean income. The mean absolute deviation will register no change in such a case and so fails the Dalton principles. We must conclude that using as it does the entire income distribution the mean absolute deviation has no compensatory features as a quick estimate and is therefore a bad measure of inequality.

4) *The coefficient of variation:* one way to avoid the insensitivity of the mean absolute deviation is by giving more weight to larger deviation from the mean. A familiar statistical measure that does just this is the standard deviation which squares all deviations from the mean. Because the square of a number rises more than proportionately to the number itself, this is effectively the same as attaching greater weight to larger deviation from the mean, so that only relative incomes matter. Thus

$$C = \frac{1}{\mu}\sqrt{\sum_{j=1}^{m}\frac{nj}{n}(yj-\mu)^2}$$

Where: μ= mean, C is coefficient of variation, it consider a transfer from j to m, where $yj \leq ym$. This implies a transfer from a smaller number [i.e., $(yj-\mu)$] to a larger one [i.e., $(ym-\mu)$], which increases the *square* of the larger number by more than it decreases the square of the smaller number. The net effect is that C invariably registers an increase when such a regressive transfer is made.

5) Lorenz Curves: is another common way to analyze personal income statistics. The Lorenz curve shows the *actual* quantitative relationship between the percentage of income recipients and the percentage of the total income they did in fact receive during a given year. The more the Lorenz line curves away from the diagonal (line of perfect equality), the greater the degree of inequality represented. The extreme case of perfect inequality (i.e., a situation in which one person receives all of the national income while everybody else receives nothing) would be represented by the congruence of the Lorenz curve with the bottom horizontal and right hand vertical axes. The greater the degree of inequality, the greater the bend and the closer to the bottom horizontal axis the Lorenz curve will be.

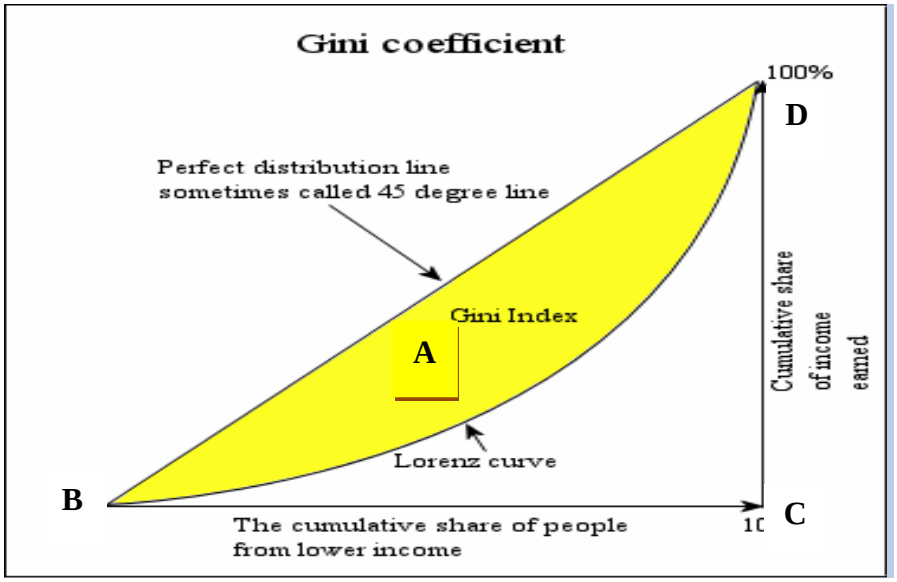

Figure 2.1 Lorenz curve and Gini coefficient

Source: Adopted from Todaro and Smith. (2012). Economic development, 11th Ed (p 208)

6) **Gini Coefficients and Aggregate Measures of Inequality:** A final and very convenient shorthand summary measure of the relative degree of income inequality in a country can be obtained by calculating the ratio of the area between the diagonal and the Lorenz curve divided by the total area of the half square in which the curve lies. It is the ratio of the shaded area *A* to the total area of the triangle *BCD*. Gini coefficients are aggregate inequality measures and can vary anywhere from 0 (perfect equality) to 1 (perfect inequality).

The Gini coefficient for countries with highly unequal income distributions typically lies between 0.50 and 0.70, while for countries with relatively equal distributions, it is on the order of 0.20 to 0.35 and it is approximately 0.44 for a relatively unequal distribution. (Todaro and Smith, 2012)

2.4 Theoretical Literature on the Link between Economic Growth and Income Inequality

During the 1970s, in the developed world, there was a growing concern with the quality of life, and which was manifested in protests against the consequences of economic growth, such as pollution and depletion of natural resources. In the developing world the main concern was focused on the relationship between economic growth and income distribution, since many countries that had experienced growth rates above their historical standards realized that such growth seemed to have negatively affected the income distribution, leading to increased inequality and a failure to eliminate the level of poverty (Todaro, 1994).

In the 1950s, Simon Kuznets formulated the most important contribution to the study of inequality in the last half of the twentieth century which is known as the "inverted U-curve" hypothesis. Kuznets (1955) argued that inequality within nations rises in the early stages of economic growth, becomes more pronounced at intermediate levels of development, and decreases thereafter as countries become wealthy. Kuznets's hypothesis shifted the framing of income inequality as a social problem to the examination of size distributions, spurred worldwide efforts to collect relevant income data, created a prolific program of research, and helped frame key issues in economic policy-making. So increasing were Kuznets's arguments that the U-curve hypothesis became paradigmatic of inequality theorizing during the last half of the twentieth century (Moran 2005). Kuznets's central purpose was to establish the character and causes of secular trends in the size distribution of income, and specifically to question whether income inequality increases or decreases during the process of economic growth.

Kuznets began by examining tentative empirical evidence available at the time. Using historical distribution data within the United States, England, and Germany, Kuznets found that inequality was characterized by long-term stability, before beginning to decline starting at least around 1920. This trend was accompanied by significant increases in real income per capita. Thus, he concluded that, at advanced stages of economic development, inequality first leveled off then began to decline as these economies continued to expand. The concentration of savings at the top of the income distribution, and the simultaneous inter-sectoral shift from low-income agricultural sector to the high-income industrial sector could result in converging incomes. After Kuznets, Williamson (1965) argued that like personal inequality, regional inequality also shows inverted-U shaped relationship. He pointed out that the most natural resources among the different regions of a country are unequally distributed. A discovery of new resources will then increase unbalanced development of regions, and a selective influx of labor and capital, perhaps encouraged by government policies, will lead to a further increase in regional inequality. At later stages of economic development, new resources will be discovered in less developed regions and government policies will concentrate on lagging regions, so that the process is reversed.

Barro (1999) constructed theory on how growth can be affected. These theories can be classed into four broad categories such as; credit-market imperfections, political economy, social unrest, and saving rates. According to his theory credit market imperfection reflect balance information and limitations of legal institutions because creditors may have challenge in collecting on defaulted loans because law enforcement is imperfect. Because of this credit-market imperfection, people with no or little asset tend to have lower interest rates and therefore they cannot invest in opportunities that would bring a positive return to them. Higher inequality through credit-market imperfections thus reduces the possible economic output. He explains political economy channel by comparing mean and median income in the economy. If the mean income in an economy exceeds the median income, the system of majority voting tends to favor redistribution of resources from rich to poor. Here, a greater degree of inequality motivates more redistribution through the political process especially transfer payments and the associated tax finance will bend economic decisions. He also indicates that high inequality motivates the poor to engage in crime, riots, and other disruptive activities and this participation represents a direct waste of resources because the time and energy of the criminals are not devoted to productive

activities and destabilize the economy of the country. Therefore, income equalizing transfers promote political stability. The other assumption is that individual saving rates rise with the level of income. A rise in inequality tends to raise investment and then more inequality would enhance economic growth at least in a transitional sense and the saving rate provide an explanation why inequality could have a positive impact on economic growth.

