THE IMPACT OF INSTITUTIONAL QUALITY ON INCOME INEQUALITY: COMPARATIVE ECONOMIC ANALYSIS OF ETHIOPIA AND UGANDA

Norahun Tafere Taw

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ADDIS ABABA, ETHIOPIA

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SCHOOL OF COMMERCE
SCHOOL OF GRADUATE STUDIES

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This is to certify that the thesis prepared by NorahunTafere Taw, entitled: "*THE IMPACT OF INSTITUTIONAL QUALITY ON INCOME INEQUALITY: COMPARATIVE ECONOMIC ANALYSIS OF ETHIOPIA AND UGANDA"*and submitted in partial fulfillment of the requirements for the Degree Of Master Of Science In Development Economics complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Advisor	Signature	Date
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Internal Examiner	Signature	Date
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External Examiner	Signature	Date

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ACRONYMS AND ABBREVATIONS

ADB African Development Bank

ADB Asian Development Bank

ADF Augmented Dickey-Fuller Test

AIC Akaike Information Criterion

ARDL Autoregressive Distributed Lag

DW Durbin Watson

GDP Growth Domestic Product

ILO International Labour Organization

LIS Luxembourg Income Study

MoFED Ministry of Finance and Economic Development

OECD Organizations for Economic Co-operation Development

PP Philips-Perron Unit root test

SBIC Shwartz Bayesian Information Criterion

SDGs Sustainable Development Goals

SSA Sub-Saharan Africa

SWIID Standardized World Income Inequality Data

UNDESA Unite Nations; Department of Economic and Social Affiars

UNDP United Nations Development Program

UNICEF United Nations Children's Fund

UNRISD United Nations Research Institute for Social Development

WBI World Bank Indicators

WGI World Governance Indicators

ABSTRACT

Income inequality is currently a global issue since the gap between the rich and poor people within countries has been rising and it is one of the causes for polarizing societies as well as affects social cohesion among the society in a country. While there are various causes for the observed income inequality globally, there is still an acceptable suggestion that rising income inequality can be controlled by improving the quality of existing institutions. The main purpose of this paper is to explore the impact of institutional quality on income inequality in the case of Ethiopia and Uganda. The study uses time series annual data from 1991 to 2019, and an effort is made to identify the short run and long run impacts of institutional quality on income inequality in Ethiopia applying an Autoregressive Distributed Lag (ARDL) and Error Correction Methods (ECM). The findings of the study revealed that voice and accountability and rule of law are affecting income inequality in the long run for Ethiopia, while rule of law and political stability and absence of violence/terrorism has negative effect for Uganda in the long run. The coefficient of the ECM is found with the appropriate sign and magnitude. In general, the findings of the study highlighted that institutional quality has a vital role for income inequality reduction through the instrument on income redistribution from the richest to the poorest segment in both countries.

Key words: *Income redistribution, Gross Gini, Institutional quality, ARDL, Error Correction Model.*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Countries widely differ in their institutional quality as well as recently, studies argued that global difference in prosperity across a state is the matter of institutional quality. According to North (1991) “institutions are the rules of the game in a society or more formally, humanly devised constraints that shape human interaction.” Chong and Gradstein (2007) confirmed that efficient institutional framework have an important role to reduce income inequality.

Strong institutions are usually considered as a key determinant to economic success and development. Since the 1980s, most of the advanced nations have faced the problem of rising income inequality, thus the issues of income inequality and redistribution begun to dominate in academic and political debates, resulting in various interpretations of causes and consequences of distributional effects (Josifidis et al, 2017). Fukuyama (2008) suggests that by improving institutional quality; particularly some of among the six clusters of institutional quality indicators such as government effectiveness, regulatory quality, control of corruption and rule of law are potent points of development strategies for many countries in the world.

While new causes of income inequality have been identified, such as globalization, low-skilled biased technological change (LSBTC) or migration, there is still an acceptable opinion that rising income inequality can be controlled by improving the existing institutions. However, it usually needs serious attention that the worsening of income distribution is related not only to the intensifying the existing institutions but also to the emergence of new social asymmetries that require new institutional environment and structural arrangements (Josifidis et al., 2017). According to Josifidis et al. (2017) dynamic model, an institutional quality is an engine to make redistribute the resources from the top richest to the lower poor whereas low-quality institutions are inclined toward to the rich.

A country with poor institutional quality is also likely to have high income inequality. For example a study conducted by Chong and Gradstein (2004) by using cross-country data briefly shows that the correlation between income share of the middle-income quintile and different measures of institutional quality is in the range of 0.30 and 0.44 and the highest relation is with the rule-of-law gauge. On the other hand, the relationship between many measures of institutional quality and the Gini coefficient (a widely used measure of income inequality) ranges between 0.40 and 0.44, based on aggregate institutional measure used.

The World Bank Group assessed Ethiopian income inequality in 2000, 2005 and 2011.The study showed that Ethiopia's level of inequality measured by the Gini coefficient, has consistently stayed less than 0.3. This is lower than the African countries average Gini coefficient value of 0.4. On the other hand, Uganda's income inequality, measured by using Gini coefficient, increased from 0.365 in 1992/93 to 0.395 in 1999/2000 and to 0.426 in 2009/10, in 2014 it stood at 0.47 (OXFAM, 2016). Redistribution is a broad concept and it defined as the use of tax and transfer policies to decrease income inequality (Atkinson, 1997)

Both Ethiopia and Uganda are located in the world's poorest block, Sub-Saharan Africa, and the institutional quality indicators in both countries are very close in magnitude. Taking this into account, this research wants to look at the impact of institutional quality on income inequality and make comparison among the two countries

1.2 Statement of the Problem

The world leaders' central issue during their meeting in Davos, Switzerland, was income inequality. It was a burning issue and showing that how the rising of income inequalities across different regions represent one of the major challenges for world leaders in the upcoming years (world economic forum, 2014). Bigsten (2014; as cited in Ada, 2018) noted that the higher magnitude of inequality in Africa has existed longer time without showing significant turning down. Some of the factors that may cause the high level of income inequality in Africa are connected to high rate of unemployment and underemployment, high inflation rate, poor working conditions, extreme level of poverty and lack of strong institutions.

The World Bank (2014 and 2016) report shows that most of unequal countries suffered from income inequality are African countries with average Gini coefficient amount of 0.43.Compared to the global average, African average Gini is 1.1 times exceeding the coefficient of the remaining developing world, which is 0.39.This shows there is an existing of extreme income inequality in the continent. This is also confirmed by UNDP (2017) "ten of the nineteen most unequal countries in the world are from Africa". According to UNDP (2017) the issue of income disparities among individuals in SSA has given limited attention historically from a policy, research and political perspective.

Ethiopia has aimed to become a low middle-income country by 2025. The country shall expect to do more in order to operate the economy and address the income inequality reduction. While the country's Gini coefficient was 0.28 in 1999/00 and 0.30 in 2011, there is a huge urban-rural divide (MoFED, 2002 and 2013).When we decompose the level of income inequality in Ethiopia as urban and rural income inequalities, the rural income inequality shows unobservable change between 1999/00 and 1995/96, which is around 0.26 and the urban area swinging between 0.38 in 1999/00 and 0.34 in 1995/96. The relatively high urban area income inequality and the unchanging rural income inequality through time put on the way of the country's effort to reduce poverty (Tassew et al, 2009).

Kuznar (2019) asserts that Ethiopia's economy is 'paradoxical 'compared to other countries. The country is an extremely poor nation with an extremely high economic growth rate and low income inequality across the entire population. However, Ethiopia's success in economic growth and decreasing income inequality are uneven across socio-economics, rural/urban, educational and ethnic lines as well as growth will be enhanced if wealth can be redistributed from the rich to the poor, this is because the marginal productivity of capital is higher for the poor. Moreover, as to Oxfam (2016), since the 1990s Uganda has witnessed a significant increase income inequality, its Gini coefficient has rose, "paradoxically" during sustained economic growth, this implies "growth with exclusion" relatively few people/elite has benefited from economic growth in Uganda.

Ethiopia is low-income country that has experienced fast economic growth and the rate of poverty reduction is high, but the poverty is still high in absolute terms. Even though income inequality has remained low, the ongoing structural transformation of the economy will be expected to widen the income distribution in the country (Seid et al, 2015; World Bank, 2015b). Then, income redistribution is likely to have a vital role in the future in order to maintain its low income inequality and keeps crest record in reducing poverty.

Some studies, for example Josifidis et al (2016 and 2017) and Chong and Gradstein (2007), have been conducted on factors governing income inequality, of which the majority has targeted affluent nations, such as OECD and more advanced countries but not emerging economies like sub-Saharan African states. Since countries in SSA region, like Ethiopia, are characterized by extreme poverty and an increasing income inequality, it is worth assessing the key factors of income inequality.

As a result, this paper took a look at the relationship between institutional quality and income inequality in Ethiopia and Uganda. It also investigate which one among institutional quality indicator (s) do matter most and its (their) contribution to reduce income inequality in Ethiopia and Uganda over the given periods. As the country is working to achieve low income inequality level, one of the sustainable development goals, analyzing the impact of institutional quality indicators to achieve this goal is relevant and has policy implications. The paper also analyzes the impact of institutional quality on income inequality in Uganda, which has similarities in many aspects with Ethiopia, and made a comparison among the two.

Ethiopia is one of the Sub-Saharan Africa countries that has endogenous institutions while Uganda adopted exogenous institutions, Uganda was a protectorate of the British Empire from1894 to1962. In light of this, this paper tries to compare their institutional quality performance against their income inequality. In Ethiopia from the year 1991 to present many economic and political policy transitions have been taking place, and this paper addresses the impact of institutions in the country through these years. Besides it will fill the gap in the topic.

1.3 Objectives of the Study

1.3.1 General objective

The general objective of this study is to analyze the impact of institutional quality on income in Ethiopia and Uganda over the years 1991 to 2019.

1.3.2 Specific objectives

In order to realize the general objective, some specific objectives are also needed to be achieved. These are to:

i. Identify which of the institutional quality indicator (s) matter most in reducing income inequality in Ethiopia and Uganda
ii. Investigate the effect of average institutional quality on income inequality in both countries.
iii. Investigate to what extent institutional quality enhances income redistribution in both countries from 1991-2019.
iv. Examine the direction of causality between institutional quality and income inequality in the two countries.

1.4 Research Hypotheses

In this study, the following hypotheses shall be tested:

H01: Institutional quality variables have a positive impact on income inequality than macroeconomic variables selected for this study in both countries.

H02: The expected sign of institutional quality variables are positive except voice and accountability and control of corruption in Ethiopia and Uganda.

H0$_3$: There is a significant causal relationship between institutional quality and income inequality /redistribution in both countries.

1.5 Research Questions

- Do institutional quality indicators matter most for income inequality reduction relative to macroeconomic variables in Ethiopia and Uganda?
- What is the direction of causality between institutional quality and income inequality in Ethiopia and Uganda?

1.6 Significant of the Study

First of all, the study is very crucial for the government and any other interesting groups (agencies) to see the impact of institutional quality on the economic outcomes that are on the grounds in Ethiopia and Uganda and the study will present and compare the present state of institutional quality and income inequality in Ethiopia and Uganda. The findings will initiate academia, researchers and any politicians by provoking deep thinking and stimulating discussions on the subject matter. In addition, the paper will fill address the paucity of research on the impact of institutional quality on income inequality in Ethiopia.

*1.*7 Scope and limitation of the Study

The study focused on the investigation of the impact of institutional quality on income inequality in Ethiopia and Uganda over the given period 1991-2019. Since the study would be examined and find out the role of institutions for income inequality reduction in Ethiopia and Uganda based on annual time-series data. The study will be limited to a span of period covering 1991 to 2019.

1.8 Organization of the Study

The rest of the paper is organized as follows: the second chapter will devote to review relevant theoretical and empirical evidences, while the third chapter will present a time series data and specifies the econometric model. Chapter four will analyzes and discuss/interprets the econometric results. The last chapter will conclude thesis and recommend policies.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Theoretical Literature

2.1.1 The Theoretical Concept of Income Inequality and Institutional Quality

Income inequality is a dynamic and wider concept than poverty in which it is describing overall population and does not only attack on the poor as far as poverty can focus partially based on its magnitude and relativity (absolute or relative poverty). Income equality is the fair and equal distribution of aggregate income among the citizens. Perfect income equality is the contrary of perfect income inequality, where the former one referring to every individual has an equal share of the total income (it has lower Gini = 0, perfect equality), while the latter is defined as all the total income is held by a single individual (it has maximum Gini= 100, perfect inequality), where every nation's economy distribution around the world can be oscillated between the two extremes (i.e 0<distribution<100) but neither of the two extremes (Gehring and Kulkarni, 2006).

Josifidis et al (2017) empirically investigated the impacts of institutional quality on income inequality in OECD economies for the previous two decades. It is argued that various interests of social groups are pressuring to worsen income inequality but their effects are not correctly explained the reason is distributional influences of innovative interferences are neglected. The study targeted the sample of 21 OECD countries and they found that elitization is more effectiveness than unionization on income redistribution but when they have compared to institutional quality among those nations both are less pronounced. It is noted that institutional inertia (the advancement of institutional environment is very slow) is partly liable to high income inequality and inefficient income redistribution.

Factors that cause the rising of income inequality are identified by Atkinson (2015) such as globalization, technological change, growth of financial services, varying pay norms, decrease role of trade unions and unstructured use of redistributive tax and transfer policy. According to Chong

and Gradstein (2007), income disparity is usually going along with the gap in political and economic power that side to more powerful elites and they are advocators in order to make effortless the existing national economic policy.

Madni (2018) examined the effectiveness of income inequality to determine the institutional quality in Pakistan by using ARDL approach in annual time series data. The results of the investigation reveal that income inequality in the country is weakening institutional quality while an ethnic diversity can also be a crucial determinant for quality of institution. Madni (2020) empirically find the result that institutional quality is very important to reduce the level of income inequality in all models of the research; that is institutional quality has negative impact on income inequality.

Law et al (2014) examined the linkage among institutional quality, income inequality and financial development through the period 1985-2010 for eighty one countries. By using the approach of threshold regression, it is concluded that the initial level of institutional quality matters to express manage income inequality. A better institutional quality is vital for the capability of financial development to decrease income inequality in the selected countries, but financial development can be in useless to abate income inequality in the absence initially strong institutional quality.

Norris et al (2015) found that trade openness is negatively related to income inequality and technological progress is positively associated with income inequality (high-tech with rising income inequality).The increase in income inequality in the world during the past three decades has resulted in a large number, both theoretical and empirical investigations whose aim is to examine the role of different determinants that affect inequality both within and among countries. The main objective of an economic policy should be considered distributional effects (Arestis and Martinez, 2016).

2.1.2 How does history influence the performance of institutional quality?

This section will assess profoundly the effects of colonialism on the contemporary institutions. The current institutions are existed and shaped by the premised of the historical institutions particularly the "colonial heritage". Africa has built bad institutions because they confiscated bad and extractive institutions from their abroad colonizers and legal origins adopted from their colonizers have also influenced the present institutional arrangements that serve to the societies (La Porta et al, 1999). Acemoglu et al (2004) argue that those European settlers transferred extractive institutions to their colonies rather than leave better institutions especially in areas where resources and loubers are more abundant and the climate and environmental conditions are not comfortable for the colonizers.

North (1991) institutions evolve more drastically acting as a bridge between the past and the present and the future rather than snapping the line between them, the backup of history is largely providing the story of "institutional evolution" that may serve as legal backup between the past and the present and the future.

A number of economists have worried about the economic determinism in regard to wealth and income inequality. History tells us, the distribution of wealth has always been extremely political and it cannot be solved by only economic mechanisms. Moreover, it needs the contribution of economic, political and social actors as well as the relative power of those actors and the outcome of all those collective choices. History plays out based on the trends that how societies view income and wealth inequality and what types of policies and institutions they experience to gauge and transform them (Piketty, 2015).

The ultimate cause of income inequality is political aspect and income inequality is caused by the economic torque. Some economists confirmed that the predominance of politics, for example Acemoglu and Robinson on their book of "Why Nations Fail" noted that "while economic institutions are critical for determining whether a country is poor or prosperous, it is politics and political institutions that determine what economic institutions a country has (Acemoglu and

Robinson, 2006) and as to Stiglitz (2012) claims that "a major idea of this book is that inequality is the result of political forces as much as economic ones".

Rodrik (2014) points out institutions which help in reducing conflicts, making warranty social cohesions and stability of the system that are normally the sources of successful working of market economy. Such type of institutions can also play the role of 'participatory politics' in the context of political economy policies.

In Ethiopia during Emperor of Haile Selassie institutions were extractive which means selassie led the country as his own private property and there was no economic development in Ethiopia during the Solomonic dynasty. Furthermore, the haile selassie regime overthrown by a military coup in 1974, the coup was led by Derg and after holding the power the Derg regime started nationalizing property including all urban and rural land and most types of private owned property as well as the country moved to socialist state, that was declared by the Derg regime in 1975 (Acemoglu and Robinson, 2012).