Galor and Moav (2004) provided a single theory in which the relationship between the distribution of income and growth is not stable over time depends on the stage of development in a country. The positive impact of inequality upon growth reflects the situation of an economy during its early stage of industrialization. At the early stage, the accumulation of physical capital is the principal engine of growth and it is promoted by inequality among people. Once the economy has passed the early stage, the accumulation of human capital becomes the prime engine of growth and a more equal distribution of resources allows more people to invest in education. In this stage, in the presence of credit constraints, access to education is easier if wealth is evenly spread among individuals, and hence policy decisions have to be directed towards inequality-reducing strategies. Their conclusions are particularly relevant for less developed countries (LDCs). In contrast with the historical growth path of the currently developed countries, where physical capital was the prime engine of growth, human capital accumulation may be the prime engine of growth in some LDCs, even in the early stages of development.

Aghion and Penalosa (1999) summarize three points why inequality has been seen to have an effect on growth. The first argument is the hypothesis of marginal propensity to save of the rich people is greater than that of the poor people. When the investment rate is positively related to the savings rate, and investment and growth are positively correlated, more unequal economies are grow faster. Second, in the separate investment and large sunk costs, the concentration of wealth is an important for the creation of new activities. The third argument is that the trade-off between equity and efficiency through incentives to workers. If output depends on the work effort of agents and an equal distribution of wages might discourage them from making any additional effort and thus reduce the efficiency of the production system Mirrlees, (1971).

Galor (2000) and Galor & Moav (2000) argued that the relationship between income inequality and growth depends on the stage of economic development or industrialization. During the initial

stages of economic development, physical capital accumulation is a major engine of economic growth. High initial income inequality stimulates high aggregate savings that, results in increase physical capital accumulation. Physical capital then stimulates the process of economic development. Therefore, income inequality increases economic development by channeling resources towards individuals with a higher propensity to save. At later stages of economic development, human capital accumulation replaces the accumulation of physical capital as the major engine of growth, due to capital-skill complementarities. During the economic process, the increased availability of physical capital raises the return on investment in human capital.

Myrdal (1968) stated that an increase economic inequality within a country would adversely affect its economic development tend to bring about social inequality, and latter in all its forms is unfavorable to productivity that means it will cause a slowdown in economic progress. According to Clark (1995) many of the nations experiencing high rates of income inequality are less developed countries and developing countries. It has been argued that in the future, income inequality and the accumulation of wealth in a small proportion of individuals would result in higher growth. From this 'trickle down' theory, the mass poor are just waiting and they will receive transfers of the accumulated wealth through redistribution. The redistribution of wealth finally puts everyone in a better position than they were before and income inequality it tolerable. However, there could be a negative impact of inequality on growth as argued others. If a country experiences high income inequality, there is great pressure from the poor masses 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 slows growth. On the other hand Alesina and Rodrik (1991) and Persson and Tabellini (1990) argue that inequality actually slows growth. This is because increased inequality causes greater conflict over distributional issues, thereby encouraging greater government intervention into the economy and higher taxes. This lowers the rate of return on private assets, restricting capital accumulation and slowing growth and they confirm these theoretical predictions with cross country growth regressions.

Perotti (1996) summarized the arguments that income inequality will be harmful for economic growth. The first argument is that an unequal distribution of income will lead to pressure for redistribution through distortionary taxes and incase reducing growth. Observing an equal after-tax distribution of income may simply mean that redistribution via progressive taxation has taken place. If this argument is to be tested empirically then data on pre-tax income should be used. However he used data on the distribution of both the pre-tax and the post-tax distribution of income. If data on the post tax distribution of income are used a positive relationship between inequality and growth would be expected, assuming that countries with a more equal distribution of after-tax income have higher rates of redistribution and also assuming that redistribution does affect incentives. The second argument is that inequality may lead to sociopolitical instability, which will in turn reduce investment and hence growth. Again, this is more likely to occur in the long run, with it taking some time for inequality to lead to political instability (although the effect of instability on investment and hence growth may well be more immediate). The third argument is that in the presence of imperfect capital markets inequality will reduce investment in human capital, which will in turn reduce growth. This is also likely to be a long-run, rather than short-run, phenomenon. The fourth and final argument is that as inequality increases, fertility is likely to rise and human capital investment fall, both reducing growth. Again, there may be significant time lags involved. In general the arguments suggesting that inequality is harmful for growth are more likely to apply in the long run.

2.5 Empirical Evidences on the Relationship between Economic Growth and Income Inequality

In connection with the theoretical literature many researchers have been conducted to examine the relationship between income inequality and economic growth for cross country difference, panel data and time series data in both developed and developing countries using a variety of independent variables. However they gate different relationship; positive, negative, no interaction and following Kuznets curve.

Perotti (1996) studied the reduced form relationship between income distribution and growth. He used cross sectional data for a number of countries. From the estimates he found that there is a positive relationship between equality and growth and this positive relationship is quantitatively weaker and statistically insignificant for poor countries while the relationship between equality and growth is stronger in democracies. Tian (2012) investigates the relationship between income inequality and economic growth in China by using OLS method for 22 years data from 1985 to 2007. The results showed that for the time periods examined, Gini coefficient which as a measurement of income inequality has negative impact on economic growth rate. Along with this effect, it achieved the expectation that increased income inequality results decreased saving rate and decreased GDP growth rate.

Barro (1999) with evidence from a broad panel of countries shows little overall relation between income inequality and rates of growth and investment. He suggested that income inequality have positive effects for high level income but negative for low income per capita. In other words, the effect of income inequality on economic growth in developed countries can be positive while for developing countries the effect seems to be negative. Shin (2012) used heterogeneous agent growth model found that in the early stage of economic development, income inequality has a negative effect on economic growth and has a positive effect near stable state and also income tax does not always reduce income inequality. Income inequality can be reduced by higher income tax near a stable state, but it cannot be reduced in an early stage of economic development.

Dahan and Tsiddon (1998) investigated the dynamic interactions among demographic transition, income distribution, and economic growth. They showed that fertility and income distribution follow an inverted U-shaped dynamics in the process of economic development. In the first stage fertility increases and income inequality enlarges, whereas in the second stage fertility declines, income becomes more equally distributed, human capital becomes more abundant, and growth of income per capita takes off. Delbianco et al. (2014) explores the relationship between the inequality of income distribution and the economic growth of 20 Latin American and Caribbean countries during the 1980-2010 periods. The study shows that the features of this relationship depend on the income level. However, when it comes to the upper tail of the richer countries' income distribution, higher inequality encourages economic growth

and the relation becomes positive. Thus, contrary to the economic policy recommendations for the richer countries, their evidence suggests that progressive redistributive policies in favor of poorer layers of population promote economic growth in lower income economies.

Voitchovsky (2005) analyzed the influence of the shape of income distribution on economic growth for a panel of 25 countries by Using comparable data on disposable income from the Luxembourg Income Study and claims that inequality within a country is positively correlated to growth at the top quartiles of the distribution, but negatively linked at the lower end of the distribution. He highlighted the potential limitation of investigating the effect of income distribution on growth was using a single inequality index; a single inequality statistic is likely to capture a relatively unimportant average effect of inequality on growth, and mask the underlying complexity of the relationship. The results of the study suggested that growth was facilitated by an income distribution that is compressed in the lower part of the distribution, but not so at the top end. In this view, redistributive policies - such as progressive taxation and social welfare - are likely to facilitate growth through their impact on the bottom of the distribution, and to inhibit growth through their impact on the top of the distribution.

Medgyesi and Toth (2009) analyzed the different growth effects on the distribution of labour income by used a simple two sector economies that are high-productivity modern sector and low-productivity/low-wage sector. They argued that when employment increases with the same proportion, growth does not necessarily change income distribution. Hsing (2005) examined the relationship between income inequality and economic growth by incorporating investment and human capital in economic growth function in case of US. The empirical results showed that income inequality retards economic growth while investment and human capital stimulate it.

Fikadu (2010) analyzed the relationship between Poverty, Inequality and Growth in Rural Ethiopia. The study used unbalanced panel data of five rounds, 1994a, 1995, 1997, 1999 and 2004 obtained from ERHS that was collected from 18 Peasant Associations (PAs). He shows that growth and change in inequality significantly affect the poverty gap in Ethiopia. However, the initial or baseline inequality had insignificant effect; thus inequality plays a role in perpetuating poverty.

Forbes (2000) studies about an effect relationship of inequality and transitional GDP per capita growth using a dynamic panel model that includes country fixed effects. Her sample spanned the period 1966-1995 and covered 45 countries. Forbes found that inequality has a significant positive effect on transitional GDP per capita growth. The estimates in her paper show that the level of GDP per capita is around 5 percent higher in the long run due to a one percentage point increase in the Gini coefficient. Jong (2010) conducted a study to investigate the effect of income inequality on economic growth using data set of Forbes (2000) by applying dynamic panel technique GMM to reduce endogenous problem and cross-sectional analysis and showed that long term economic growth is inversely affected by income inequality. In the short term to the medium term, income inequality affects economic growth but impact is uncertain and same is true from sub-group analysis.

Morteza and Ghasem (2015) studied the relationship between Economic Growth and Income Inequality in Developing Countries, by using panel data and data for 28 developing countries over the period 1990-2010 and the results indicate that as per hypothesis Kuznets in the early stages of growth, income inequality increases and then it declines in later stage.

Fields (1988) used cross-sectional data, inter -temporal data, and micro data states that considered the two possible conclusions that income inequality must increase before it decreases and the other one is that income inequality may increase or decrease depending on the type of country economy and the policies pursued. Also, the studies that consider structural and policy factors along with income level or rate of growth, the reports, show that the amount of inequality in different countries was associated with factors such as education, government economic activity, population growth rate, urbanization, and importance of the agricultural sector in total production. Herzer and Vollmer's (2012) study on 46 countries by using a panel co-integration analysis and they found on average income inequality has a negative long-run influence on economic growth. They also found that the effect of income inequality on per-capita income to be about half as large as the effect of an increase in investment.

Castelló-Climent (2010) investigated the impact of income and human inequality on economic growth by applying GMM approach on the data of advanced countries. The empirical results showed that income inequality leads to human capital inequality that in turn retards economic growth. This reveals that income inequality and human capital inequality inversely affect economic growth. Halter et al. (2014) investigated about Inequality and Growth: The neglected time dimension. The analysis includes up to 90 countries and covers the period from 1966 to 2005and they emphasize that the time dimension of the inequality-growth relationship by showing that higher inequality fosters growth in the short term, but hampers growth in the medium to long-run.

Binatli (2012) examined the relationship between income inequality and per capita income in Turkey during the periods of 1970– 1985 and 1985–1999. The results are indefinite showing positive impact of income inequality on economic growth in nineties and negative effect of income inequality in seventies. Jair and Janaina, (2014), examine the Relationship between Income Inequality and Economic Growth in Brazil. Their aim was to verify the correlation between income inequality and economic growth in Brazilian states using the Kuznets inverted U hypothesis for the time period from 1995 to 2012 by using dynamic panel data, the generalized method of moments (system GMM). The empirical evidence found that the relationship between income inequality and economic development in Brazil in the time period analyzed follows the inverted U model as proposed by Kuznets studies.

Zouheir and Imen (2012) examined the nexus between income inequality and economic growth using data of North African countries such as Tunisia, Morocco and Egypt by applying panel regression. They found that high income inequality is harmful for economic growth but trade openness and, physical and human capital investment enhance economic growth. Malinen (2013) investigates the relationship between inequality and growth in a sample of 70 countries in OECD and non-OECD for the time period of 1965 to 2000 by using an alternative measure of income distribution and GMM estimation and founds evidence of a negative relationship between Inequality and growth.

Fawaz et al. (2014) addressed the correlation between economic growth and income inequality. They conducted by using a multiple regression analysis in 111 countries and they discovered that high-income developing countries (HIDCs), as classified by the World Bank, and low-income developing countries (LIDCs) show different relationships by employed different techniques of analysis over the period of 1960 to 2010 which emphasized the relationship seen only in the short and medium-run. In their study, which focused on the relationship in the context of credit constraints, the HIDCs held a positive relationship between economic growth and inequality. The LIDCs possessed a relationship opposite that of the HIDCs. As income inequality decreased, then economic growth increased.

Maina (2006) studied the relationship between income inequality and economic growth in Kenya. The study period covers time series data from the year 1950 to 2006. The data was analyzed by using ordinary least squares (OLS) method. The result of the study shows that income inequality is negatively related to economic growth; that means high income inequality reduces growth and income inequality has remained high due to concentration of wealth in a few hands. In case the riches are able to save and invest their income to accumulate more wealth; their share of income will remain high and the poor people remain poor partly because they cannot borrow against future earnings to invest in production, the education of their children and assets to reduce their vulnerability.

Lee et al. (2015) have argued that the long-held view that inequality was an inevitable outcome of structural transformation had been based on a partial reading of Kuznets. His examines inequality begins to decline, was not economic or based on the natural progression of an economy or the unseen hand of the markets, instead inequality decrease due to political and policy choices propelled by the growing power of the urban working classes. Therefore, reducing inequalities in the context of structural transformation is not automatic. Rather, it is a matter of social and political choice, and robust policies. According to the empirical evidence of UNDESA (2013) supports this view in showing that inequality decrease much depends on country-specific conditions and national policies. The study also provides concrete proof of the policy basis of inequalities in discussing inequality trends in three countries undergoing structural transformation – Brazil, India and China. The paper argues that while Brazil experience ‘record-

high levels of inequality', its recent economic growth has improved the situation of poor people partly because of improvements in education and labour market conditions, as well as expanded social assistance programs like cash transfers. On the other hand China and India have experienced rising inequalities in spite of high levels of growth.

Markus and Daniel (2017) studied the relationship between Inequality and GDP per capita, by using data on the time period from 1970-2010. They estimate a panel model where the relationship between inequality and GDP per capita depends on countries' initial incomes. Estimates of the model show that the relationship between inequality and GDP per capita is significantly decreasing in countries' initial incomes. Results from instrumental variables regressions show that in Low Income Countries transitional growth is boosted by greater income inequality. In High Income Countries inequality has a significant negative effect on transitional growth. For the median country in the world a 1 percentage point increase in the Gini coefficient decreases GDP per capita growth over a 5-year period by over 1 percentage point; the long-run effect on the level of GDP per capita is around -5 percent.

2.6 Conceptual Framework

This study is conducted based on the conceptual framework drawn from the theoretical and empirical literature reviews explained above. This research is focused on studying the relationship between income inequality and economic growth in Ethiopia. From the literature review above, the study has developed the following graphical representation of the conceptual framework, which shows the relationship between the income inequality and economic growth.