As Acemoglu and Robinson say that a nation adopted extractive institutions economically they will fail and such kinds of institutions remain poor countries poor and coming to stop from their path of economic growth due to the intervention of the elites who design the economic institutions in order to better off themselves and continuance their power at the worse off other majority people who devoted their time and effort in the economic systems in a society, thus this situations are happening today in Africa.

According to La Porta et al (1998 and 1999) noted that the current institutional quality is strongly determined by the origin of the legal system in a country. This is also believed or not, the legal origin of a country may be simply connected to the efficiency of the government in the delivery of public services, unlike the overall quality of institutions of a country.

2.1.3 Global Income Inequality Trends

Global income inequality between individuals increased almost constantly from the inception of industrial revolution till the First World War. During that time the global Gini's index rose from 0.50 to 0.61. During this period the main driving vigor for increasing the world disparity was the inequality between countries. Around 1950 between the two World Wars, inequality in within-country reduced, whereas the increase in income inequality across countries continued in rapidly. Today world income inequality highly increasing, it is higher than inequality found in any single country including South Africa and Brazil which are the most unequal states in the globe (Milanovic , 2007). According to Oxfam (2016), the wealth has been owned by the richest one percent exceeds that of the rest of the world owns.

One of the fundamental causes that increases income inequality in the advanced economies is the growing of "new globally-oriented super elite", which is defined as both economically and politically dominant social class that includes capitalists, top managers and influential politicians connected by their communal interests. It is also crucial to highlight that the new elite includes not only the capitalists in terms of landowners, capital owners and credit providers, whose power is based on ownership of production factors, but also includes non-capitalist managerial and political elite that do not control production factors but they make key decisions on behalf of the elites . It is inspiring to read the mechanisms that help the transfer of income from the 'median' workers to the "globally-oriented super elites" such as weakening of welfare state, debt based economy and privatization of public goods and socialization of private losses (Josifidis et al 2016).

Since the 1980s the first world economies have been facing with the challenge of rising income inequality. The occurrence of macroeconomic instability and social segmentation has been accelerated income inequality these are also becoming an evident to world financial crisis during 2008. Recent OECD report indicates that, neglecting the mitigating effects of the welfare state through taxes and transfers on income, income inequality in most Organization for Economic Co-operation and Development countries has accelerated by more from the past three years to 2010 than in the previous twelve years (OECD, 2015).

According to Milanovic (2012; as cited in Rohwerder, 2016) at a global level income inequality can be considered as three concepts: international income inequality, based on "the income of all individuals wherever they live"; between–country income inequality, based on "the mean income in different countries" and between-country income inequality that "factors in countries' population sizes". Global income inequality refers to the disproportional distribution of income among individuals /households of the world regardless to location of the countries where people live (Galasso, 2014).The intention of the current paper will focus on the disparity of income between households within a country (Ethiopia), which is called within-country income inequality (internal income inequality).

Among the above mentioned ways of income inequality the one that is global income inequality (income inequality among all individuals around the globe) reduced for the first time in almost two hundred years and its Gini declined between 2000 and 2015 from 75 to 62 percent respectively (World Bank 2016; Milanovic, 2012). This is an important to the reduction of income inequality among nations; this is due to the growing up of income particularly in China and India. The economic growth of China and India can proximate cause for the reduction of world income inequality between the households (individuals) rather than changes in the distribution income within the countries (UNDP, 2015). As to Milanovic suggests that world income inequality is too much greater than income inequality within an individual country. However, Milanovic also estimated global income inequality by including top incomes in the sample between 1988 and 2008 the Gini moved from 76.3 to 75.9 percent and by excluding top income from the sample and its Gini is reduced from 72.5 percent for 1988 to 69.6 percent for 2008. Therefore top income is playing decisiveness role to estimate the global income inequality trends. Although when we trace the global income inequality during 1990-2014 on average is increased from 38.6 to 41.8 percent Sudip (2017).

When we compare the Gini index value by region, Ortiz and Cummins computed it in 2011 they found that middle-income countries such as Latin American and Caribbean countries had shown high level of income inequality with Gini index values of 48.3. Trends of Gini index value between 1990 and 2008 in Easter Europe and Asia had risen by its magnitude from 8.7 to 35.4 percent and

Sub Saharan African countries' income inequality had also risen, with Gini values 44.2 that showed higher unequal distribution of resources in the region whereas high-income countries income inequality had registered its Gini by 30.9. Latin America has stayed the region with the highest level of income inequality. Although on the other side since 2000 Latin America Gini index value reduced by 1.3 and since 1990 sub-Sahara Africa Gini value also reduced by 5 points (Ortiz and Cummins, 2011).

In different regions or countries with reduced income inequality due to the growth of education and public transfers to the poor and these are key contributors to the reduction of the cases. On the other hand, these rising trends gradually shifting to reduction trends with the importance (influence) of institutions and economic policies (UNDESA, 2013; UNICEF et al, 2014; UNDP, 2013). However, some evidences show that decreasing income inequality is key actor to reducing other inequalities and enhancing economic opportunities (UNDP, 2013).

In sum, according to Galbraith (2011) describes the evolution of income inequality in the global economy since 1963as correlation between income inequality, development, political regimes and the functional distribution of income.

2.1.4 Income Inequality and Institutional Quality Trends in Africa

Africa has been looking for good governance still puts a central place and the institutional perspective is critical as pointed out in Agenda 2063, it states that "Africa shall also have capable institutions and transformative leadership in place at all levels"(African Union Commission, 2015).

Income inequality particularly in sub-Saharan Africa (SSA) has captured an attention during the adoption of the 2030 Agenda for Sustainable Development (SDGs).Because of the complexity and multi-dimensionality of income inequality determinants; it is difficult to attack its challenge. Moreover, the disproportional distribution of both national resources and economic outcomes is one of the factors to drive income inequality in Africa. The challenge more likely comes from due to lack of quality governance and institutions over the last two decades and the region has

transitioned toward developing democratic leadership's that play a key role in reducing income inequality.

According to governance indicators in 2008 governance ranks, compared Africa with other few global countries, used a value centered at zero and ranges -2.5 to 2.5, with large positive values being good (superior) government, Sub-Saharan Africa has scored higher than Asia in voice and accountability (account for -0.63 >-0.72) and higher than former Soviet Union in voice and accountability, rule of law and control of corruption their values are -0.63,-0.83 and -0.80 respectively and Soviet Union's -0.77,-0.84 and -0.89 respectively (Asian Development Bank; ADB,2010).

As UNDP (2017) noted that basically those democratic leaders mentioned above can manage the public funds and investments effectively in key areas such as education, job-creating industries and technological innovation which are positively contribute to the narrowing of income gap by expanding different opportunities for the people. Fikadu et al (2019) say, the poor economic status of African's is connected to their weak institutional quality.

2.1.5 Trends of income inequality and institutional quality in Uganda

According to Oxfam (2016) the trends of income inequality for Uganda has risen from the 0.365 to 0.47 since 1992/93 through 2014/15. Even if most of the national income has held by the richest ten percent of the population, it is around 35.7 percent of the country's income but the poorest 10 and 20 percents of the population have accounted for 2.5 and 5.8 percent of acquired from national income.

Ethiopia and Uganda have similar aspects in their economic conditions, for example in both countries' agricultural sector is the dominant one for their economic growth and the severity of poverty in the two countries higher in rural areas than urban areas. In Uganda income inequality has born in the "colonial-era".

2.1.6 Income Inequality, Institutional Quality and Poverty in Ethiopia

Poverty in Ethiopia has different patterns such as economic, geographic, political, demographic, environmental and economic policy roots and causes. Ethiopia is one of the poorest countries in the world where some of the main features of the economy are explaining by low income and productivity; weaken capital accumulation and investment, create high level of unemployment rates and underemployment and high inflation rates.

While the vital of institutions for economic development has widely been accepted, several important studies confirm that institutional quality varies across countries and investigate the effect of economic conditions on institutional quality some of the studies are: Chong and Gradstein (2004) suppose that equal distribution of income is very crucial for building better institutions.

In our opinion Ethiopian institutional changes has been moving slowly due to, it threaten by "institutional inertia" this phrase has adopted from Josifidis et al (20017), the reason we said that institutional changes are very lagging behind the dynamics of both poverty and income inequality and the institutional changes cannot run with the speed of technological innovation and the emergence of new business ideas. When we talk about income distribution its effects could be a major objective of economic policy (Arestis and Martinez, 2016). The important impact of institutional quality, which recognized by scholars, on income inequality is in restoring equality by redistributing income (Olivera, 2015).

2.1.7 Income Inequality, Economic Growth and Poverty Nexus in Ethiopia

The main theoretical approach to investigate the determinants of income inequality involves some version of the Kuznets (1955) curve. Kuznets's idea, further developed by Robinson (1976), concentrated on the movements of persons from subsistence sector to modern or industry sector. However, the agriculture and rural sector initially constitutes the size of the economy, the features of this sector has low per capita income and relatively little inequality while the industry and urban sector has higher per capita income and possibly a relatively high degree of inequality (Barro, 2000).

According to Tain (2012) investigates the connection between income inequality and economic growth in China using OLS technique for 22 years data from 1985 to 2007. The estimated result showed that Gini coefficient that as a measure of income inequality has negative effect on economic growth rate. Along with this impact, it appeared the prediction that increased income inequality results reduced saving rate and decreased GDP growth rate.

Without the involvement of institutions, economic policies are not better, that design, implement and manipulate them (Aguilar, 1997). To build good institutions it takes longer time and evolving locally by trial and error (Rodrik, 200b). According to IMF (2003) highlights that the development of institutions is strongly connected with GDP per capita also institutional development measures "the quality of governance as well as the degree of corruption, political rights, public sector efficiency and regulatory burdens".

The relationship between institutional quality and the distribution of economic outcomes shall be taken significant attention from the previous some decades up to date. In recent history, the wide ranging for all measures of inequality materializes to follow the U-shaped pattern across more developed countries, as shown for the Anglo-Saxon countries. It was raised until the 1930s when long path decline varied by five to ten from country to country and the time around 1980s or a little later in some countries it begun to increase again until the twenty first century (ILO, 2014).

Ethiopian economic growth would highly depend on the changes in political trends and developmental approaches. In reality when we traced and observe it, the imperial regime that governed the country until took over the power by the armed force (DERG) particularly characterized by the land targeted, sluggish growth and used exploitative policy of millions of the poor tenants. In 1974, the DERG regime nationalized land and induced a policy to encourage redistributed the land owned by the landlord to the tillers and applied policies motivated and imitating by the communist regimes of Eastern Europe. In 1991, the DERG regime overthrown by the Ethiopian People's Revolutionary Democratic Front (EPRDF) and introduced a new constitution, stressing market liberalization and led by a 'democratic developmental state' inspired by East Asia (Cornia and Martorano, 2017).

Income inequality retards a pace of economic growth and hampers the reduction of poverty, objective of economic growth can decrease poverty but growth bends where countries with high initial stages of income inequality and the distributional model of growth inclined to the non-poor. Furthermore, an economy is frequently constrained to different kinds of shocks that weak economic growth, institutional paralysis, higher income inequality provokes a number of people expose to poverty (Ravallion, 2004).

Institutions are weak because of rule of law is absent especially important rules are poorly enforced. According to structural competitors Ethiopia's institutions rank with compared to the world competitive index is 83rd in 2013/14 and the country's enforcing contract is accounting 84th, international trading across the border is ranked 166thand culture of paying taxes is 113th (World Bank, 2016).

Inequality is a multidimensional phenomenon, we consider a single dimension from those dimensions of inequality that connected to income and wealth is also strongly linked to poverty. A fair and a more equal distribution of income with in a country will have a direct impact on the welfare of its people and also the allocation of national income shall be associated with that of cumulative welfare and the consequences will raise the citizens' average per capita income, good economic performance and poverty is lower (UNRISD,2010).

2.1.8 The Relationship between Institutional Quality and Income Inequality

Chong and Gradstien (2007) argue that there is a strong empirical bear for dually reinforcing mechanism between income inequality and institutions, though the direction of causality from inequality to institutions is stronger than the reverse causality. They noted that inequality causes weak institutions because the rich and powerful elites are obstacles of the changes in the institutions to shield their ability to capture huge rents. Besides, weak judicial systems (rule of law) which neglect the poor constrain the ability of the poor to extract rents. They also find that small values of institutional quality are connected with persistently high income inequality, which leads to persistently poor institutional outcomes.

Study conducted by Chu and Hoang (2020) examined the correlation between economic complicity and income inequality in 88 countries by using two-step difference GMM with robust standard error over the period 1990-2017. They found that economic complicity is significantly connected with higher income inequality. They also measure by using institutional quality indicators an average of six indicators of institutions from the World Governance Indicators (WGI) and they found that quality of institutions have a positive and significant impact whereas its squared term has a negative and significant impact. Their investigations confirmed that countries with poor institutional quality, initial progress widens economic disparity while in the long term improvement of their quality institutions reduces income inequality.

Easterly (2006) finds that higher quality of institutions is related with lower stages of income inequality in developing countries. According to Chong and Gradstein (2007), suggesting that the interaction of income and political inequalities has good detrimental consequences for institutional quality and redistribution. They found that income inequality has a negative influence on institutional quality and taxation. In addition to that they revealed that the above stated findings showed that weaker institutional quality leads to higher income inequality.

It is broadly believed that poor institutional quality has a positive effect on income inequality. For example, corruption can change the distribution of social spending by making the rich better off at the worse off the poor and which leading greater income inequality. In line with this argument, investigations have found that a positive relationship between institutional quality and income inequality regardless of the states. Chong and Gradstein (2007) notice that institutional quality is an instrument to reduce income inequality but political factors may affect its implementation.

Johnston (1989), one of the earlier contributions to corruption- inequality literature, finds that corruption tends to widen the existing income inequalities. Li Xu and Zou (2000) find that corruption, which is one of the six clusters of institutional quality dimensions, affects the level of income inequality through capital markets, government expenditure and asset distribution. World Bank (2000) adds lower stages of corruption harms the poor through a number of channels such as lower economic growth, more regressive taxes systems, less effective social spending, lower

investment on human capital of the poor by reducing funding for education and disproportional distribution of assets.

Parotti (1996) and Bènabou (1996) revealed that income inequality could direct to politically unstable institutions as power oscillates back and forth between redistributive populist groups and "oligarchy –protecting conservative factions". It has also been argued that from the initial situations such as income distribution plays a decisive role in the rise of democratic institutions, while with huge initial income inequality, the ruling elite can repress democracy and equal rights in order to keep their privileged position and continued to capture larger rent. Gupta and Davoodi (2002) find that corruption could rise income inequality and it can lead to tax evasion, defective tax policy as well as discourage possibilities of necessary income /wealth redistribution from the rich to the poor.

2.1.8.1 Measurement of Income Inequality as a Proxy of Income Redistribution

Gini coefficient (GC) is one of the most fundamental measures of inequality that used and computed by many researchers during the study of income inequality or it can also be measured by the quintile ratio. Suppose X_i be the horizontal axis that represents the total percentage of population and Y_i be the vertical axis that represents the total percentage of expenditure. The Gini coefficient can be calculated by the following formula (WBI, 2005; Tesfaye, 2006; and Tassew et al, 2008).

Gini (GC) = $\mathbf{1} - \sum_{\boldsymbol{i=0}}^{\boldsymbol{N}} (\boldsymbol{X_i} - \boldsymbol{X_{i-1}})(\boldsymbol{Y_i} + \boldsymbol{Y_{i-1}})$……. (1)

Where X_i is the value on the total percentage of population

Y_i is the value of total percentage of expenditure

N is sample size

While several studies have tried to find to establish a connection between inequality of economic outcomes and the degree of redistribution, most of the studies have suffered from the scarce of reliable data for market income inequality and used proxy variables for redistribution, such as the size of public spending or transfers (Perroti, 1996; de Mello and Tiongson, 2006).

Norris et al (2015) describe the widening of global income inequality within countries and income distribution ranges from 0.55 to 0.70 depending on the measure of Gini coefficients of gross and net incomes have risen substantially since 1990s in most developed countries, they measured not only the developed world but also EMDCs, Latin American countries and Asian and Eastern Europe nations. They used to measure income inequality on those regions by taking redistribution as a proxy of income inequality, measured by the difference between gross Gini (market income inequality) and net Gini inequalities (disposable income).

Mahler and Jesuit (2006) were among the first to conduct reliable cross-country time series data for both concepts based on Luxembourg Income Study (LIS). They provide the Gini index for the inequality of private sector incomes, (they used the market income inequality and inequality of private sector incomes interchangeably), which also presents the planned gauge of the initial distribution of income (income before taxes and transfers), as well as the distribution of disposable incomes (i.e net income distribution or after taxes and transfers).

Depending on these researchers can have a choice to use to measure redistribution by applying either of the absolute difference between the two Gini coefficients, or as the change in the Gini coefficient due to taxes and transfers relative to its initial level. Both the absolute and relative measures are repeatedly used in literature on income inequality and redistribution and the justification using either concept of the two depending on the study context (ibid).