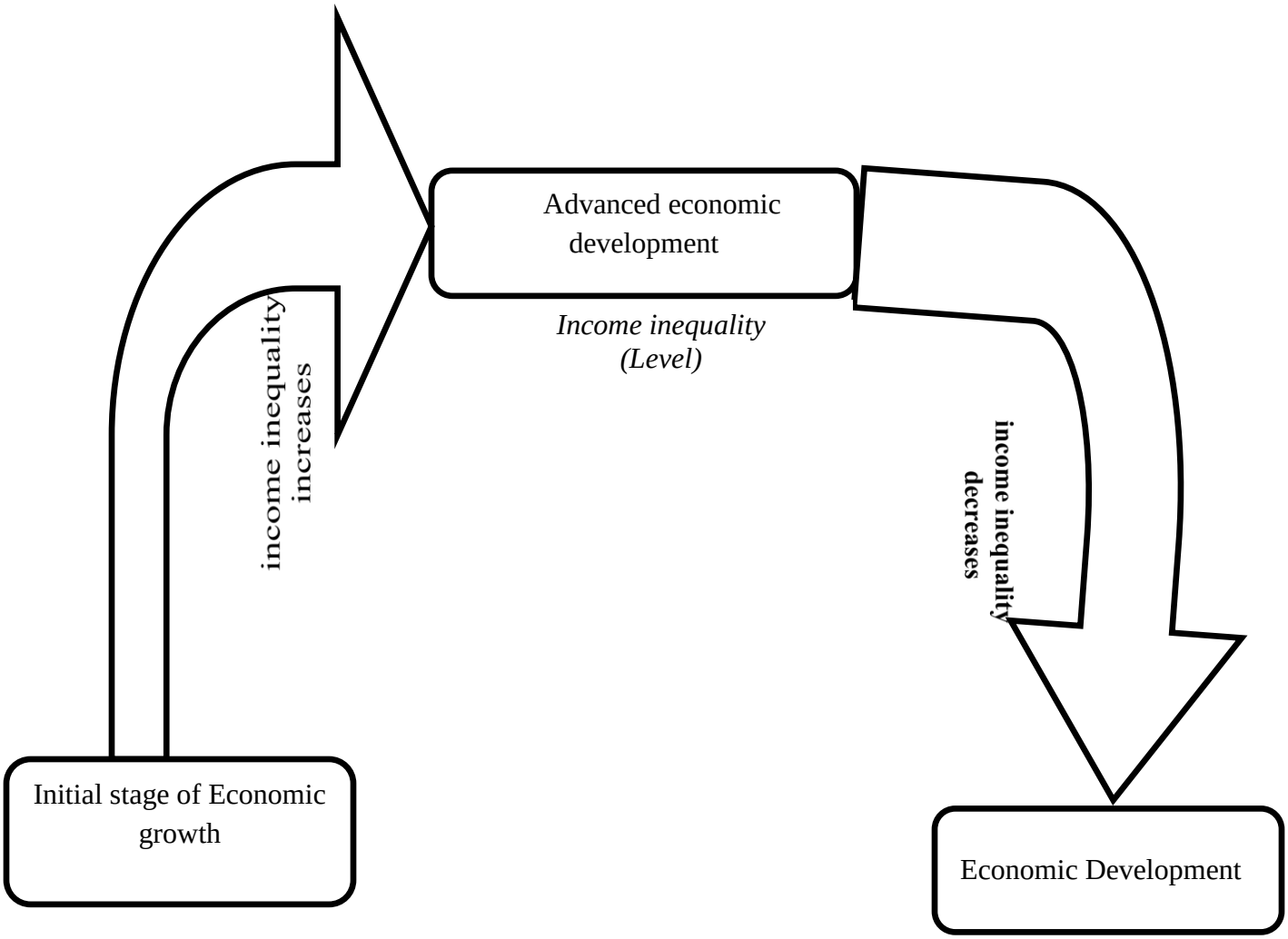

Figure 2.2: Conceptual framework of the study

Source: Own construction based on literature (2018)

CHAPTER THREE: RESEARCH METHDOLOGY

3.1 Introduction

This chapter gives details on how the research activities are carrying out, such as, the methods that were used throughout the study to accomplish the research objectives. It includes the research design, the data type, source and methods of data collection, the model specifications and estimation procedure.

3.2 Research Approach and Design

This study adopted a quantitative type of research approach because most time series analysis are quantitative in nature and both the variables used in this study are macroeconomic variables which are expressed in quantitative terms. Quantitative research approach places, the emphasis on measuring the variables using numerical values and analyze data by adopting a quantitative tools. Quantitative research approach is informed by post-positivism research philosophy that argues the presence of multiple realities. The subject this study deals with also show multiple reality which is already evidenced in the empirical literature review whereby some studies came up with Kuznets type of relationship between income inequality and economic growth, while some others came up a negative or positive relationship between the two variables. Therefore, a quantitative research approach with hypothesis testing fits very well to the subject of this thesis.

The study employed both descriptive and causal research design in order to achieve its objectives. Therefore the research applied causal research design for identifying the causal relationships between growth of real GDP and income inequality. The research also uses descriptive type of research design technique to elaborate the nature of variables under reflection. Descriptive measures such as mean, standard deviation and inferential technique will be used. Data will also be analyzed and expressed in terms of charts and tables for quick references.

3.3 Data Source, Description of Variables and Hypothesis

The study used secondary data that were collected from National Bank of Ethiopia (NBE) and the World Bank (WB) dataset.

Real GDP: is the total market value or monetary value of all finished goods and services produced in a country borders in a specified time period and calculated on annual basis. The data of real GDP is taken from NBE.

Income inequality: it can be measured using the GINI coefficient or the quintile ratio. Gini coefficient is a measure of statistical dispersion developed by the Italian statistician, Corrado Gini, in 1912. Gini coefficient measures the degree of inequality in the distribution of income in a country. It varies from a value of zero to a value of one, where zero indicates perfect equality (that all households had the same income), and one indicates perfect inequality (one household holds all income in the society). According to Deaton (2013), Gini coefficient is "the average difference in income between all pairs of people divided by the average income". This coefficient is obtained by the Lorenz curve, which represents the cumulative percentage of income earned by each cumulative share of the population. For the purpose of this study the researcher used gini coefficients that have already been computed from the World Bank Database. In view of the fact that Ethiopia is a low income country, According to Kuznets (1955) in the early stages of economic growth inequality within nations rises as the economy growth, accordingly, positive relationship between inequality and economic growth is expected.

3.4 Methods of Data Analysis

The study adopted both descriptive and econometric methods of data analysis. Results are presented using graphs and tables. Descriptive statistical methods such as mean, minimum values, maximum values, standard deviations etc. are used to describe the variables considered in this study. In addition econometrics tools and techniques were used to do necessary diagnostics tests, and to explain long-run and short-run relationship between economic growth and income inequality. The econometric tools were estimated using Ewiew 9 application software. Details of the econometric model and its specification, estimation procedure and the diagnostic tools used for the study are presented below.

3.4.1 Model Specification

This section presents the framework for the analysis of long run and short run relationship between income inequality and economic growth in Ethiopia. The study adopted the Autoregressive Distributed Lag (ARDL) model as a general function to explain the long run and short run relationship between GDP and income inequality (GINI coefficient) in Ethiopia.

Pesaran and Shin (1999) introduced the ARDL model to co-integration and error correction depending on the degree of stationary levels of the variables. This method has certain econometric advantages as compared to other co-integration procedures. The first one is, it is applicable irrespective of the degree of integration of the variables (i.e., whether the variables are purely I(0), I(1) or mixture of both) which avoids the pre-testing problems associated with standard co-integration, which requires that the variables be already classified into I(1) or I(0) or mixture of both (Pessaran et al., 2001). Secondly, the long run and short run parameters of the model are estimated simultaneously since it takes into account the error correction term in its lagged period. Third, with the ARDL approach it is possible that different variables have different optimal numbers of lags of the order of integration of the variables. The fourth advantage is, the ARDL approach is more robust and performs better for small sample sizes and by applying the ARDL technique we can obtain unbiased and efficient estimators of the model (Narayan, 2004). Mathematically, the model is presented as follows:

The ARDL *(p, q1, q2.....qk)* model specification is given as follows;

$\Phi\ (L, p)\ yt = \sum_{i=1}^{k} \beta_i\ (L, q_i) x_{it} + \delta w_t + \mu_t ut \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$

Where $\Phi\ (L, p) = 1 - \Phi 1L - \Phi_2 L^2 - \ldots - \Phi_p L^p$

$\beta(L,q) = 1 - \beta_1 L - \beta_2 L^2 - \ldots - \beta_q L^q, \quad for\ i=1,2,3\ldots\ldots k,\ \boldsymbol{u}_t \sim iid(0;\delta^2).$

L is a lag operator such that $L^0 y_t = X_t$, $L^1 yt = y_{t-1}$, and w_t is a s x1 vector of deterministic variables such as the intercept term, time trends, seasonal dummies, or exogenous variables with the fixed lags. *P=0,1,2…,m, q=0,1,2….,m, i=1,2….,k:* namely a total of *(m+1)k+1* different ARDL models. The maximum lag order, m, is chosen by the user. Sample period, *t = m+1, m+2…., n.*

OR

The ADRL (p, q) model specification:

$$\boldsymbol{\Phi}\,(L)\,yt = \boldsymbol{\varphi} + \boldsymbol{\theta}\,(L)\,xt + \mu_t, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(2)$$

With

$$\boldsymbol{\Phi}\,(L) = 1 - \boldsymbol{\Phi}_1 L - \ldots - \boldsymbol{\Phi}_p L_p,$$

$$\boldsymbol{\theta}\,(L) = \boldsymbol{\beta}_0 - \boldsymbol{\beta}_1 L - \ldots - \boldsymbol{\beta}_q L^q.$$

Hence, the general ARDL *(p, q1, q2......qk)* model;

$$\Phi\,(L)y_t = \boldsymbol{\varphi} + \boldsymbol{\theta}_1(L)x_{1t} + \boldsymbol{\theta}_2(L)x_{2t} + \boldsymbol{\theta}_k(L)x_{kt} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

Using the lag operator L applied to each component of a vector, $L^k y = y_t - k$, is convenient to define the lag polynomial $\Phi(L,p)$ and the vector polynomial $\beta(L,q)$.

As long as it can be assumed that the error term ut is a white noise process, or more generally, is stationary and independent of *xt, xt-1, … and yt, yt-1, …,*

Given the above model specification, model for the study is rendered as the form:

$$\boldsymbol{\Phi} \ln Y_t = \beta_o + \beta_1 \ln x_{1t} + \beta_2 \ln x_{2t} + \beta_3 \ln x_{3t} + \ldots\ldots\ldots + \beta_{ki} \ln x_{kt} + \varepsilon_t \ldots\ldots\ldots\ldots(1)$$

$$\boldsymbol{\Phi} \ln RGDP_t = \beta_o + \beta_i \ln GINI_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where: $\ln RGDP_t$ - Natural logarithm of real GDP

$\ln GINI_t$ - Natural logarithm of inequality

β_o – Constant and β_1 are partial regression coefficients

ε_t- Error term

t- Time trend to capture the effect of time

3.4.2 Estimation Technique of the ARDL Model

Since the ARDL model employs Ordinary Least Square (OLS) estimation method, the study estimates a standard ARDL regression model by using OLS estimation procedure for the regression parameters. Thus, the general ARDL structure for two variables (Y_t and X_t) can be expressed as follows:

$$Y_t = \sum_{i=1}^{n} \alpha_i Y_{t-i} + \sum_{j=0}^{n} \beta_j X_{t-j} + \varepsilon_t \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

In view of the above general model, an ARDL representation of the variables in this study is estimated as follow:

$$\Delta \ln RGDP_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta \ln RGDP_{t-1} + \sum_{i=0}^{n} \alpha_{2i} \Delta \ln GINI_{t-1} + \beta_1 \ln RGDP_{t-1} + \beta_2 \ln GINI_{t-1} + \varepsilon_t \quad \text{..... (4)}$$

The left-hand side is Economic Growth; which is real GDP, the expressions (β_1 and β_2), correspond to the long-run relationship and the remaining expressions with the summation sign represent the short-run dynamics of the model.

The null hypothesis of no co-integration in the long-run between the variables in the above equation is:

Null hypothesis (H_0): $\beta_1 = \beta_2 = 0$ (no long run relationship among the variables) against the alternative one:

Alternative hypothsis (H_1): $\beta_1 \neq \beta_2 \neq 0$. The F-test has no standard distribution which depends on whether the variables include in the model are I(0), or I(1), the numbers of repressors', and whether the model contains an intercept and/or a trend (Narayan, 2004). To test the significance of lagged level of the variables under consideration, the appropriate statistic is F or Wald test as Pesaran *et al.* (2001) proposed for bound test approach will be applied.

The short run Error Correction Model (ECM) integrates the short-run dynamics with the long-run equilibrium without losing long-run information. After testing the existence of a long run relationship between the variables through the Bound Testing, a short run error correction model (ECM) can be derived from ARDL through a simple linear transformation (Banerjee *et al.*, 2003). The error correction model is a short-run dynamic model, consisting of differenced variables, except the error correction term. The error correction term reflects the difference between the dependent and explanatory variable, lagged one time period. This model can incorporate a number of lags on both the dependent and explanatory variables. The diagnostic and the stability tests are conducted to ascertain the adequacy of the ARDL model.

3.4.3 Methods of Test for Stationary and Heteroscedasticity

Many economic and financial time series exhibit trending behavior or non-stationery in the mean. Therefore, it is necessary to test the stability of the series before identification of the relationship between variables.

1) Stationary (Unit Root) Diagnosis: A time series is said to be stationary if its mean and variance are constant over time and the value of covariance between the two periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed. (Gujarati, 2004). Time series data are rarely stationary in level forms. Regression involving non-stationary (I.e., variables that have no clear tendency to return to a constant value or linear trend) time series are lead to the problem of spurious regression. This occurs when the regression results reveal a high and significant relationship among variables but no relationship exist in fact. Stock and Watson (1988) have shown that the usual test statistics (t, F, DW, andR^2) will not possess standard distributions if some of the variables in the model have unit roots. The other precondition for testing unit root test when we applying ARDL model is to check whether the variables enter in the regression are not order two (I.e. I(2)). So, it is necessary to test for time series variables before running any sort of regression analysis because it affects the estimation procedures. In general non-stationarity can be tested using Augmented Dickey-Fuller (ADF) test, Phillips Perron (PP) test and Kwiatkowski- Phillips-Schmidt-Shin (KPSS) test. However, to ensure reliable result of test for stationarity, this study employs both Augmented Dickey-Fuller (ADF) test and Philip-Perron (PP) tests.

2) Heteroscedasticity and Stability Test: The diagnostic test examines the serial correlation, normality distribution of the residuals, functional form and heteroscedasticity associated with the model. The stability test employs the cumulative sum of squares of recursive residuals (CUSUMSQ) and the cumulative sum of recursive residuals (CUSUM) and examines the structural stability of the model.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter contains both the descriptive and econometrics analyses results and their interpretations. Under the descriptive statistics, the trends and overall performances of the variables are presented. The statistical tools such as tables and graphs are used to describe the variables used in the model. The econometric analysis begins by testing the necessary diagnosis such as stationary, hetroscedasticity and bound test. Then, both the long run and short run relationship between economic growth and income inequality are presented by estimating the ARDL model. After estimation has been made the interpretation and discussion are continued based on the model results.

4.2 Results of Descriptive Statistics

The descriptive statistics describes the basic futures of the data in a study. It provides simple summaries about the sample and the measures and a better look about the variables by summarize the statistical properties of the series in the model.

Table 4.1 below shows the summary of descriptive outcome for all the dependent variable and the independent variable used in the study such as mean, maximum, minimum, standard deviation and number of observation. The dependent variable used in this study was Real GDP and the explanatory variable is income inequality which is GINI coefficient.