The Gini coefficient of disposable incomes G_d can be computed as a weighted average of both income components (i.e G_p represents Gini private sector incomes and G_l represents the Gini for incomes from the “lump-sum” redistribution) and where the weights are given by 1-t and the tax rate t:

$G_d = G_p (1-t) + G_l*t$……. (1)

If all individuals receive the same "lump-sum" payment, the Gini coefficient G_l takes the value zero and equation (1) can be shown as:

$G_d = G_p(1-t)$ …….(2)

From equation ($1^{'}$) we understand that if the tax rate is zero, post and pre-income inequality are the same and hence no need of redistribution takes place, whereas if the tax rate rises , the Gini for disposable income (G_d) decreases until it finally reaches zero when all income is taxed as well as redistributed.

The Gini coefficient for market incomes (G_m) can also be calculated using by Brown (1994) formula:

$$\boldsymbol{G_m = 1 - \sum_{k=1}^{n} (X_k - X_{k-1})(Y_k + Y_{k-1})} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{3})$$

Where X_k is the cumulative proportion of the population, for k = 0,…., n, with $X_0 = 0$, $X_n = 1$:

Y_k is the cumulative proportion of the income variable, for k = 0,….. n, with $Y_0 = 0$, $Y_n = 1$. The equation can be rewritten as:

$$\mathbf{1 - G_m = \sum_{k=1}^{n} (X_k - X_{k-1})(Y_k + Y_{k-1})} \ldots\ldots\ldots\ldots\ldots (4)$$

According to Maltzer and Richard (1981) assumption, all incomes received from taxation are redistributed. Thus all the total sum of incomes does not change. The share of the aggregate sum receipts in total incomes is so equal to the tax rate t, and the share of remaining private sector incomes in aggregate income is equal to 1-t. We therefore try to know the distribution of both income components and their relative weight in allover post-tax, post- transfer distribution.

$G_d = (1-t)\, G_m$…….. (5)

Maltzer and Richard also assumed that the "tax rate rises as mean income rises relative to the income of the decisive voter". The ratio of mean to median income is a frequent metric for inequality and 'monotonically' connected to the Gini coefficient under the assumption that distribution of income follows a lognormal pattern (Lopez and Servèn, 2006). Generally the current paper uses Maltzer and Richard (1981) and Josifidis et al (2017) formula to measure the absolute change of redistribution (ΔG^{abs}), which can be defined as the absolute difference between the two Gini coefficients.

$$\Delta G^{abs} = G_m - G_d \ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where, ΔG^{abs} represents absolute redistribution that is a proxy of income inequality for the present research.

G_m is the Gini for market incomes which is a proxy of income pr-taxes and transfers. As to Maltzer and Richard (1981), they called it "initial income distribution or Gini private sector incomes".

G_d is disposable Gini which is a proxy of income after taxes and transfers (Gini after).

The relative redistributive ΔG^{rel} is also the other one to measure the income inequality as acting for redistribution and which is the absolute difference between the two Gini coefficients divided by the market Gini coefficient:

$$\Delta G^{rel} = \frac{G_m - G_d}{G_m} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Substituting equation (4) in to equations (5) and (6) gives:

$$\Delta G^{abs} = G_m * t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (5')$$

$$\Delta G^{rel} = t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6')$$

Where, the relative change of Gini coefficient is directly proportional to the tax rate, whereas the absolute change of Gini coefficient is a function of both the tax rate and Gini market coefficient (Gini coefficient for private sector incomes).

The greater market inequality will induce a higher tax rate, the above two equations (i.e 5'and 6') implies that the relative redistribution is the best proxy for the tax rate t, which they postulate to rise higher inequality. It is thus suitable to examine how market inequality influences relative redistribution and to examine the relationship between G_m and ΔG^{rel}. Equation (5') indicates that the absolute redistribution shall increase with the Gini coefficient for market inequality even if the tax rate remains constant. The relationship between market inequality and absolute redistribution is positive but this finding is not confirmed by Maltzer-Richard hypothesis that the tax rate rises with inequality (ILO, 2012; cited in Maltzer and Richard, 1981).

The relationship between institutional quality and income inequality is bi-directional which have been revealed by a number of researchers some of them are Easterly, Ritzen, and Woolcock, 2006; Chong and Gradstein, 2007; Josifidis et al, 2016; Hoff and Stiglitz, 2004; Alesina and Angeletos, 2005, they empirically confirmed that income inequality can affect institutional quality, whereas the causation also runs in the reverse direction i.e inequality drives institutional quality and institutions drive income inequality. As of Easterly (2006) confirms that high quality institutions linked with lower levels of income inequality in developing countries and together this empirical results, by constructing quality institutions a country can build social cohesion practicing common good through the reducing of economic divisions and weak social cohesion. In turn, strong social cohesion and more linguistic homogeneity lead to build better institutions, "more fractionalized societies have worse rule of law".

A country which is on a process to be settling a democracy so it expects that democracy increases income redistribution and decrease inequality but this situation may fail to be succeeding when democracy is engrossed by the richer segments of elites (Acemoglu et al 2013). During this process the country that can amply democracy on the country, elites capture its target toward to their interests by controlling the state ideology and monopolizing public opinion (Wisman, 2013).

According to Albertus and Menaldo (2014) found that there is only a smooth relationship between democracy and redistribution only if elites are politically weak during a transition.

2.1.8.2 Measure of institutional quality

There is no single or common straightforward gauge of institutional quality. As a result, institutional quality shall be proxy by other variables we call them institutional quality variables. Furthermore, different institutions or organizations compute the quality of institutions for various countries by using different methodologies. Since previous scholars and literatures have used different measure of quality of institutions from different sources. Some of the indices that used for measuring institutions are governance index, political freedom index and economic freedom index have been used in different literatures to measure institutional (governance) qualities (Dereje, 2018).

According to Kaufmann et al(2011) six measures of institutional or governance quality is (see chapter three the definitions of the six dimensions of institutional quality measures) calculated as many individual variables and various sources. They assume that the observed score of country j on indicator k.Y_{jk} can be given as a linear function of unobserved governance in country j, g_j and error term ε_{jk} as:

$$Y_{jk} = \alpha_k + \beta_k (g_j + \varepsilon_{jk}) \qquad (8)$$

Where α_k and β_k are representing parameters which map unobserved in country j, into the observed data from source k and Y_{jk}.Thus the aggregate governance indicators will be ranking from -2.5 and 2.5 (the lowest value corresponds to low quality of governance and the reverse).

2.1.8.3 Taxation and Income Inequality

Taxes are used for different purposes; they can increase revenue for the government provide for incentives or disincentives for some activities and correct market failures. However, the most relevant issue of this paper is also to find how taxes can reduce income inequality in Ethiopia through income redistribution channel and taxes as well as expenditure serve to distribute income

and help to reduce income inequality as well as by using its revenue (tax revenue) for improving the framework of the existing institutions (Musgrave, 1959).

Josifidis et al (2016) finds that the real effect of taxes on income inequality has captured by the interaction term of itself with Gini before (i.e taxes* Gini before) than a single tax variable, while the results are found that single taxes variable has positive relationship with income inequality it does not mean that higher taxes increases income inequality this is due to the effect of taxes on income and profits are not income "sensitive". They are free from market generated income inequality whereas the interaction term has a negative relationship with income inequality which shows that increasing in taxes decreasing income inequality for "non-zero levels of market-generated income inequality".

According to Musgrave (1959), tax system is an important mirror of a country's priorities and political and ideological choices through institutional development. Taxation plays different roles such as stabilization, allocation and distribution economic outcomes. Stabilization refers to "counter cyclic" roles that government enjoys to smooth economic activity and consumption. Allocation refers to "the provision of public goods" and distribution refers to transferring of economic outcomes from the rich to the poor in order to create a more equitable society. Taxes in Africa are regressive: the positive relationship between tax variable and the Gini coefficient is statistically significant (UNDP, 2017).

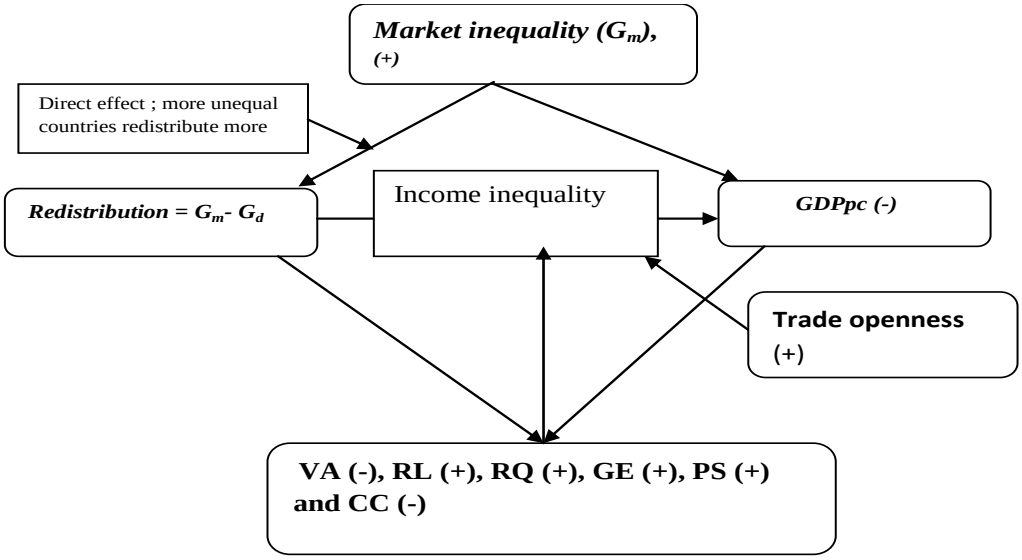
2.1.9 Conceptual Framework

The conceptual framework is based on the assumptions of the researchers by considering the existing theory, for the current paper the authors would be investigated the impact of institutional quality on income inequality in Ethiopia and Uganda over the period 1991- 2019. Income redistribution is dependent variable for this study and it is the proxy of income inequality. Income redistribution and disposable income inequality (inequality after taxes and transfers), driven by the influence of market income inequality (inequality before taxes and transfers) on the processes in

which various social groups institutionalize their economic interest. However, those super elites they affect the channel between income redistribution and institutional quality.

In a democratic institutional space, where the majority has a greater opportunity in electoral weight rather than the minority, it is expected that the worsening of income distribution can be counteracted by greater income redistribution, pro-poor policies and avoiding the priorities of the elites (Josifidis et al, 2017).

Figure 2.1: Interrelationships between variables



Source: the author modifies based on Ostry et al (2014)

Ostry et al (2014) used panel data and fixed effect regression analysis from 1960 to 2010 for 153 both developing and OECD countries. They found that the disparity between the market and resultant income inequality is much more pronounced in industrial world than in developing nations and the author used income redistribution as dependent variable for the study, it is shown that by taking the whole sample (i.e both OECD and developing countries) which shows that the

relationship between market inequality and income redistribution is positive which accounts for 0.483, while when we see case by case for example, their relationship is 0.619 in OECD and 0.405 in non-OECD world.

2.2 Review of Empirical Evidence

Empirical research on the impact of institutional quality on income inequality in Ethiopia is scarce, few done on developed countries. When we see the relationship between measures of institutional quality and income inequality they reinforce each other, based on different literatures they have been conducted to examine the relationship between these two variables by using different data methods like panel, cross-sectional and time series data and taking different countries in both developed and developing using different dependent and independent variables. Nonetheless they gate different results and relationships, positive, negative and no interaction.

Josifidis et al (2016) by applying panel data with panel-corrected standard error estimator on OECD countries, they found that institutional quality is a negative association with income inequality. Furthermore, their findings regarding to tax effect on income inequality is positively related to income inequality based on the authors' justification and the theoretical facts the positive sign of tax normally does not mean that high taxes increases income inequality, the real impact of tax on income inequality is explained by the interaction term between taxes and Gini-before, which is negative relationship showing that increases in taxes reduces income inequality.

Kunawotor et al (2020) investigate that income inequality relatively high in Africa compared to the worldwide, the continent's average market Gini accounts for 48.254, in terms of regional distribution Southern Africa the top mean Gini score of 59.07. Next high average market Gini recorded is West Africa 46.04, East Africa 45.39 and North Africa 42.50. institutions and also show very poor in Africa as compared by the mean -0.628, a minimum of -2.1and a maximum of 0.88 on a scale of -2.5 (weak) and 2.5(strong). The best dimensions of institutional quality in Africa are political stability and absence of violence/terrorism and control of corruption which have highest mean score of -0.506 and -0.603 respectively. But still they are very weak. The bad

indicators are government effectiveness and regulatory quality with an average of -0.707 and -0.667 respectively.

Sonora (2019) examined that the link between rule of law and income inequality in Latin America and he/she found that progress to legal systems specifically the warranty of property rights and mitigation of corruption, reduces income inequality. According to Adeleye et al (2017) examine the impact of institutional quality on financial development in decreasing income inequality in sub-Saharan Africa. The investigation uses five indicators of institutional quality such as control of corruption, political stability, government effectiveness, rule of law and political rights. They get only significant outcome on the interactive term of control of corruption with financial development and generalize that if corruption is under controlled income inequality will reduce.

Chong and Caldèron (2000b) examined the relationship between institutions and the Gini index. They viewed an "inverted U-shaped" associate for a cross section of countries from Latin America, East Asia, Africa and OECD. Based on their findings, they wind up that for developing countries progresses in the quality of institutions may be connected with the soaring of income inequality. Moreover, better quality institutions and low income inequality road to the future economic developmental sustainability and prosperity.

Chong and Gradstein (2007) using panel of countries with GMM-IV methods, they found that institutional quality is negative relationship to income inequality which is measured by the Gini coefficient and is positively associated with the level of democracy, this implies that a country with more equal and democratic societies has good quality institutions, while the country is non-democratic, so income inequality is negatively correlation with institutional quality and taxation. They suggesting that on their conclusion part both economic and political inequalities are the main determinants of institutional quality and income redistribution.

IMF (2014) finds in the empirical study of fiscal and income inequality relationship focused on both developed and developing nations and its conclusions show that direct income taxes and

transfers decreased income inequality in advanced economies by an average of one- third and it reduced market Gini coefficient by about 14 percentage points in 2005.

Income /wealth distribution and inequality help to structure institutions, similarly corruption and income inequality are bi-directional that is corruption increases income inequality, while higher stages of income inequality also make corruption more and more increasingly (Asia Development Bank,2010).

According to Chong and Gradstein (2004) found that progresses in performance of political stability have a big impact on income distribution, as shown by reduction value of Gini coefficient from the authors cross country panel data analyses. They used different indices of aggregate governance to measure institutional quality and the higher quality of institutions is connected with the progresses of income distribution as explained by lower Gini coefficients and as a better distribution of income is also connected with higher quality of institutions. However, the impact of the latter shows to be stronger than the impact of the former as measured by the magnitude of the regression coefficients.

Josifidis et al (2017) examined by using panel data for 21 OECD countries, results found that between redistribution and trade union as well as accelerating the changes in the quality of legal and political institutions, they are positive relationship with income redistribution. The increase in market income inequality shows the income falls on the hands of the richest 1 percent of the population and speeding up the changes in quality of institutions and is connected with the reduction in income redistribution.

As Josifidis et al (2017) confirmed from his panel data and Fixed Effect model economic institutions surprisingly negative correlation with income redistribution this is due to the opinion of the authors one of the possible explanations is that economic freedom, as an artificial indicator of the quality of economic institutions, is connected with the decreasing of regulation and state intervention in the economy as well as the economic institutions can influence actively on big capital and which is categorized under “fast-moving “ institutions but legal and political

institutions are less influential on the big capital than the former one and they are grouped under "slow-moving" institutions, this is the second suggestion of the authors.

Fischer (2000) and Easterly (2002) the study of cross country regressions, they found that openness is positively associated with income inequality. Alemayehu (2006) from his study of the link between openness, poverty and inequality for African countries, he revealed that the relationship between openness and income inequality is positive and significant. In addition, ECA (2004) supports the above findings the report confirms about the positive relationship between openness and income inequality in the selected African countries.

Chong and Calderón (2000) by using cross country panel data and GMM technique, they find that measuring income inequality (using Gini coefficient) shows a negative relationship to education (proxy by secondary school enrollment rate), thus a country with more educated people have more income distribution as well as have better quality of institutions. Generally their findings indicate that the lower the quality of institutions, the higher the extent of income inequality. On the one hand, they examined that the relationship between income inequality and institutional quality, they used both linearly and quadratic institutional quality variable in regression the results quite different which are positive in linear institutional variable and negative in quadratic (squared) institutional variable.

CHAPTER THREE

3. METHODOLOGYOF THE STUDY

3.1 Type and Source of Data

For the purpose of the current study and to assess the impact of institutional quality on income inequality in Ethiopia and Uganda, the study used secondary data. Data source on income inequality (proxied by income redistribution) in Ethiopia and Uganda over the period 1991-2018/19 by using time series annual data from different sources. We obtained income inequality data from the Standardized World Income Inequality Database (SWIID). The one main advantage of this dataset is that it provides both the net Gini (Gini disposable), after taxes and transfers, and the gross Gini coefficients (i.e Gini market) by measuring country-level inequality (Acemoglu et al, 2015).

While data on the institutional quality indicators would be sourced from the World Bank Worldwide Governance Indicator (WDI) Database which is produced by Kaufmann et al (2011) and it is the major source for the study, whereas Data on GDP per capita and trade openness with import and export variables are obtained from World Bank Development Indicators (WBDI) and African Development Bank (ADB).

3.2. Methods of Data Analysis

The collected data will be analyzed by using both descriptive and econometric methods to establish empirical impact of institutional quality on income inequality on Ethiopia and Uganda.

3.2.1 Descriptive Analysis

Descriptive research design also used the researchers which is an appropriate research method to examine and compare the study. The study employed a quantitative type of research approach and applied descriptive research approach with the help of average, trend and variability analysis in order to compare the data on institutional quality and income inequality between Ethiopia and

Uganda. Descriptive statistical measures such as mean, coefficient of variation, standard deviation and graphic analysis will be used to describe the trend in institutional quality and income inequality in both countries. Besides coefficient of variation will estimate for institutional quality and income inequality to discuss and compare the variability of institutional quality and income inequality over time.

To avoid or reduce any econometric and statistical problem that may affect the study, we will conduct series of diagnostic tests in order to secure reliable and robust results. The heteroscedasticity and autocorrelation issues are tested by using Breusch-Pagan-Godfrey and the Breusch-Godfrey LM respectively as well as to test the problems of normality and functional form we will conduct the Jarque-Bera test and the Ramsey reset test respectively. In these tests, we set the null hypothesis estimation test (absence of these problems) against the alternative hypothesis estimation of their presence, thus fail to rejection or rejection of the null hypothesis shows the absence or presence of the stated econometric problems. In addition, to check the stability of the model within the study period, the study conducts both the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) graphs.

3.2.2 Econometric Model Specification

The current study will be used Autoregressive Distributed Lag (ARDL) bound tools developed by Pesaran et al (2001). This approach is used for testing the existence of long-term relationship between the dependent variable, which is income redistribution the proxy of income inequality and the selected explanatory variables to study the impact of institutional quality on income inequality in Ethiopia and Uganda. The ARDL approach is an ordinary least square (OLS) based model and the time series data tests by applying co-integration ("the existence of long-run relationship between variables").

It is introduced ARDL to co-integration and error correction model (ECM) depending on the degree of stationary levels of the variables. ARDL model has some advantages such as; it is relatively more efficient for small size and finite observation or sample data sizes, it uses a combination of endogenous and exogenous variables, unlike a VAR model that is strictly for

endogenous variables and solving endogeneity problems, serial autocorrelation and misspecification problems. Thus, ARDL technique follows general to specific approach and it is more appropriate to interpret the model of time series data (Ghouse et al, 2018). It is applicable regardless 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 pr-testing problems linked with standard co-integration (Pesaran et al, 2001). But According to pesaran (1995) ARDL model is inefficient for higher orders like I(2) and the likes. As we mentioned on the previous subtopics the Augmented Dickey-Fuller (ADF) and Phillips-perron (PP) tests are going to conduct to check for stationarity in the variables. The ARDL Bounds test will be used to confirm the existence of co-integration between variables. After revealing the existence of co-integrating variables, the ARDL will be employed to investigate the long run relationship between institutional quality and income inequality.

Generally, both the long run and short term parameters of the model will estimate simultaneously and by taking in to consideration of the error correction term in its lagged period. Another advantage of ARDL approach it is possible that different variables have different optimal number of lags of the order of integration of the variables. And the final advantage, according to Narayan (2004) ARDL is the more robust by avoiding spurious regressions and carries out better for small sample sizes and by applying the ARDL method we will obtain unbiased and efficient estimators of the model. These are the reasons we have chosen ARDL model for this study.

A dynamic error correction model (ECM) shall be derived from ARDL through a simple linear transformation. ECM integrates the short-run dynamics with the long-run equilibrium without losing long-run information and avoids such as spurious relationship resulting from non-stationary time series data. Furthermore, the coefficients in the ECM indicates how deviations from that long-run connection affect the changes on them in next period and the parameters gauge the speed of adjustment from the short-run equilibrium to long-run equilibrium state, the larger the magnitude of the coefficients of the parameter, the higher the speed of adjustment of the model from short-run to long-run (Shrestha and Bhatta, 2018).

Maltzer and Richard (1981) and Josifidis et al (2017) defined redistribution as the absolute difference between Gini for market inequality (Gini before taxes and transfers) and Gini disposable income (Gini after), thus redistribution is the best proxy for income inequality and we have already mentioned broadly in the literature body.

$$\boldsymbol{RED = \Delta G^{abs} = G_m - G_d = f\ (RGDP,\ Gini\_Mkt,\ GE,\ RL,\ RQ,\ PS,\ AV,\ CC,\ Openn)..\ (8)}$$

We use absolute difference instead of relative measure of redistribution (the absolute measure of redistribution divided by Gini before taxes and transfers which results the percentage measure of redistribution), using an absolute measure of redistribution avoids "level effects" the influence of market income inequality on the measure of income redistribution from the analysis (Josifidis et al, 2017).

ARDL approach will be applied to estimate the long and short run coefficients of variables relationship and if variables will be co-integrated state both short-run (ARDL) and long-run (VECM) models. The ARDL (p, n_i) form of equation will be as given below:

$$\begin{aligned}\mathbf{\Delta RED_t} = \quad & \boldsymbol{\alpha_0} + \sum_{\mathbf{i=1}}^{\mathbf{p}} \boldsymbol{\alpha_{1i}} \mathbf{\Delta RED_{t-i}} + \sum_{\mathbf{i=1}}^{\mathbf{n}} \boldsymbol{\alpha_{2i}} \mathbf{\Delta GDPpc_{t-i}} + \sum_{\mathbf{i=1}}^{\mathbf{n}} \boldsymbol{\alpha_{3i}} \mathbf{\Delta lnopen_{t-i}} \\ & + \sum_{\mathbf{i=1}}^{\mathbf{n}} \boldsymbol{\alpha_{4i}} \mathbf{\Delta Ginimkt_{t-i}} \sum_{\mathbf{i=1}}^{\mathbf{n}} \boldsymbol{\alpha_{5i}} \mathbf{\Delta GE_{t-i}} + \sum_{\mathbf{i=1}}^{\mathbf{n}} \boldsymbol{\alpha_{6i}} \mathbf{\Delta\, RL_{t-i}} + \sum_{\mathbf{i=1}}^{\mathbf{n}} \boldsymbol{\alpha_{7i}} \mathbf{\Delta\, RQ_{t-i}} \\ & + \sum_{\mathbf{i=1}}^{\mathbf{n}} \boldsymbol{\alpha_{8i}} \mathbf{\Delta PS_{t-i}} + \sum_{\mathbf{i=1}}^{\mathbf{n}} \boldsymbol{\alpha_{9i}} \mathbf{\Delta\, AV_{t-i}} + \sum_{\mathbf{i=1}}^{\mathbf{n}} \boldsymbol{\alpha_{10i}} \mathbf{\Delta CC_{t-i}} + \boldsymbol{\beta_1} \mathbf{RED_{t-1}} + \boldsymbol{\beta_2} \mathbf{GDP_{t-1}} \\ & + \boldsymbol{\beta_3}\, \mathbf{lnOpen_{t-1}} + \boldsymbol{\beta_4} \mathbf{Gini\_mkt_{t-1}} + \boldsymbol{\beta_5} \mathbf{GE_{t-1}} + \boldsymbol{\beta_6} \mathbf{RL_{t-1}} + \boldsymbol{\beta_7} \mathbf{RQ_{t-1}} \\ & + \boldsymbol{\beta_8} \mathbf{PS_{t-1}} + \boldsymbol{\beta_9} \mathbf{AV_{t-1}} + \boldsymbol{\beta_{10}} \mathbf{CC_{t-1}} + \boldsymbol{\varepsilon_t} \ldots\ldots\ldots\ldots \qquad (\mathbf{9})\end{aligned}$$

Where:

RED is redistribution of income (the best proxy of income inequality)

GDP per capita is Growth Domestic Product per capita (nominal)

Open is trade openness as measured by the sum of import and export divided by GDP.

Gini-mkt is gross income inequality (Gini before taxes and transfers)

CC is control of corruption

PS is political stability and absence of violence/terrorism

GE is government effectiveness

RL is rule of law

RQ is regulatory quality

AV is voice and accountability

B's are the long-run coefficients

α's are the short-run coefficients of the ARDL model

p represents the number of lagged periods for the dependent variable,

n denotes the number of lag periods for the selected explanatory variables and

Δ, α_o, $\varepsilon_t$and ln represent the first difference operator, constant term, stochastic error term and natural logarithm respectively. $\boldsymbol{\varepsilon_t}$ is assumed to be serial uncorrelated with independent variables and i.i.d~N (0, σ)[1], where i.i.d stands for "independent and identical distributed".

3.3 Description and measurement of variables

3.3.1 The Dependent Variable

Where in the model above, the dependent variable is income redistribution (RED) as a proxy of income inequality and measured by the absolute difference between market incomes Gini and disposable income Gini (Josifidis et al, 2017) as well as according to Maltzer and Richard (1981) "absolute redistribution is measured as the difference between the Gini for private sector incomes (Gini for market income inequality) and the Gini for disposable incomes". Moreover, they use the terms 'private incomes' and 'market incomes interchangeably.

According to Josifidis et al (2016) used Gini coefficient after taxes and social transfers (Gini after) as dependent variable which is a proxy of income redistribution and they used a panel analysis of the affluent OECD countries. The logarithmic transformation increases the likelihood that the data will have a normal distribution that affects the robustness of estimates, therefore except institutional quality variables all macroeconomic variables are expressed in natural logarithmic form.

3.3.2 The Explanatory Variables

Institutional quality is explained by six dimensions of institutional indictors, thus the institutional measures are composite indices obtained by using cluster and factor analysis on more than 30 existing institutional indicators. According to Jaskow(2008),the institutions are classified in to three homogenous groups of institutions such as legal, political and economic therefore the institutional quality variables listed herein below, six institutional quality indicators, are extracted from the above three mentioned types of institutions.

REDt$_{-1}$; is the lagged dependent variable, which is used as an independent variable and captures the one year lagged value of income redistribution. The current stag of income inequality depends on its past level.

GDP per capita; is the nominal gross domestic product, which indicates the current impact of economic growth on the dynamics of income inequality (the current income redistribution) along with the dynamic of market income inequality or market inequality before taxes and transfers.

Gini_market income inequality: it is a market-generated income inequality as a proxy of Gini pre- taxes and social transfers (Gini before or gross income inequality) and the expected sign would be positive Josifidis et al (2017).

Trade openness; is measured by total trade as a percentage of GDP (the sum of imports and exports divided by GDP). Huggett et al (2006); Beck et al (2007) examined the significance of educational attainment and trade openness to resist income inequality. Trade openness accelerates economic growth, trade openness promotes technological and skills exchange, it creates

employment opportunities among others and efficient allocation of economic outcomes in turn, reduces income inequality by enhancing income redistribution. Therefore, it is expected that trade openness will impact positively on income inequality.

Institutional quality variables: is obtaining from WGI which is representing by the six Kaufmann et al (2010) institutional dimensions /governance indicators, as a proxy for institutional quality variables, such as control of corruption (CC), rule of law (RL), regulatory quality (RQ), political stability (PS), government effectiveness (GE) and accountability and voice (AV). These six governance quality indicators are measured in unite values about -2.5 (corresponding to weak governance) and 2.5 higher values also corresponding to better governance outcomes and the data has available since 1996. Although the present paper starts from 1991 to 2018/19 we will fill the missed values by using extrapolate/interpolate method by observing the data trends.

i. **Government effectiveness (GE)**: It measured by the opinions of the quality of public services, civil service and the extent of its independence from political forces, quality of policy formulation and implementation and the reliance of government's commitment to such policies, thus encouraging a benign context for private investment.
ii. **Regulatory quality (RQ):** It measured the perceptions of the capability of the government to formulate and apply sound policies and regulations that allow and enhance private sector development through expansion of investment.
iii. **Rule of law (RL):** It captures the perceptions of the degree in which mediators have poise in and reliance by the rules of society and the quality of contract enforcement, property rights, the police and the courts as well as the probability of happening crime and violence. Rule of low measures the successes of a people in developing an environment in which fair and inevitable rules based on economic and social interactions and especially it attaches more on property rights and enforcements. More exercise of rule of law encourages income redistribution by reducing income inequality.

iv. **Control of corruption (CC)**: It obtains the perceptions of the extent in which public goods (such as power, knowledge, wealth etc) are exercised and used for a private purpose (gain), including both little and significant forms of corruption or bribery as well as the state can be connected and hunted by the elites and private interests. Thus by cutting the connection of potential elites from the public economic outcomes we can reduce income inequality and rising redistribution.

v. **Voice and accountability (AV):** It captures the extent in which the nationalists can make the nations to vote and challenge the government, thus restrict the authoritarian power. We expected that by enhancing voice and accountability through encouraging political reliability and building democratic institutions reduces income inequality in Ethiopia and Uganda.

vi. **Political stability and absence of violence (PSAV**): The lower the likelihood of political instability and politically encouraged violence, the more beneficiary a country's citizens will invest in their own interest future (Alesina et al, 1996). Through stable political systems/ absence of violence it is ease to redistribute resources from the rich to the poor. Moreover, it captures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism.

3.4. The Unit Root Test

It is a widely popular method over the past decades in order to test stationarity (non stationariy) by using Dickey Fuller (DF) test (1979) or Augmented Dickey-Fuller test (ADF), Phillips-Perron test (PP) and Durbin- Watson (DW) test. Both ADF and PP are the most commonly used unit root tests that applicable in time series data, while DW can use to test stationarity if the classic regression result of DW statistics less than the value of R^2 ($DW < R^2$), this reveals that the series is non-stationary and the reverse i.e $WD > R^{2,}$ the series is stationary (Granger-Newbold, 1974).

Furthermore, the term stationary is nothing but it is the underlying time series were stationary or at least stationary more or less a deterministic trend as well as exhibited a long run association. Stationary models their variables have constant means and variances over time or independent of time, whereas non-stationary time series that produces unit root as well as diverges away from their mean over time or depending on time trend (Nkoro and Uko, 2016).

The problem of non-stationary time series model can be defeated by using co-integration technique. The reason to apply the co-integration econometric test which is the most powerful way of detecting whether there is steady state equilibrium between variables or no cases. In applied econometrics, the Granger(1981) and, Engle and Granger (1987),ARDL co-integration technique or bound test of co-integration (Pesaran and Shin1999 and Pesaran et al, 2001) and Johansen and Juselius (1990), co-integration methods The increase in income inequality in the world during the past three decades has resulted a large number, both theoretical and empirical investigations whose aim is to examine become the remedy to determining the long term association between series that are non-stationary and reparameterizing them to the error correction model (ECM).The reparameterized output gives the short run dynamics and long run relationship of essential variables (Nkoro and Uko, 2016).

Suppose that the Dick-Fuller (DF) unit root test for Y_t, which is random walk process the model is as shown, according to Nkoro and Uko (2016)

With random walk; $\boldsymbol{Y_t = Y_{t-1} + u_t}$ **……..**(10)

Then the regression model becomes;

- ***No constant,*** $\boldsymbol{Y_t = \rho Y_{t-1} + u_t}$, subtract both sides by Y_{t-1} we will have and $-1 \leq \rho \leq 1$.
- **Drift with no constant,** $\boldsymbol{\Delta Y_t = (\alpha - 1) Y_{t-1} + \alpha_2 T + u_t}$ … … … … … … … … (11)

Where $\rho = \alpha - 1$, Δ is first difference operator and T is the trend factor and u_t is the white nose residual.

- Constant With a drift we have, $\boldsymbol{\Delta y = \alpha_0 + \rho_1 Y_{t-1} + u_t}$…… (12)

Normally we test the hypothesis that ρ = 0. If ρ = 0, "α" in equation (11) shall be equal to 1, so we will have a unite root and the series under consideration is non-stationary and α<1, the series is stationary. On the other hand, ρ ≥1 which means the underlying variables shall be explosive (ibid).

3.4.1 The Augmented Dickey-Fuller (ADF) Test

To use the DF test, it is supposed that the error term will be uncorrelated. While in the case the error term will be correlated applying Augmented Dickey-Fuller (ADF) test which is developed by both Dickey and Fuller. This test will use to test stationarity and conduct by adding the lagged values on each variable (Pantula, 1989). The ADF unit root test is used at level form and first difference of each series.