Table 4.1: Descriptive statistics for Dependent and Independent Variables

Statistics	Variables	
	RGDP	GINI
Mean	439422.8	0.32
Median	399290.1	0.31
Maximum	803357.4	0.39
Minimum	197604.4	0.29
Std. Dev.	200890.1	0.03
Observations	16	16

Source: Own estimation based on NBE and World Bank data sets (2018)

The table above represents the statistical summaries of 16 observations for each variable included in the model. With the average (mean) value of 439422.8, the dependent variable (real GDP) has minimum and maximum values of 197604.4 and 803357.4 respectively. The mean, minimum and maximum value of GINI is 0.32, 0.29 and 0.391. The implications of the high range, is that the presence of out layers which in turn affects the mean value of data. The standard deviation of RGDP and Gini is 200890.1and 0.030 respectively, which shows the actual observation of the RGDP is highly dispersed from the mean values while GINI has lowest standard deviation of 0.03 implies its mean value and actual observations are close each other. According to Todaro (2012) The Gini coefficient for countries with highly unequal income distributions typically lies between 0.50 and 0.70, relatively equal distributions, it lies between 0.20 and 0.35 and it is approximately 0.44 for a relatively unequal distribution. The average (mean) value of GINI in Ethiopia which is 0.32 lies between 0.20 and 0.35, represents there is relatively equal distributions.

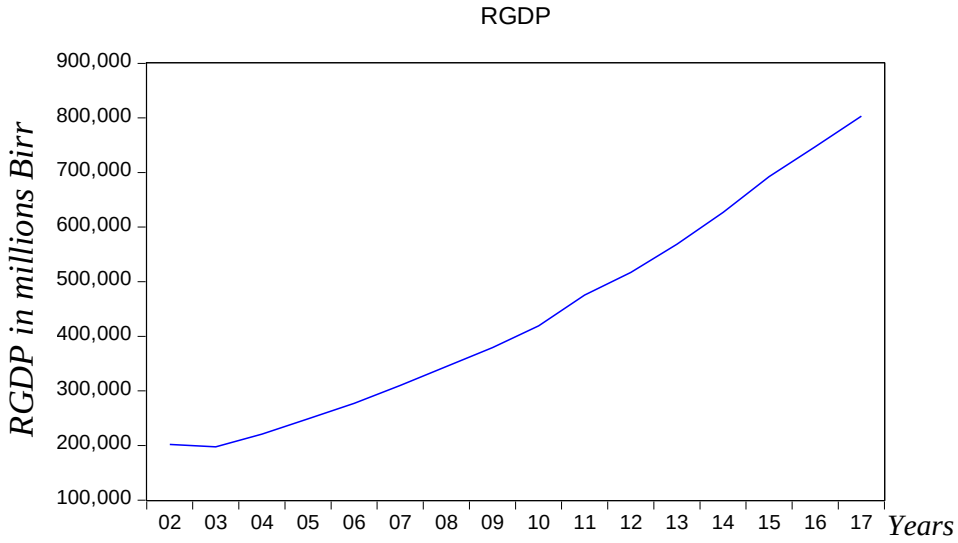

Figure 4.1: Trends of Total real GDP in Ethiopia from 2002 -2017
Source: Computed based on NBE data

According to NBE, the real GDP of Ethiopia was 201,840.04 million birr in 2002 and it reaches 803357.42 million birr in 2017.

The figure 4.1 above showed that from 2002 to 2017 the graph is sharply upwards that indicates higher rate of growth. This unprecedented high growth rate is attributed due to a combination of pro poor growth policy (since 2003 on wards) and state led development program (since 2005 on wards) and the present government implementing a development program aimed at poverty reduction through rapid economic growth and macroeconomic stability (Zerayehu 2013).

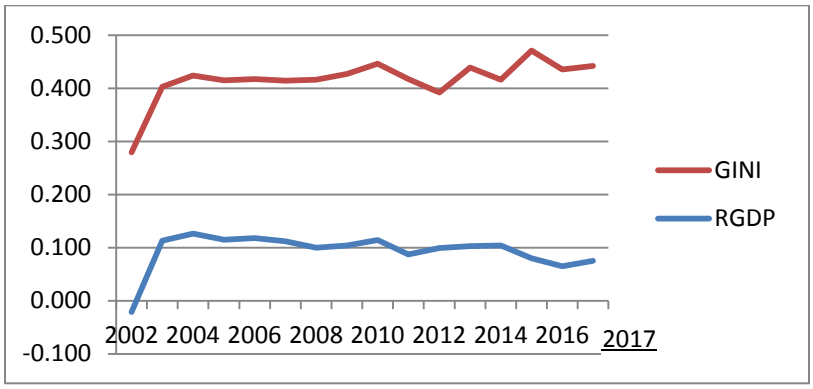

Figure 4.2: Trends of GINI coefficient and growth rate of RGDP

Source: Computed based on World Bank data and NBE

The trend of income inequality (GINI) and growth rate of real GDP relatively low at starting year and shows increase. The graphs illustrate the same properties that increase or slight decrease at the same periods. This shows positive relationship between GINI and RGDP. Therefore according to Kuznets hypothesis an increase in income inequality as economy growth at initial stage, Ethiopian income and growth relationship follows Kuznets hypothesis. Since Ethiopia is a low income country.

4.3 Results of Diagnostic Tests

4.3.1 Results of Unit Root Test

Most macroeconomic time series are trended and therefore in most cases are non-stationer. In order to receive consistent, reliable results, the non-stationary data needs to be transformed in to stationary data. Unit Root test is used to make the data stationary. So before to utilizing the data in estimating ARDL model, it is very important to check the time series properties of each series. When a series contains unit root, it is common to transform the variables through differencing so as to make it stationary. In order to determine the degree of integration, a unit root test is carried out using the standard Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests.

Moreover in applying ARDL model all of the variables should be integrated of order zero (I (0)), integrated of order one I (1) and a mixture of two. But it should not be integrated of order two (I (2)). To check these conditions, unit root test is conducted before any sort of action taken. Therefore the unit root test could convenience us whether or not the ARDL model should be used. The result in table below shows that there is I (1) but not any order two.

Table 4.2: ADF Unit Root Test Results

Variables (At level & 1st difference (D))	With intercept only		Test critical values:			With intercept and trend		Test critical values:		
	t-statistics	Prob	1% level	5% level	10% level	t-statistics	Prob	1% level	5% level	10% level
LNRGDP	0.23	0.965	-3.959	-3.081	-2.68	0.672	0.998	-4.886	-3.829	-3.363
D(LNRGDP)	-8.24	0.000	-4.004	-3.0989	-2.690	-3.036	0.163	-4.992	-3.875	-3.388
LNGINI	-0.04	0.940	-3.959	-3.081	-2.681	0.711	0.998	-4.886	-3.829	-3.363
D(LNGINI)	-7.35	0.000	-4.004	-3.0989	-2.690	-3.231	0.125	-4.992	-3.875	-3.388

Source: Own estimation based on NBE and World Bank data sets (2018)

Based on the above ADF Unit root test result, both variables are stationary in first difference. This result indicates that, none of the variables are I (2).

Table 4.3 Phillips-Perron test statistic test (unit root test) results

Variables (At level & 1st difference (D))	With intercept only		Test critical values:			With intercept and trend		Test critical values:		
	Adj. t-Stat	Prob	1% level	5% level	10% level	Adj. t-Stat	Prob	1% level	5% level	10% level
LNRGDP	0.248	0.966	-3.959	-3.081	-2.681	-4.0131	0.033	-4.72836	-3.7597	-3.325
D(LNRGDP)	-7.476	0.000	-4.004	-3.099	-2.690	-30.55	0.000	-4.80008	-3.7912	-3.342
LNGINI	-0.023	0.942	-3.959	-3.081	-2.681	-3.1978	0.122	-4.72836	-3.7597	-3.325
D(LNGINI)	-6.145	0.000	-4.004	-3.099	-2.690	-35.175	0.000	-4.80008	-3.7912	-3.342

Source: Own estimation based on NBE and World Bank data sets (2018)

Similarly, the PP test shows that both variables are stationary in first difference. Form table 4.2 and 4.3 we can conclude that none of the variables entered in the regression are order two, which are not desire in applying ARDL model. So ARDL co-integration technique proposed by Pesaran *et al.* (2001) is the most appropriate method for estimation or to check the long run relationship among the variables.