As to Nkoro and Uko(2016);

Restrictive ADF model: $\boldsymbol{\Delta Y_t = \rho_1 Y_{t-1} + \alpha_1 T + \sum_{i=1}^{k} \alpha_i \Delta Y_{t-i} + \cup_t} \ldots\ldots\ldots\ldots (\mathbf{13})$

General ADFmodel:$\Delta Y_t = \boldsymbol{\alpha_0 + \rho_1 Y_{t-1} + \sum_{i=1}^{k} \alpha_i \Delta Y_{t-i} + \cup_t} \ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{14})$

GeneralADF model: $\boldsymbol{\Delta Y_t = \alpha_0 + \rho_1 Y_{t-1} + \alpha_1 T + \sum_{i=1}^{k} \alpha_i \Delta Y_{t-i} + \cup_t} \ldots\ldots\ldots\ldots\ldots (\mathbf{15})$

Equation (16) includes constant term and time trend

Where $\rho_1 = \alpha - 1$; u_t is a pure white noise error term

$\boldsymbol{\alpha} =$ Coefficient of $\boldsymbol{Y_{t-1}}$

$\Delta \boldsymbol{Y_{t-1}}$ = First difference of $\boldsymbol{Y_t i.e\ Y_t - Y_{t-1}}$; $\boldsymbol{\Delta Y_{t-2} = Y_{t-2} - Y_{t-3}}$; $\boldsymbol{etc,}$ the notion being to include enough lagged terms in order to make the error term in the equation serially uncorrelated. The null hypothesis of ADF test is $\rho_1 = 0$ against to the alternative hypothesis $\rho_1 < 0$. We can reject the null hypothesis if the variable is stationary otherwise no fail to reject (non-stationary).

3.4.2 The Phillips-Perron (PP) Unit Root Test

It is very important method of DF test if the error term is independently and identical distributed (u_t~ i.i.d). The ADF test will adjust the DF test by taking care possible serial correlation in the error term by adding lagged difference terms of the regression and Phillips-Perron (PP) test can also use nonparametric statistical approach to take care of the serial correlation in the error term

with adding lagged difference terms. Statistically both ADF and PP have asymptotical regression outcomes (Gujarati, 2004).

$$\Delta y_t = \alpha + \rho y_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (16)$$

$$\Delta Y_T = \alpha_1 + \alpha_2 t + \rho Y_{t-1} + u_t \ldots\ldots\ldots\ldots\ldots (17)$$

We can test the hypotheses:

H_0: $\rho = 1$, the series of Y_t is I(1) or it has a unit root.

H_1: $\rho < 0$, the series of Y_t is I(0) or it has no unit root

3.5 Co-Integration (Bound) Test

In time series data using ordinary least square (OLS) or other similar econometric tools for non-stationary time series may generate spurious results. On the other hand, when we test two variables and their regression results may indicate that these a significant correlation exists between them, which in fact are uncorrelated. Such kind of regression is called "spurious regression" which mainly happens because of the non-stationarity of the time series used in the regression model. On the other token in the long time two or more variables can make in equilibrium connection even though they may deviate from in the short term. Because of these issues, Engle and Granger (1987) developed co-integration test method to analyze the connections among non-stationary variables (Shrestha and Bhatta, 2017).

The study will follow the Pesaran et al (2001) to find the co-integration relationship among the selected variables by using F-test for the significance of the hypotheses stated above. Besides, the calculated F-statistics, so as to Pesaran et al (2001) provide two critical values that are the lower bound I(0) and the upper bound I(1) based on these values we will be concluded that both the null hypothesis (no existence of long run relationship or no co-integration) and the alternative hypothesis (there is existence of co-integration or there is a long run relationship among variables). Moreover, the decision needs to consider both the F-statistics and the critical values in order to say whether the hypotheses reject or fail to reject, if the computed F-test exceeds the upper bound

critical value we can reject the null hypothesis whereas the F-test lesser than the lower bound critical value we can say fail to reject (i.e accept) the alternative hypothesis. But if the calculated F-test is sandwiched between the lower and upper critical values, it is inconclusive (we cannot say whether co-integration exists or not).

3.6 The Long-Run Estimates of ARDL Model

The long-run ARDL model as shown below will be estimated by using OLS, if the magnitude of the F-statistics is greater than the upper bound critical value so that we obeying existence of long-run relationship between variables. The long-run coefficients in the output part, they represent the balanced/ equilibrium effect of the explanatory variables on the dependent variable (Kripfganz and Schneider, 2018).

$$\begin{aligned}\Delta RED_t = \quad & \alpha_0 + \sum_{i=1}^{p} \alpha_{1i}\Delta RED_{t-i} + \sum_{i=1}^{n} \alpha_{2i}\Delta GDPpc_{t-i} + \sum_{i=1}^{n} \alpha_{3i}\Delta lnopen_{t-i} \\ & + \sum_{i=1}^{n} \alpha_{4i}\Delta Ginimkt_{t-i} \sum_{i=1}^{n} \alpha_{5i}\Delta GE_{t-i} + \sum_{i=1}^{n} \alpha_{6i}\Delta RL_{t-i} + \sum_{i=1}^{n} \alpha_{7i}\Delta RQ_{t-i} \\ & + \sum_{i=1}^{n} \alpha_{8i}\Delta PS_{t-i} + \sum_{i=1}^{n} \alpha_{9i}\Delta AV_{t-i} + \sum_{i=1}^{n} \alpha_{10i}\Delta CC_{t-i} + \delta ecm_{t-1} \\ & + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (18)\end{aligned}$$

$where\ \alpha_{1i}, \alpha_{2i}, \ldots, \alpha_{10i}$, are the short-run dynamic coefficients of the model's adjustment long run equilibrium.

Where δ is speed of adjustment parameter with negative sign which calibrates the convergence time, in other words, a positive coefficient shows a divergence while a negative coefficient tells a convergence. Moreover, the negative speed-of-adjustment coefficient (-δ) gauges the dependent variable reacts to a diversion from the equilibrium relationship in one period or how it rapidly adjusts the disequilibrium point and *ecm* stands for error correction term, the term ecm is nothing but it acts as the speed of adjustment parameter or it indicates how much of the disequilibrium being corrected (Nkoro and Uko, 2016).

3.7The short-run estimation of ARDL model

After obtaining the long-run relations, our next task is to estimate short-run dynamics relation of ARDL model by applying the following equation. If the F-statistics less than the lower bound then there is short- run relationship. The coefficients in the output section explain for the short-run variations not due to deviations from the long-run equilibrium (Nripfganz and Schneider, 2018).

$$\begin{aligned}\Delta RED_t = \quad & \alpha_0 + \sum_{i=1}^{p} \alpha_{1i}\Delta RED_{t-i} + \sum_{i=1}^{n} \alpha_{2i}\Delta GDPpc_{t-i} + \sum_{i=1}^{n} \alpha_{3i}\,\Delta \ln Open_{t-i} \\ & + \sum_{i=1}^{n} \alpha_{4i}\Delta Ginimkt_{t-i} \sum_{i=1}^{n} \alpha_{5i}\Delta GE_{t-i} + \sum_{i=1}^{n} \alpha_{6i}\Delta\, RL_{t-i} + \sum_{i=1}^{n} \alpha_{7i}\Delta\, RQ_{t-i} \\ & + \sum_{i=1}^{n} \alpha_{8i}\Delta PS_{t-i} + \sum_{i=1}^{n} \alpha_{9i}\Delta\, AV_{t-i} + \sum_{i=1}^{n} \alpha_{10i}\Delta CC_{t-i} + \varepsilon_t \dots\dots (19)\end{aligned}$$

3.8. Diagnostic Tests

Stationarity and multicollinearity and T-tests, (the T-test is used to test there may be a significant difference between the means of the data for Ethiopia and Uganda), when two or more independent variables have a strong coefficient of relation is referred to as multicollinearity (Pesaran and Shin, 1999). The current paper will apply this approach to test for multicollinearity among variables.

Robustness of the model is testing by using various diagnostic tests. After estimation has done it has to check whether the model has achieved the desired properties. Some of various diagnostic tests for this study are serial correlation, functional form test, normality test and hetroscedasticity tests. Autocorrelation will be tested by using Durbin Watson and Breusch-Godfrey LM test, functional form is tested by Ramsey REST test which is used to test based on the null hypothesis that is the model is specified correctly. Moreover, hetroscedasticity will be tested by using White's test and the stability of the model will be checked by CUSUM test.

CHAPTER FOUR

4- RESULTS AND DISCUSSIONS

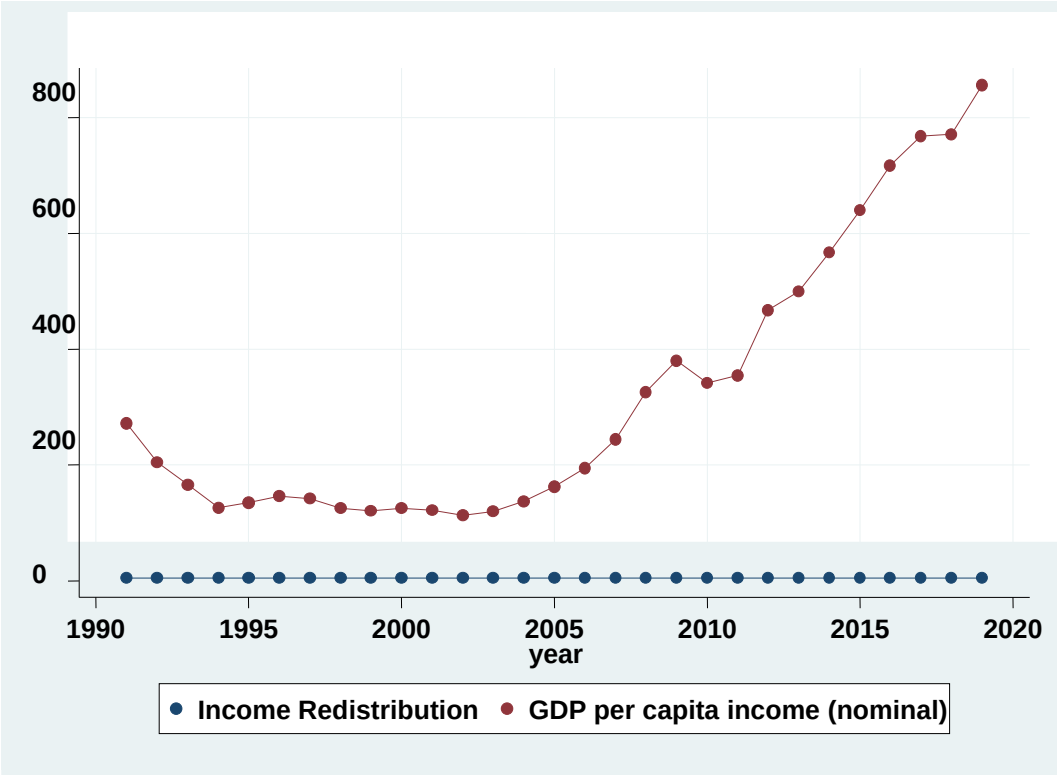
This chapter will present and discuss the data results of the analysis of data by following the research findings and interpretations. The findings are associated with the research objectives that will support the study. The institutional quality and income inequality variables will be presented and discussed with charts along with the respective statistical descriptive and econometric measures.

4.1 Descriptive analysis and presentations

The average income inequality (Red= 3.96) for Ethiopia is less than the average for Uganda (Red= 5.51), as shown below table 4.1 and 4.2. This indicates that in Uganda income inequality is more criticalness than in Ethiopia and the average value of Gini market (37.60) in Ethiopia is smaller than the average for Uganda which is 46.3, this also confirmed that national resources are owned by the richest 1% of population in Uganda is higher than in Ethiopia. Moreover, by considering the estimation of coefficient of variation (CV=standard deviation divided by mean), which gauges the variability of income inequality, the value of Ethiopia is 1.7 percent which is slightly consistent than the value for Uganda, which is 2.2 percent.

As shown the figure 4.1 below, the trends of income inequality and GDP per capital for Ethiopia showing that the trend of income inequality is indicating that it is steady state throughout the periods, this assures that in the country no economic outcome is fairly distributed to the society even if the market income inequality does not decrease in the country and income gap might be more widened in the future than in the past if the trend keeping moving up. While the trend of GDP per capita from the first five years showing declined. The reason for the declining of GDP per capita in Ethiopia, the time was a revolutionary years and it was not an easy decade for the Ethiopia there is no fundamental structural and policy changes in the country without policy change the country economic crisis had been deepen.

Figure 4.1: Trends of income redistribution and GDP per capita in Ethiopia



Source: Own computation based on secondary data 1991-2019.

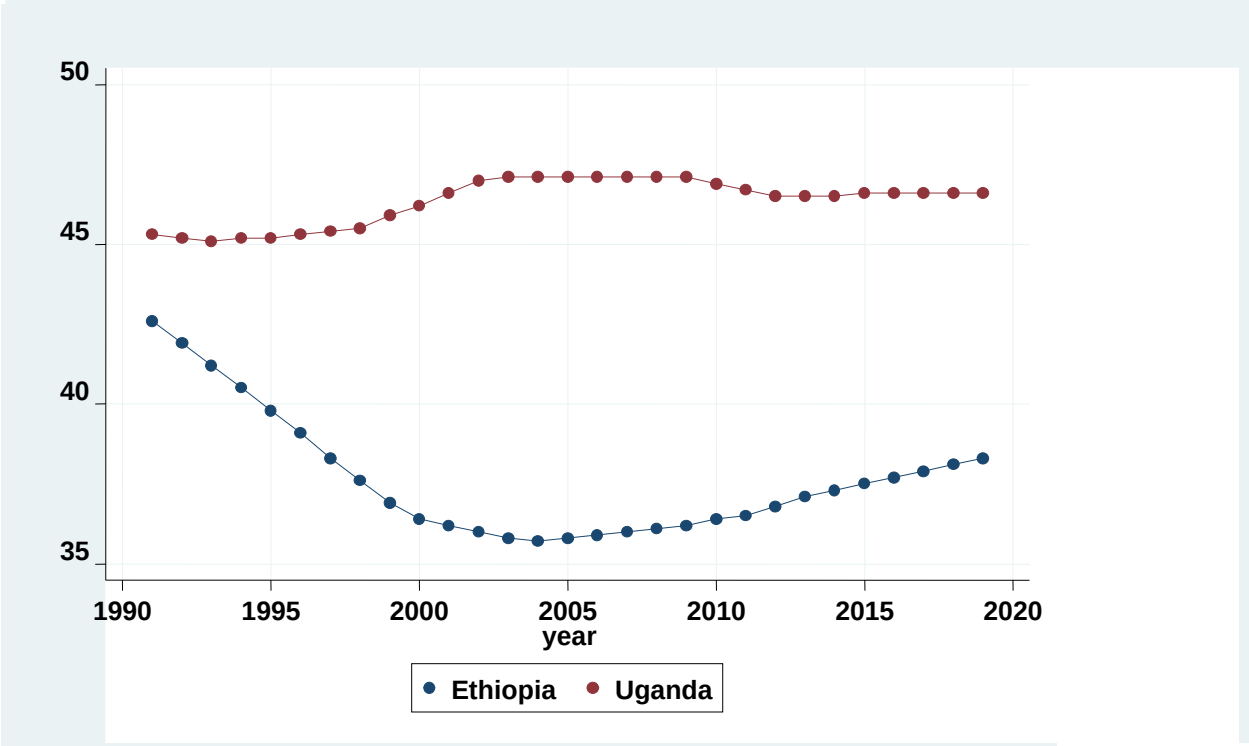
After 1995 to around 2003/04 the GDP per capita is slightly constant due to a momentum that retards the growth pace but the trend reversed after 2005/06 and there is a shock between 2010 and 2012.

The explanatory macroeconomic variables given from the model such as, GDP per capita, trade openness and market income inequality, to compare their mean and CV values of Ethiopia against to Uganda as follows; for Ethiopia the mean value of GDP per capita is 322.03 less than the average value for Uganda, which is 473.45 and their CV is Ethiopia is less variable (73 percent) than Uganda (56 percent).

When we compare the market income inequality (inequality before taxes and transfers) for Ethiopia and Uganda, as figure 4.2 below tells that Ethiopia has lower income inequality than

Uganda, but the trend of Ethiopian income inequality is showing slightly rising after 2006 while Uganda's inequality trend looks almost constant after 2011.

Figure 4.2: Comparison of market income inequality



Source: Own computation based on secondary data 1991-2019

The average values of trade openness and market income inequality (Gini-mkt) for Ethiopia and Uganda are 16.6 percent and 38 for Ethiopia and 37 percent and 46 for Uganda, this shows that Ethiopia is less perform in case of trade openness than Uganda while in case of market income inequality Ethiopia has a good performance (38) in relative to Uganda (46) since if a country has less average value of its Gini-market so it exhibits less income inequality in turn there is income redistribution across the poor. Whereas, based on the coefficient of variations (CV) in GDP per capita, trade openness and Gini-market for Ethiopia are 73, 17 and 5 percents respectively; all are showing more variable than Uganda (56, 17 and 1.6 percent). But based on the result coefficient

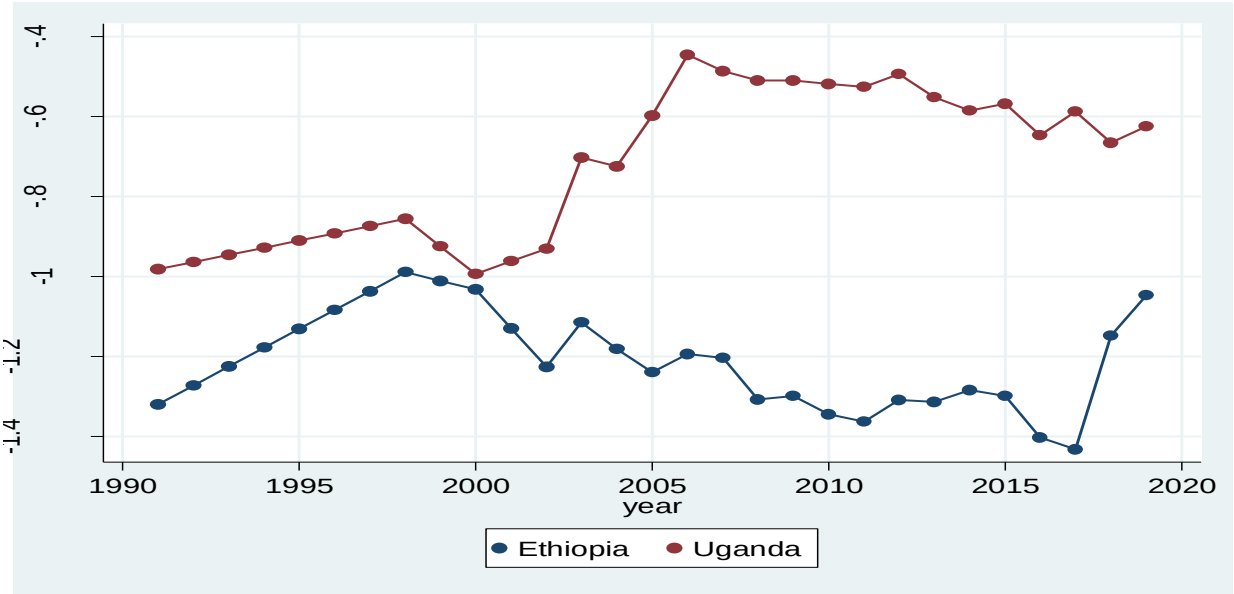
of variations of trade openness for both countries have similar values, they perform relatively the same performance.

Now, we are going to begin and analysis the estimated values of institutional quality variables:

Voice and accountability (VA): based on Tables 4.1 & 4.2 shown below, the estimated mean value of voice and accountability for Ethiopia is -1.21, less than the mean value for Uganda which is -0.72 showing that Uganda performs better regarding to voice and accountability over the period 1991-2019.Regarding to coefficient of variance (CV) for both countries is indicating that Ethiopia is more consistent (10 percent) than Uganda (26 percent), which is more variable.

Trends in institutional quality in Ethiopia and Uganda, the estimate of voice and accountability for Ethiopia and Uganda is indicated in Figure 4.3 below, which indicates that in overall Uganda has been better performing than Ethiopia over the period of 1991-2019. However, based on the estimation results as shown in the figure currently Ethiopia has been performing in a good condition particularly after 2016 relative to before 2016.

Figure 4.3: Comparison of voice and accountability

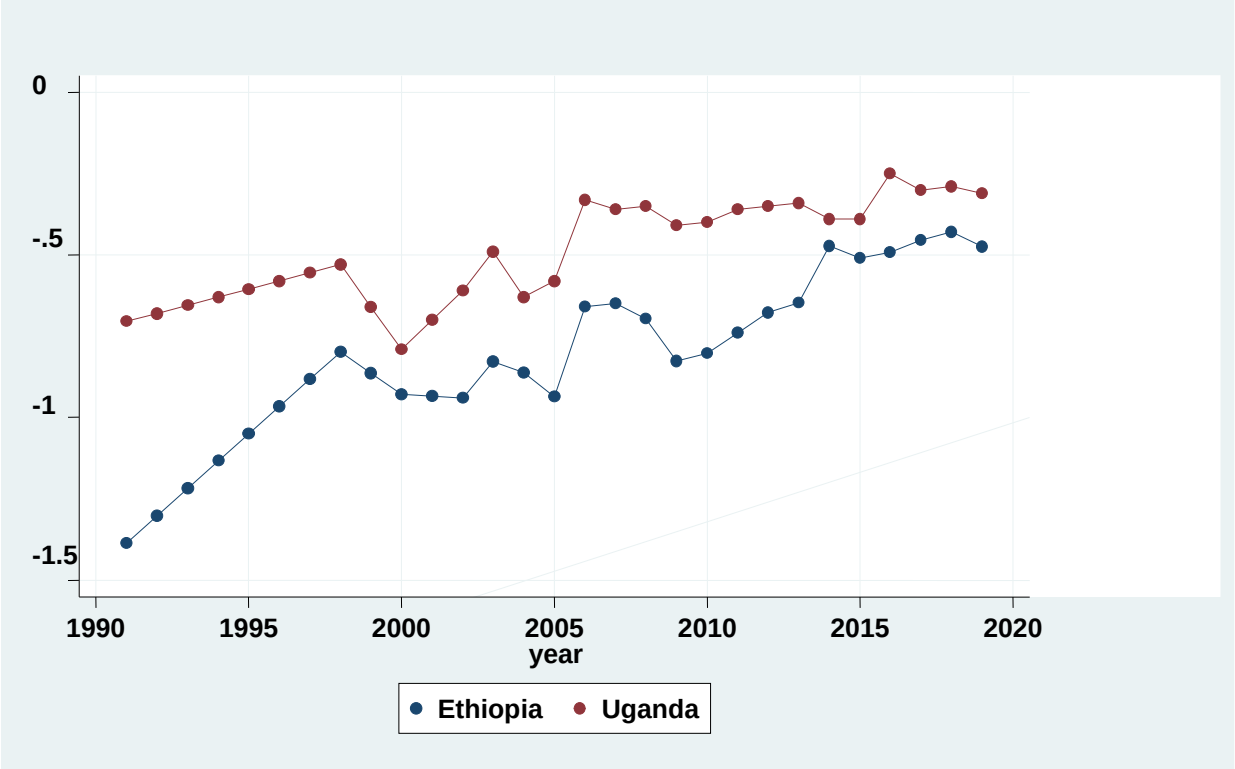


Source: Own calculation based on secondary data 1991-2019

Rule of law (RL): based on Table 4.1 and 4.2, the estimated average value of rule of law in Ethiopia is (-0.81) less than the mean value of Uganda, which is -0.49, this also indicating that Uganda performs better in respect of rule of law. Whereas based on the estimated values of coefficient of variability for both countries have almost similar values which is for Ethiopia (CV=31percent) and for Uganda which is (CV=32 percent), therefore both are more variable.

Besides, based on the above figure 4.4, the estimated result of rule of law for Uganda almost in all the sample periods 199-2019 was better than Ethiopia. In Uganda societies and agents have a confidence on their quality of rules and court, security of property rights and better contract of enforcement during the period whereas in Ethiopia based on the figure shown below, the extent of all these activities are not consistent due to the graph is oscillating. Furthermore, the quality of rule of law currently shows slightly decline.

Figure 4.4: Comparison of rule of law



Source: Own computation based on secondary data from WGI (1991-2019)

Before proceeding to the estimation of long run and short run models the study summarizes the variables used in the model employed to analyze the impact of institutional quality on income inequality in Ethiopia in table 4.1 below.

Table 4.1: Descriptive statistics of the variables included in the model of Ethiopia

Variables	Obs	Mean	Std.Dev	CV	Min	Max
Red	29	3.955172	0.0685889	1.70%	3.8	4
GDPpc	29	322.0266	236.6666	73%	111.9272	857.5013
Lnopen	29	3.448974	0.5719391	16.6%	1.685922	3.933525
Gini-mkt	29	37.64138	1.918615	5%	35.7	42.6
Va	29	-1.21066	0.1220009	-10%	-1.431522	-0.9892508
Rl	29	-0.81226	0.2537927	-31%	-1.917674	-0.8601215
Rq	28	-1.14221	0.219155	-19%	-1.70557	-0.2345042
Ge	29	-0.86783	0.4202121	-48%	-1.386229	-0.3967329
Ps	29	-1.41709	0.3472837	-25%	-1.828522	-0.6302906
Cc	29	-0.74605	0.3715806	-50%	-2.1032	-0.4064651

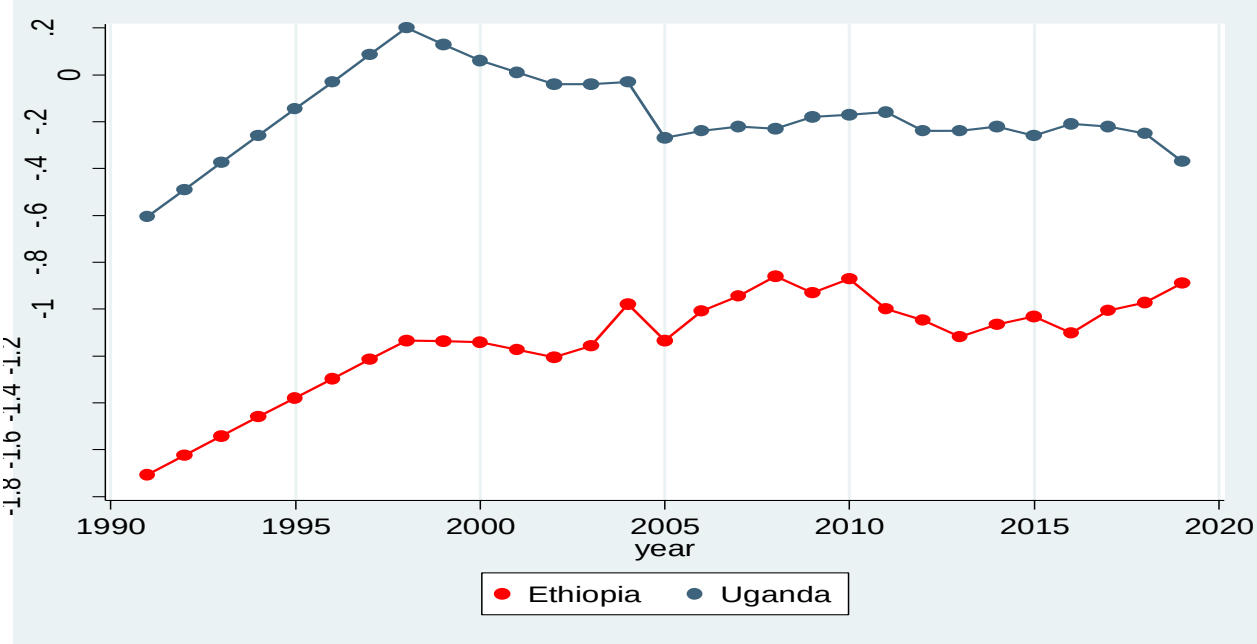
Source: Own calculation based on secondary data sources (1991-2019)

Regulatory quality (RQ): Based on Table 4.1 and 4.2, the estimated mean value of regulatory quality in Ethiopia -1.14 it is less than the average estimated value of Uganda which is -0.17. That indicates Uganda performs better than Ethiopia in terms of regulatory quality over the given years. But regarding to coefficient of variation (CV) Ethiopia is extremely more consistent (19 percent) than Uganda (103 percent).

Furthermore, in figure 4.5 as shown below, the estimated result of regulatory quality for Uganda has been far better than the regulatory quality for Ethiopia in all the observation years. In Uganda especially between 1995 via 2004 the values of regulatory quality are positive thus according to Kaufmann et al (2010) the estimate value of governance falls between -2.5 weak governance quality and 2.5 has strong governance quality, therefore Uganda had a strong governance

performance in the years from 1995 to 2004 and after 2015 the trend of Ethiopia has been increased but for Uganda it has been declined.

Figure 4.5: Trends of regulatory quality for both countries



Source: Own computation based on secondary data source from WGI (1991-2019)

Before proceeded to the estimation of long run and short run models the study summarizes the variables used in the model employed to analyze the impact of institutional quality on income inequality in Uganda in table 4.2 below.

Table 4.2: Descriptive statistics of the variable included in the model (Uganda)

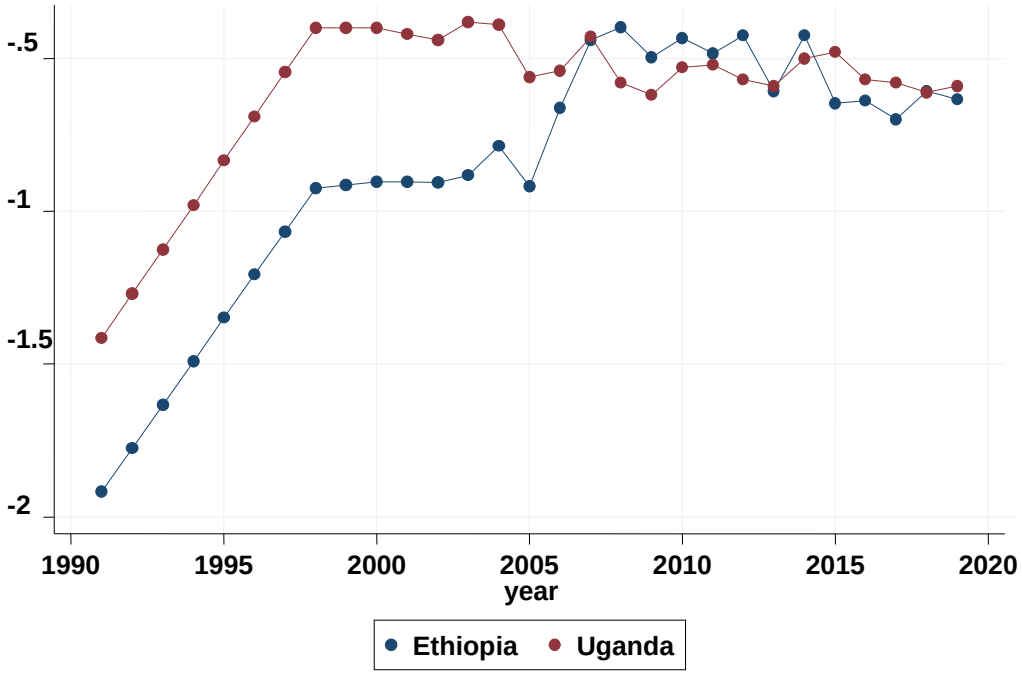
Variable	Obs	Mean	Std Dev.	CV	Min	Max
Red	29	5.506897	0.1222731	2.2%	5.2	5.7
GDPpc	29	473.4536	265.6624	56%	153.944	876.3543
lnOpen	29	0.3738425	0.0630712	17%	0.2783936	0.5705391
Gini_mkt	29	46.33448	0.7271642	1.6%	45.1	47.1
CC	29	-0.84	0.2099404	-25%	-1.17	-0.2950001
RL	29	-0.4906897	0.156192	-32%	-0.79	-0.25
RQ	29	-0.1727586	0.1777317	-1O3%	-0.605	0.2
GE	29	-0.6193103	0.262698	-42%	-1.415	-0.38
PS	29	-1.249234	0.5156733	-41%	-2.595517	-0.5715618
VA	29	-0.7206563	0.1906761	-26%	-0.993295	-0.4453833

Source: Authors' calculation based on secondary data sources (1991-2019)

Government effectiveness (GE): Based on the above table 4.1 and 4.2, the estimated average amount of government effectiveness for Ethiopia is -0.87 which is less than the mean value of Uganda, which is -0.62, showing that Uganda performs more in terms of government effectiveness than Ethiopia. Its coefficient of variation for Ethiopia and Uganda are 48 percent and 42 percent respectively, these values show that both countries have higher variability.

In additions, based on Figure 4.6, the estimated result of government effectiveness for Uganda was better performance between 1996 through 2004 than Ethiopia, while government effectiveness in Ethiopia during the period between 2008 through 2014 was better than Uganda.