4.3.2 ARDL Bound Tests for Cointegration

After checking the stationarity of the variables, the next step is checking the bound test for co-integration. The first task in the bounds test approach of co-integration is estimating the ARDL model using the appropriate lag length selection criteria. A maximum lag of order 1 was automatically chosen for the conditional ARDL model. Because according to Pesaran and Shine (1999) for the annual data are recommended to choose a maximum of one or two lag lengths. In addition the stationarity of the results confirmed that both variables were of order 1 and according to Wooldridge, (2000) the more lags we include, the more initial values we lose. The F-test through the Wald test (Bound test) is performed to check the joint significance of the coefficients. . Then Wald (bound test) is performed and the value for F-statistic obtained. The computed F-statistic value is compared with the lower bound and upper bound critical F-values that have been provided by Pesaran *et al.* (2001) and Narayan (2004). As it is indicated in table below,

Table 4.4: Results of the ARDL Bound Test

Test Statistic	Value	K	Critical Value Bounds		
			Significance	I0 Bound	I1 Bound
F-statistic	100.9355	1	10%	4.04	4.78
			5%	4.94	5.73
			2.50%	5.77	6.68
			1%	6.84	7.84

Source: Own estimation based on NBE and World Bank data sets (2018)

As indicated in the above table, the calculated F-statistic i.e. 100.9 is higher than the upper bounds of the critical values at all significance levels. Since the computed F-statistics is greater than the upper bound critical value, it implies that it rejects the null hypothesis (H_0= No long run relationship exist among the variables) and accepts the alternative hypothesis (Long run relationship exists).

4.3.3 Model Stability and Diagnostic Test

From Table 4.5: the test for serial correlation is the Langrangian Multiplier (LM) test for autocorrelation, the test for functional form is Ramsey s RESET test, the test for normality is based on a test of skewness and kurtosis of residuals and the test for a hetroskedasticity is based on the regression of the squared residuals on square fitted values. Table 4.5 indicates that the long run ARDL model estimated in the study passes all the diagnostic tests. This is because the p-values associated with both the LM version and the F version of the statistics was unable to reject the null hypothesis specified for each test.

Table 4.5: Results of Diagnostic Test

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(2)= 2.378143[.3045]	F((2,12)= 1.047497[.3808]
B:Functional Form	CHSQ(1)= 2.585998[0.1078]	F(1, 13)= 2.280450[.1549]
C:Normality	CHSQ(2)= .079476[.961041]	Not applicable
D:Heteroscedasticity	CHSQ(1)= .330476[.5654]	F(1,14)= .295265[.5954]

A: Lagrange multiplier test of residual serial correlation

B: Ramsey's RESET test using the square of the fitted values

C: Based on a test of skewness and kurtosis of residuals

D: Based on the regression of squared residuals on squared fitted values

Source: Own estimation based on NBE and World Bank data sets (2018)

The first test is answers the question whether there is or not an interdependence/correlation between the two residuals. This is called an autocorrelation test. The Brush God Fray LM test failed to reject the null hypothesis because the p-values associated with test statistics is greater than the 5% standard significance level (i.e. 0. 3045 > 0.05). This implies that there is no problem of autocorrelation in the model. Secondly, the results of the Ramsey's RESET test, which tests whether the model suffers from omitted variable bias, showed that the model is correctly specified (see Table 4.5). The third test is about the nature of distribution of the residual. Since the p-value associated with the Jaque-Berra normality test is larger than the standard significance level (i.e. 0.96 > 0.05), we fail to reject the null hypothesis. The last diagnostic test deals about the variance nature of the residual i.e. hetroskecedasitcity test. The null hypothesis is

constant variance of the residual or homoskecedasitcity as we observed from the above table the p-value of the test statistics is higher than the associated significance level (i.e. 0.57 > 0.05), then we fail to reject the null hypothesis. Therefore, it can be concluded that there is no specification error.

4.3.4 Stability Tests (Plot of CUSUM and CUSUMQ)

The cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of residuals (CUSUMQ) plotted against the critical bound of the 5% significance level which shows that the model is stable overtime. The stability of the long run coefficients is used to form the error correction term in conjunction with the short run dynamics. Having this in mind, in this study the CUSUM and CUSUMQ tests which are developed Brown et al. (1975) are conducted. CUSUM test is based on the first set of n observations.

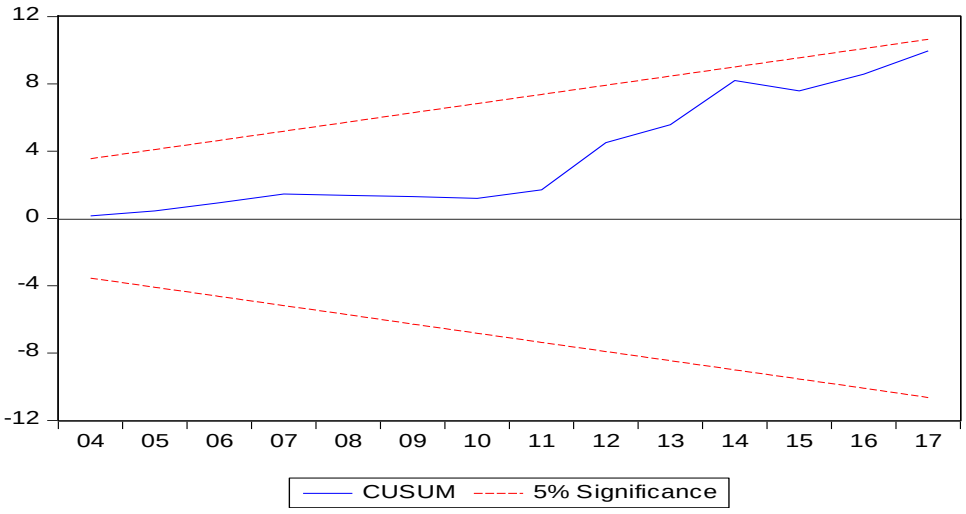

Figure 4.3: Plot of Cumulative Sum of Recursive Residuals (CUSUM)

Source: Own estimation based on NBE and World Bank data sets (2018)

If the plot of CUSUM stays within 5% significance level, then estimated coefficients are said to be stable which is similar to carry out the CUSUMQ that is based on the squared recursive residuals. Depending on the plotted graph, one can identify at what point of time a possible instability (structural break) occurred. If the plot of CUSUM and CUSUMQ statistic moves without crossing the straight lines, then the estimated coefficients are said to be stable.

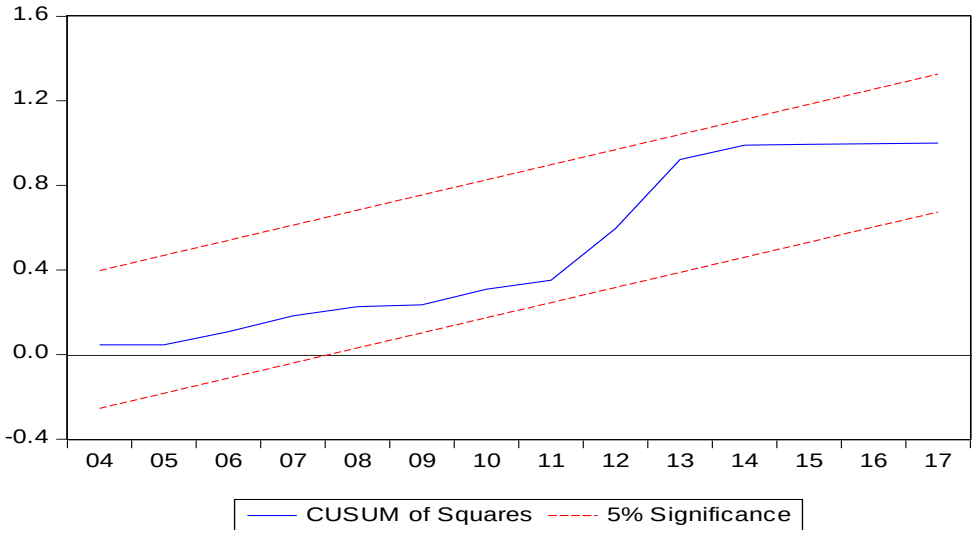

Figure 4.4: Plot of Cumulative Sum of squares of Recursive Residuals

Source: Own estimation based on NBE and World Bank data sets (2018)

As the above figure indicates both CUSUM and CUSUMQ test statistic for the model did not cross the critical value lines, so it is safe to conclude that the model is stable. Accordingly, the results of the estimated model are reliable and efficient.