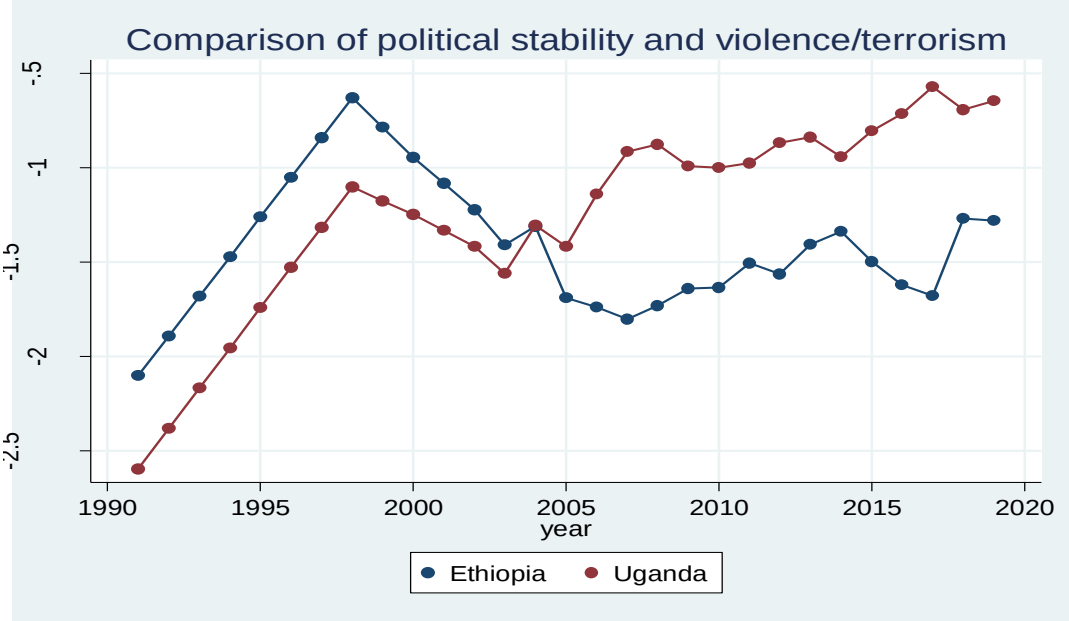
Figure 4.6: comparison of government effectiveness



Source: Own computation based on secondary data from WGI (1991-2019)

Political stability and absence of violence/terrorism (PS): Based on table 4.1 and 4.2, the estimated mean value of political stability and absence of violence/terrorism in Ethiopia is -1.42, which is less than the estimated average value of Uganda, which is -1.25, it is showing that Uganda has better political stability relative to Ethiopia in the sample years. Whereas based on their coefficient of variations (CV) for Uganda is more variable (41 percent) than Ethiopia (25 percent).

Figure 4.7: Trend of political stability and absence of violence/terrorism

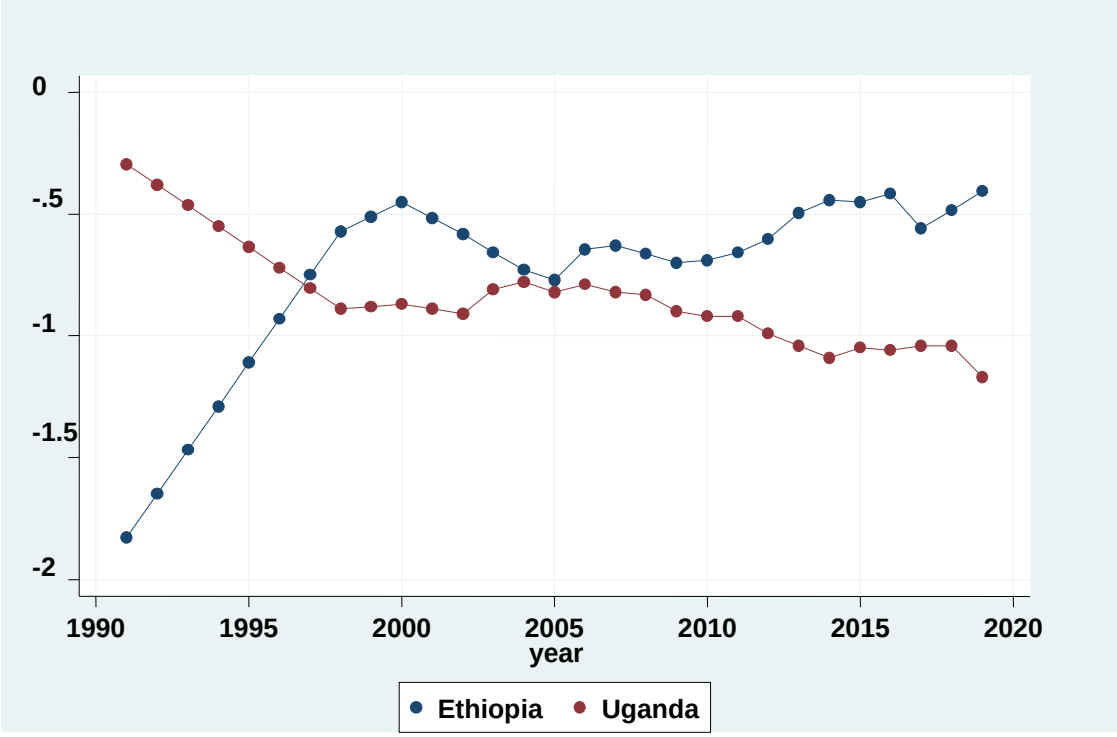


Source: Own computation based on secondary data from WGI (1991-2019)

As the shown from Figure 4.7 above, the estimate of political stability and absence of violence/terrorism for Ethiopia was better than that of Uganda in the years between 1991 through 2003, after that it reversed and Uganda was starting to perform better than Ethiopia after the year 2003/04.

Control of corruption (CC): from table 4.1 and 4.2 as shown above, the estimated value of control of corruption in Ethiopia is -0.75,which is greater than the average value of Uganda -0.84, which indicating that Ethiopia performs better in controlling corruption relative to Uganda. Regarding to coefficient of variations for the two countries, Ethiopia is twice more variable (50 percent) than for Uganda (25 percent) over the given periods 1991 to 2019.

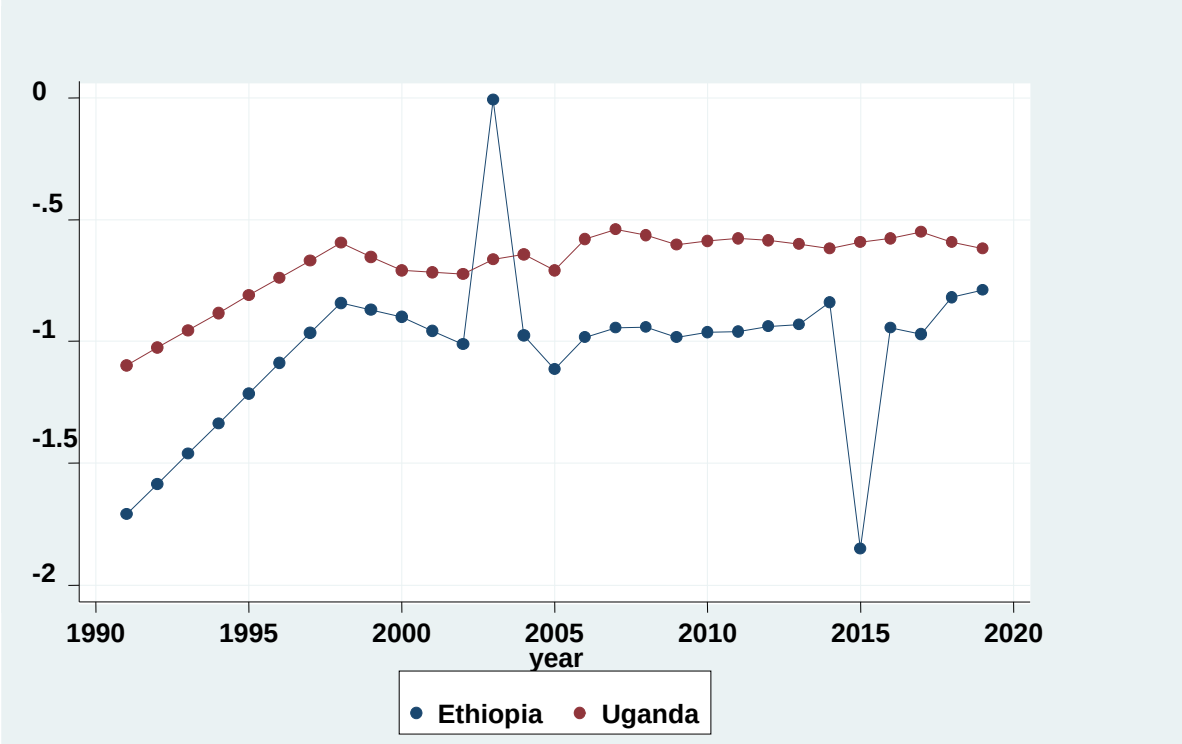
Figure 4.8: Trend of control of corruption



Source: Own computation based on secondary data from WGI (1991-2019)

In the Figure 4.8 shown above, the estimate of control of corruption for Ethiopia was by far better than that of Uganda through in all the observation years

Figure 4.9: The comparison of aggregate institutional quality for both countries



Source: Own calculation based on secondary data from WGI (1991-2019)

As per Figure 4.9 shown above, the trend of average institutional quality for Uganda has been consistent no a sign of up and down trend relative to average institutional quality for Ethiopia, but as we have observed from the graph for Ethiopia around 2001 to 2005 the trend is good whereas around 2014/15 the trend has reversed so the trend is not consistent as Uganda.

4.2. Econometric Analysis

4.2.1 Unit Root Test

Table 4.3: Augmented-Dickey-Fuller Unit Root Test (Ethiopia)

Variable	Level				First difference				I(d)
	Intercept		Intercept and trend		Intercept		Intercept and trend		
	t-value	P-value	t-value	p-value	t-value	p-value	t-value	p-value	
Red	-1.844	0.3586	-1.876	0.6671	-4.012***	0.0003	-4.059**	0.0072	I(1)
GDPpc	2.750	0.9947	-1.807	0.7122	-3.099**	0.0024	-4.776***	0.0005	I(1)
lnOpen	-2.040	0.5796	-5.038***	0.0002	-	-	-	-	I(0)
Gini-mkt	-4.960***	0.000	-3.219***	0.0004	-	-	--	-	I(0)
Va	-1.630	0.115	-1.777	0.8801	-4.086***	0.0000	-4.004***	0.0002	I(1)
Rl	-1.996*	0.0283	-3.259*	0.0733	-	-	-	-	I(0)
Rq	-2.670**	0.0065	-2.459	0.3489	-2.751**	0.005	-2.391	0.3843	I(1)
Ge	-3.265***	0.0015	-3.463***	0.0010	-	-	-	-	I(0)
Ps	-2.157*	0.0202	-2.186*	0.0194	-3.727***	0.0005	-3.686*	0.0233	I(1)
Cc	-4.891***	0.0000	-3.3004*	0.0656	-	-	-	-	I(0)

Source: Extract from results (1991-2019)

Note: ***, ** and * are significance levels at 1%, 5% and10% respectively.

In order to check a time series data whether it is stationary or note use a unit root test which is a standard procedure. The Augmented Dickey-Fuller (ADF) test is applied on the two tables 4.3 and 4.4 which show the absolute values of the calculated ADF or Z(t) test statistics must be greater than the critical values at 1% and 5% significance levels, therefore based on this variables such as lnopen, Gini-mkt, Rl ,Ge and Cc are become stationary at 1% and at 5% significance levels for Ethiopia at level that is I(0) while variables such as Red, GDP per capita, Va, Rq and Ps are stationary at first difference of I(1).

Uganda, except variables such as Red, GDP per capita, rule of law (RL)and voice and accountability(Va) are becoming stationary at first difference, while the rests are stationary at level any ways the results support the rejection of the null hypothesis (non-stationarity), while it is encouraging to accept the alternative hypothesis(i.e stationarity).

Based on the two tables 4.3 and 4.4 ADF statistics test in the case of drift (intercept) and trend, based on these results reported in table 4.3 and table 4.4 for the two countries all variables are stationary at orders I(0) and I(1). This tests statistics confirmed that there is a mixture of I(0) and I(1) essential repressors and hence, the ARDL model testing can be proceeded.

Table 4.4: Augmented-Dickey-fuller unite root test (Uganda)

Variable	Level				First difference				I(d)
	Intercept		Intercept and trend		Intercept		Intercept and trend		
	t-value	p-value	t-value	p-value	t-value	p-value	t-value	p-value	
Red	-0.972	0.1699	0.035	0.9946	-4.424***	0.0001	-5.914***	0.000	I(1)
GDPPC	-0.94	0.1774	-1.832	0.6893	-3.114**	0.0024	-3.048	0.1191	I(1)
Gini-mkt	-2.419*	0.0118	-1.975	0.6150	-1.893*	0.0355	-2.414*	0.0251	I(1)
lnOpen	-2.340*	0.0136	-2.542	0.3072	-1.773*	0.0444	-4.455***	0.001	I(1)
Va	-1.203	0.9099	-1.178	0.9150	-5.024***	0.0000	-5.055***	0.0002	I(1)
RL	-1.451*	0.0798	-3.228*	0.0790	-5.164***	0.000	-5.050***	0.0002	I(1)
RQ	-2.058*	0.0253	-2.972	0.1401	-2.295*	0.0156	-3.725*	0.0208	I(1)
GE	-3.640***	0.0007	-4.597***	0.0000	-	-	-	-	I(0)
PS	-3.127**	0.0022	-3.056	0.1171	-	-	-	-	I(0)
Cc	-2.703**	0.0060	-2.994	-2.695	0.2382	-	-	-	I(0)

Source: Own computation based on data sources (1991-2019)

Where, ***, ** and * are significance levels at 1%, 5% and10% respectively.

4.2.2 Correlation matrix

A correlation matrix is a table indicating correlation coefficient between variables that is each cell in the table indicates the correlation between two variables. A correlation matrix is four equal sides' polygon or square shape with the same variables shown in the rows and columns

(Herkenhoff &Fogli, 2013). The correlation matrixes for variables of this study model for the two countries are as shown below table 4.5 and table 4.6.

Table 4.5: Correlation matrix of variables (Ethiopia)

	Red	**GDPpc**	**lnOpen**	**Ginimk**	**VA**	**RL**	**RQ**	**GE**	**PS**	**CC**
Red	1									
Gdppc	0.3464	1								
lnopen	-0.4283	0.0494	1							
Gini_mkt	0.5791	-0.0032	-0.9389	1						
VA	-0.0805	-0.4525	-0.0894	-0.0185	1					
RL	-0.0253	0.744	0.5979	-0.5717	-0.184	1				
RQ	-0.3222	0.4375	0.8202	-0.8302	-0.0975	0.8326	1			
GE	-0.2818	0.4703	0.8454	-0.8313	-0.2236	0.8618	0.9579	1		
PS	0.1641	-0.2393	0.139	-0.232	0.7705	0.1135	0.1312	0.0808	1	
CC	-0.1981	0.3964	0.7649	-0.8224	0.0992	0.8505	0.8556	0.8716	0.4502	1

Source: Authors' computation based on data (1991-2019)

The correlation matrix of the variables is symmetrical since the main diagonal is a mirror image of those below and the correlation of two variables let say X and Y is more likely similar value with the correlation of Y and X. The line of diagonal which has values' 1 is showing that each variable always perfectly correlate with itself. According to the correlation matrix table 4.5 as shown above in the case of Ethiopia, the correlations between Gini market inequality and trade openness, government effectiveness and regulatory quality and control of corruption and rule of law and government effectiveness are strong.

In regarding to Uganda's correlation matrix table 4.6 as shown below, the correlations between rule of law and GDP per capita and political stability and absence of violence/terrorism control of corruption and rule of law are strong.

Table 4.6: Correlation matrix of variables (Uganda)

	Red	GDPpc	Gini-mkt	Lnopen	CC	RL	RQ	GE	PS	AV
Red	1									
GDPpc	0.2072	1								
Gini_mkt	0.5033	0.4718	1							
Lnopen	0.4755	0.4298	0.6954	1						
CC	-0.2532	-0.754	-0.619	-0.4031	1					
RL	0.2097	0.8213	0.5395	0.5654	-0.6696	1				
RQ	0.3625	-0.1865	0.0707	-0.0652	-0.3352	-0.2073	1			
GE	0.5402	0.3125	0.6613	0.3858	-0.7858	0.3217	0.7321	1		
PS	0.3239	0.7672	0.649	0.5461	-0.9454	0.7723	0.2972	0.7632	1	
AV	0.5095	0.7593	0.7358	0.7533	-0.5839	0.8693	-0.2027	0.4025	0.7101	1

Source: Authors' computation based on the given data (1991-2019)

4.2.3. Optimal Lag Length Selection Criteria

The optimal order of lags in the ARDL model will be chosen by using either Akaike Information Criteria (AIC) or Schwarz Information Criteria (SIC), etc. As shown in Table 4.7, among all lag order selection criteria the optimal lag period for this model indicates two periods. Based on the Woodridg's (2004) a classical approach with annual data used, the number of lags is typically small, 1 or 2lags in order not loss degrees of freedom, for quarterly data 1-8 lags and with monthly data such as 6,12 or 24 lags can be used given adequate data points. For the current study ARDL model the AIC has chosen and its minimum value is -162.305* for Ethiopia. According to Kripfganz and Schneider (2018) highlight that the optimal lag length for a model is the smallest value that value is mostly negative magnitude of AIC or BIC. The BIC leans to perform more parsimonious models.