4.4 Estimation Results of Econometric Model

4.4. 1 Estimation Results of Long Run Relationship between Economic Growth and Income Inequality

After testing the bound test for integration the next step is long run model estimation. The results of the bound test indicates us the existence of a long run relationship between Gini coefficient and real GDP. The estimated long run ARDL model is presented in table 4.6 below.

Table 4.6: Results of ARDL Long-run Estimation

ARDL(1,1) selected based on Akaike Information Criterion			
Dependent variable is LNRGDP			
16 observations used for estimation from 2002 to 2017			
Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LNGINI	13.76	0.39	35.55(0.000)
C	-22.23	0.97	-22.89(0.000)

Source: Own estimation based on NBE and World Bank data sets (2018)

According to the result from the long run test statistics, gini coefficient is significantly and positively related to real GDP. In case it follows Kuznets hypothesis since Ethiopia is a low income country, so the income inequality and economic growth rise at the same time.

Since the researcher has specified the growth model in a log-linear form, the coefficients of the dependent variable is interpreted as elasticity with respect to real GDP. The long run model result indicates that Gini coefficient is statistically significant at 1% significance level. Since the coefficient of gini is 13.8%, which is the income inequality elasticity of Real GDP. Thus, holding other things constant a one decrease in income inequality will decrease 13.8% real GDP. The finding of the study is similar to the findings of by Perotti (1996), Forbes (2000), Delbianco *et al.* (2014) and Lee *et al.* (2015).

Based on the above result, the estimation equation becomes:

LnRDP = -22.23 + 13. 76lnGINI

Where RGDP = real GDP

GINI = Inequality coefficient

4.4.2 Estimation Results of Short-Run Error Correction Model

After the acceptance of long run coefficients of the growth equation the short run Error Correction Model (ECM) is estimated. ECM indicates the speed of adjustment to restore equilibrium in the dynamic model. It is one lagged period residual obtained from the estimated dynamic long run model. The coefficient of error correction term indicates how quickly variables converge to equilibrium. Moreover it should have a negative sign a statistically significant at standard significant level (i.e. p- value should less than 0.05).

The result presented in Table 4.7 shows that the value of ECM (-1) is statistically significant at the 5% significance level with negative sign which implies that the error correction process converges monotonically to the equilibrium path relatively quickly and such very high significance of ECM (-1) is further proof of the existence of established stable long run relationship between the variables (Banerjee *et al.*, 2003).

Table 4.7: Error Correction Representation for the selected ARDL model

ARDL(1, 2, 1, 0) selected based on Akaike info criterion (AIC)				
Dependent variable is D(LNRGDP)				
16 observations used for estimation from 2002 to 2017				
Regressor	Coefficient	Standard Error	T-Ratio	[Prob]
D(LNGINI(-1))	26.87**	6.85	3.92	0.01
ECM(-1)	-0.37**	0.09	-3.99	0.01
C	-1.28	0.42	-3.02	0.03
R-squared = 0.956429				
Adjusted R-squared = 0.880180				
F-statistic = 12.54347				
Prob(F-statistic) = 0.013891				

Source: Own estimation based on NBE and World Bank data sets (2018)

Note: the coefficients are statistically significant at 5%.

The equilibrium error correction coefficient is equal to -0.37 implies that approximately 37% of the disequilibrium from the previous year's shock converges back to the long-run equilibrium in the current year. Since, its coefficient has the correct negative sign and significant at 5% level, it results in a very high speed of adjustment to equilibrium after a shock. As it is shown in the result table, similar to the long run coefficients, the main variable, i.e, the gini coefficient is positively related to RGDP.

The coefficient of determination (R-squared) is high explaining that about 95.64% of the variation in the real GDP is attributed or explained by the variations of the variable that is used in the model. In addition the F-statistics is significant that shows the model is good to explain the relationship between the variables in the short run.

CHAPTER FIVE: SUMMERY, CONCLUSIONS AND RECOMMENDATION

5.1 Summary

The drive of the study was on investigating the relationship between income inequality and economic growth in Ethiopia. The study employed quantitative approach which is based on secondary data. In order to make the estimators efficient the model diagnostic tests are tested. The result shows that no evidence of serial correlation, no functional form problem (i.e. the model is correctly specified), the residuals is normally distributed and no evidence of hetroskecedacity problem. The presence of long run relationships between real GDP and income inequality is tested by using bound test. The result revealed that F-calculated or F-statistics is greater than the upper bound critical value at standard significance level. As a result we reject the null hypothesis which says there is no long run relationship between the dependant and independent variables. After checking all the necessary tests and accepting the results, next we have estimated the long run ARDL model and short run error correction model. The results of the model have shown that income inequality (GINI) is statistically significant both in the short run and in the long run.

5.2 Conclusions

The main objective of this study is to investigate the relationship between income inequality and economic growth in Ethiopia ranging the time from 2002 to 2017. The study have investigated the long run and short run relationships between income inequality and real GDP by using Autoregressive Distributed Lag (ARDL) model to co-integration bound test approach to error correction. Before applying the ARDL model, all variables are tested for their time series properties (stationary properties) using ADF and PP tests. ADF test result shows the variables are stationary at their first difference and the PP test indicates the same as ADF test. This confirms the reason why the researcher uses ARDL model.

As we have seen from the finding part a one percent increase income inequality will increase real GDP will grow by 13.76 percent and 26.87 percent in the long run and short run respectively during the study period. The short run error correction model (ECM) formulation reveals that there is convergence towards equilibrium in the long run and the adjustment is fairly strong(37%) per annum and statistically significant.

According to Kuznets (1955) in the early stages of economic growth inequality within nations rises as economy growth. That means there is positive relationship between income inequality and economic growth and also he explained that the process of economic growth had reduced income as labor shifts from the agricultural sectors to industrial sectors. From the above finding result income inequality and economic growth are positively related, which is the same to the Kuznets hypothesis. Therefore the relationship between income inequality and economic growth in Ethiopia follows the Kuznets curve since Ethiopia is a low income country whose economy is dominated by agriculture and targets to become a low middle-income by transform the country into a manufacturing hub.

5.3 Recommendation

Based on the research findings, the study makes the following recommendations:

- ✓ Since the economy of the country depends on agriculture, to enhance the economic growth of the country, the government should address the dependence on rain-fed agriculture by studying on the feasibility of small-scale irrigation scheme, water harvesting and designing incentive schemes for the farmers; Enhancing the productivity of factors of production, in particular, labour and land to increase the productivity of labour (through education) and the productivity of land (through supply of fertilizer and rural credit provision)

- ✓ Encourage foreign investment in manufacturing industry to achieve targets to become a low middle-income by transforming the country into a manufacturing hub as stipulated in the Growth and Transformation Plan II. The redistribution of assets that is associated with increased investment can increase overall growth and provide significant benefits to the poor, so revenue from different sources should be used to enhance welfare of people in low income

group by providing investment, education and social and economic infrastructure to encourage growth.

- ✓ The government should provide facilities that will help improve the economic provisioning of the poor. This in the long run would help reduce poverty and income inequality as well as promotes economic development.

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