Table 4.7: Selection for Optimal Lag Length (Ethiopia)

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	50.5943	NA	NA	NA	2.3e-14	-3.00698	-2.86427	-2.52704
1	360.451	619.71	100	0.000	6.9e-21	-18.5519	-16.9821	-13.2726
2	2401.11	4081.3*	100	0.000	2.9e-81*	-162.305*	-159.308*	-152.226*

Source: Own calculation based on Stata 14 software.

In Uganda the optimal lag length of the ARDL model is two periods as shown Table 4.8 below and the model has allowed choosing among the three most popular criteria the one which is appropriate for the time being is AIC (-18.2486*), which is the minimum value relative to other tests.

Table 4.8: Selection for Optimal Lag Length (Uganda)

lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	66.0527	NA	NA	NA	7.5e-15	-4.15205	-4.00934	-3.67211
1	356.36	580.61*	100	0.000	9.3e-21	-18.2486*	-16.6788*	-12.9693*
2	NA	NA	100	NA	-1.1e79*	NA	NA	NA

Source: Own calculation based on Stata 14 software

4.2.4. Bounds test for co-integration

In order to test the long run correlation among variables we can detect by using F-statistics, which will compare with the lower I(0) and upper(1) bounds of Pesaran et al (2001) critical values. As we have stated on the methodology part of the study, if the genuine value of the F-statistic is exceeding the upper bound we can say that there is long run association among the variables, whereas if the F-statistic is lower than the lower bound test we cannot talking about their long run relationships .

Table **4.9:** Outcomes of ARDL Bound Tests for Co-integration (Ethiopia)

F-statistics	11.341	
Critical values	Lower Bound I(0)	Upper Bound I(1)
1%	3.79	4.10
5%	2.22	3.39
10%	1.95	3.06

Source: model result based on secondary data (1991-2019)

As shown in the above table 4.9 the result of the F-statistic falls above the critical value bounds at1% level of significance, this shows that there is a road to reject the null and formulate an equation for co-integration and according to the above table the F-calculated is 11.341, which is greater than the upper bound critical value of 4.10 at 1% level of significance. Therefore, we generalized that there is a co-integrating correlation among variables under consideration.

As shown in table 4.10 below for Uganda, the result of the F-statistic falls above the critical value bounds at1% level of significance, and then the result makes to reject the null hypothesis and formulate an equation for co-integration. Moreover, based on the table the F-calculated is 5.01, which is greater than the upper bound critical value of 4.10 at 1% level of significance. Therefore, we generalized that there is a co-integrating correlation among variables under consideration.

Table 4.10: Outcomes of ARDL Bound Tests for Co-integration (Uganda)

F-statistics	5.01	
Critical values	Lower bound I(0)	Upper bound I(1)
1%	1.95	3.06
5%	2.22	3.39
10%	2.79	4.10

Source: model result based on secondary data (1991-2019)

4.2.5. Long Run Analysis of ARDL Model

The Table 4.11 as shown below indicates that the long run co-integration of variables, which is computed by ARDL model. Based on the estimated results as shown in the table below, all explanatory variables except regulator quality (Rq) and government effectiveness(Ge) in the model are significantly determining income redistribution (income inequality) in Ethiopia in the long run. In other words, in the long run income inequality in Ethiopia is determined by both macroeconomic and institutional quality variables.

Our variable of interest particularly in institutional quality variables, among the six selected variables used for this study, control of corruption has been dropped from the long run and short run regression results analysis due to multi-collinarity detected problems in the model and after removing the variable our ARDL regression results are more significant.

Nominal GDP per capita has positive and statistically significant impact on income inequality in Ethiopia. While it implies that in the long run, ceteris paribus a one unit increase growth domestic product per capita (GDPpc) will increase income inequality by 0.00043 Dollars ($) in Ethiopia. This finding might be consistent with Kuznets (1955) inverted U shape theory that is the association between income inequality and economic development is positive at the initial stage of economic development, income inequality is increasing and then decreasing.

The relationship between income inequality (Red) and log of trade openness (lnopen) has as expected positive and significant less than 5%, the result confirms the work of many literatures. For example Fisher (2000); Easterly (2002) and Alemayehu (2006), in simple words, in the long run, ceteris paribus, a one percent (1%) increase trade openness will increase income inequality by 0.41 units for Ethiopia.

The implication is one of the determinants of income inequality is skilled biased technology (SBT), if a country opens its economy to trade it will be more exposed to technologies and innovations produced in more developed nations. Moreover, trade with richer countries which could involve trade scaling up this finally become wage differentials and so in rising income inequality.

We can also say something about the relationship between income inequality and Gini market income inequality; based on the ARDL model results in the long run, the coefficient of Gini_mkt is positive related to income inequality in Ethiopia, which means that keeping other factors are constant a one unite increase in market income inequality (Gini before) will increase income redistribution (income inequality) by 0.062 units in the long run. This result consistent with the findings of Ostry et al (2014) and Josifidis et al (2017) they found that the relationship between income redistribution and market income inequality is positive. The increase market income inequality, i.e the absorption of economic outcomes in the hands of the richest 1% of the population is connected with a decreasing in income redistribution by rising income inequality.

Table 4.11: Long-run results of estimated coefficients (Ethiopia)

Variables	Coef	Std. Err.	T	P>t	[95% Conf. Interval]
GDPpc	0.0004263	0.0001134	3.76	0.002	0.0001845 0.0006681
lnOPEN	0.4110244	0.0869498	4.73	0.000	0.2256952 0.5963535
Gini_mkt	0.0619619	0.0137594	4.50	0.000	0.0326344 0.0912894
Va	-0.3397216	0 .1311011	-2.59	0.020	-0.619157 -0.0602862
RL	-0.4110662	0.1477678	-2.78	0.014	-0.7260259 -0.0961065
Rq	0.2950863	0.1726123	1.71	0.108	-0.0728281 0.6630007
Ge	-0.128915	0 .0823931	-1.56	0.139	-0.3045317 0 .0467017
Ps	0.2578506	0.0454711	5.67	0.000	0.1609313 0 .35477

Note: ARDL (1 1 1 2 2 1 1 1 3) chosen based on Akaike Information Criteria (AIC).

From the table 4.10 we find that institutional quality indicators such as regulatory quality (Rq) and government effectiveness (Ge) will have statistically insignificant impact on income inequality of Ethiopia in the long run, this is similar results to the findings of Kunawotor(2020). Moreover, regulatory quality (Rq) has the expected positive signs but government effectiveness has unpredicted sign. From the above results (table 4.10), such as voice and accountability (Va), rule of law (RL) and government effectiveness (Ge) have negative and unexpected sign.

As per Table 4.10, both voice and accountability and rule of law have more significant impact in determining income inequality of Ethiopia in the long run (level of significances are at 5 percent).Therefore the two institutional quality indicators such as rule of law and voice and accountability are vital for Ethiopia in reducing income inequality in the long run, the reality behind of these results is that rule of law can secure property rights and it is under grouped in the political institution indicators, it protects the public power exercised by the private gain and both the potential economic elites and private interest groups cannot capture the state, therefore there is equal and fairness distribution of national economic outcomes as well as there is progress in the extent to which agents have confidence and abide by the rule of society, specifically the guarantee in securing property rights, the quality of contract enforcement and the quality of the police and the state courts and quality institutions can deliver political rights uniformly across the society so as to create efforts for income redistributive policies and this finding consistent with the finding of Sonora (2019).

Political stability and absence of violence/terrorism (Ps) has found positive as expected and statistically significant at one percent level of significance in the long run. It implies that its effect is positive on income inequality where quality political institutions can control the happening of violence or terrorism and generate better economic institutions that weaken the power of elites who plunder national resources to their own purpose. Furthermore, the country's government less likely to stabilize and unrecognized violence/operation in order to overthrow the state power by unconstitutional and violence ways will hurt the distribution of national incomes to the poor society.

Generally, the ARDL regression result indicates that both macroeconomic and institutional quality variables are statistically more significance, but institutional quality indicators such as voice and accountability and rule of law are very crucial for Ethiopia in order to reduce income inequality and more facilitate income redistribution in the long run than macroeconomic variables selected for this study.

The result of error correction term (ECM-1) as shown below Table 4.12, for Ethiopia allows modeling adjustments that directing to a long run equilibrium association with the given variables. The magnitude of the coefficient of the error correction term is -0.765, which is negative and highly significant and its level of significance is at 1%. This value indicates that the economic system adjusts/corrects its previous time disequilibrium at the speed of 76.5 percent (76.5%) for reaching a long term steady state. Moreover, this implies that if the economic system may be happened a shock one time it will take no more than a year to bring/adjust from its disequilibrium point to equilibrium point. Based on the error correction term outcome verifies that there will be a long run relationship between institutional quality indicators and income inequality for Ethiopia.

Table 4.12: Error correction estimation results, ARDL (Ethiopia)

Variables	Coef.	Std.Err	T	P>t	[95% Conf Interval]
RL(-1)	0.1828804	0.0824605	2.22	0.042	0.0071201 0.3586407
ECM(-1)	-0.7646395	0.1420526	-5.38	0.000	-1.067417 -0.4618616
R-squared	0.8763				
Adjusted R-square	0.7938				
Log likelihood	69.202928				
Constant	-0.1055123	0.549925	-0.19	0.850	-1.27765 1.066625
Dependent variable is income redistribution (Red) as a proxy of income inequality.					

Source: model result

As per Table 4.13 shown below, in the long run income redistribution (income inequality) in Uganda is determining by all macroeconomic and institutional quality explanatory variables. As we comparing the regression result of the two countries as follows; in macroeconomic variables both nominal GDP per capita and trade openness are positive signs and statistically more significance for both countries, but market income Gini (Gini-mkt) is positive sign and statistically significance for Ethiopia, while it is negative sign and no statistically significance in Uganda.

Table 4.13: Long run estimation results, ARDL (Uganda)

Variables	Cof.	Std. Err.	T	P>t	[95%Conf. Interval]
Gdppc	0.0003591	0.0001326	2.71	0.019	0.0000701 0.0006481
lnOpen	0.3811172	0.2018807	1.89	0.083	-0.058743 0.8209774
Gini_mkt	-0.0457122	0.0819394	-0.56	0.587	-0.2242429 0.1328185
Va	1.006933	0.2454997	4.10	0.001	0.4720351.541831
Rl	-0.7485649	0.3479744	-2.15	0.053	-1.506736 0.0096061
Rq	0.3761123	0.4022798	0.93	0.368	-0.500381.252605
Ge	0.501973	0.4800947	1.05	0.316	-0.54406351.548009
PS	-0.3710699	0.1449156	-2.56	0.025	-0.6868137-0.055326

Source: Model result

Note: ARDL (1 1 1 2 1 2 4 1 1) based on AIC

When we compare the ARDL model result of institutional quality variables for both Ethiopia and Uganda, the results of regulatory quality (Rq) and government effectiveness (Ge) are insignificant and consistent in both countries in the long run. Whereas variables such as voice and accountability (Va), rule of law (Rl) and political stability and absence of violence/terrorism are more significant for Ethiopia and Uganda, but except rule of law booth voice and accountability and political stability and absence of violence/terrorism have opposite signs as we found in Ethiopia.

Generally, according to ARDL regression result, Uganda had better to give great attention for rule of law and political stability and absence of violence /terrorism in order to reduce the adverse impact of income inequality on the enhancement of income redistribution in the long run.

Table 4.14: Error correction estimation results ARDL (Uganda)

ECM(-1)	-0.6537046	0.1752285	-3.73	0.003	-1.035495 -0.2719145
GDPpc(-1)	-0.0005203	0.0002087	-2.49	0.028	-0.000975-0.0000656
Rq (-1)	0.56201	0.2871246	1.96	0.074	-0.06358071.187601
Ge (-1)	-.4275714	.2716902	-1.57	0.142	-1.019533 0.1643906
Dependent variable is income redistribution (Red)					

Source: Own calculation

As per table 4.14 shown above, the ECM permits that there is a long run co-integration among the given variables. The ARDL model result of coefficient of ECM is -0.654, which is negative, more significant and falls between zero and one. This value also tells that the economic system corrects/adjusts its previous period shocks (disequilibrium) at a speed of 65.4 percent (65.4%) for reaching in a long-term steady state. Therefore, based on the ECM results there will be a long run relationship between the institutional quality variables and the income inequality for Uganda.

In sum, when we try to compare the speed of adjustment for Ethiopia and Uganda how long it takes to return/correct the disequilibrium system to its equilibrium system in the long run is almost both have taken equal time for both countries (less than one year).

Table 4:15Three ways of Granger causality test (Ethiopia)

Dep variable	t-statistics	Granger/Wald test	Wald coeff test	Decision:
Red	RL_2, Rq_1 and Ge_2: are Significant	Ginim_mkt, RL and Ge: are Significant	Gini_mkt, RL Ge: are significant	RL Granger causes Red Gini-mkt Granger causes Red Ge Granger causes Red
GDPpc	Red_2,Gin-imkt_2 RL_2 and Ps_2 Are significant	Red, RL and Ps: are significant	Red, RL and Ps:are significant	Red Granger causes GDPpc RL Granger causes GDPpc Ps Granger causes GDPpc
lnOpen	GDPpc_2: Significant	GDPpc: significant	GDPpc: significant	GDPpc Granger causes lnOpen.
Gini-mkt	Red_1& _2, GDPpc_1&2, lnOpen_2, RL_1, Rq_2 and Ps_2: Are significant	Red, GDPpc lnOpen, RL, Rq and Ps: Are significant	Red, GDPpc, lnOpen, RL, Rq and Ps: are significant	Red Granger causes Gini-mkt GDPpc Granger causes Gini-mkt lnOpen Granger causes Gini-mkt RL Granger causes Gini-mkt Rq Granger causes Gini-mkt Ps Granger causes Gini-mkt
Va	Rq_1, Ge-1 &-2, And Ps_1:areSignificant	Rq, Ge and Ps: Are significant	Rq and Ps: are significant	Rq Granger causes Va Ps Granger causes Va
Rl	Lnopen-2, Rq-1&-2 And Ge-1:are Significant	Lnopen, and Rq are significant	Lnopen and Rq Are significant	Lnopen Granger causes Rl Rq Granger causes Rl
Rq	All variables are Significant except Ge.	All variables Are significant Except Ge	All variables Significant except Ge	All variables Granger cause Rq except Ge.
Ge	All variables Significant except Red.	All significant Except Red, GDPpc &Va	All significant Except Red, GDPpc &Va	All variables Granger cause Ge, except Red,GDPpc & Va.

Ps	Only Red, Rq and Ps are significant :	Only Red, Gini -mkt and Rq Significant	Only Red, Rq, Gini-mkt & Significant	Red Granger causes Ps Gini-mkt Granger causes Ps Rq Granger causes Ps

Source: model results

In the model for this study, there are existences of both unidirectional and bi-directional causalities between the given variables. Because of bulky results we cannot be presented the regression results for the readers.

4.3. Diagnostic Tests

The robustness of the model is checking by using diagnostic test. The model estimation is accomplished, it shall be checked the performance of the model whether it has succeeded the desired objectives. For the present study there are some common diagnostic tests such as serial correlation, functional form test, normality tests and hetroscedasticity tests will be performed.

Table 4:16: Outcomes for different diagnostic tests

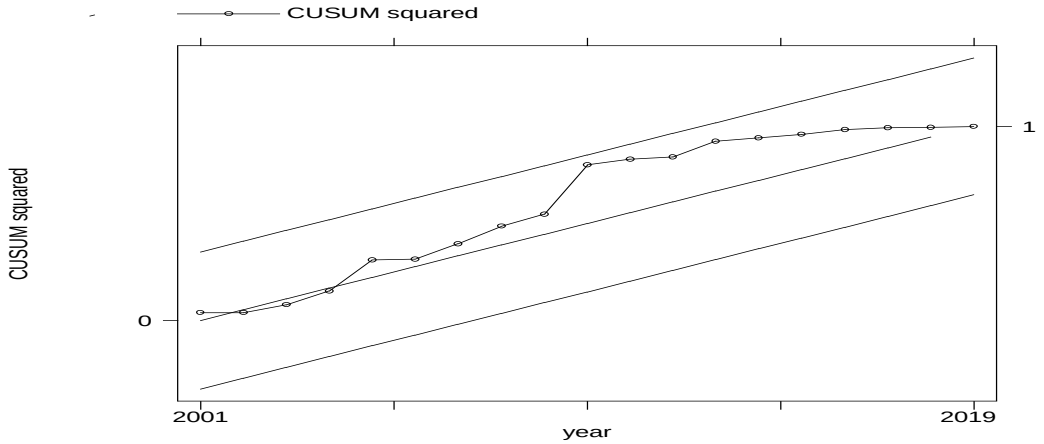
Tests	t-statistics	P-values
Functional form	F(1 24)= 9.73	0.0047
Hetroscedasticity (Whit's homoscedasticity)	26.00	0.4076
Breusch-Godfrey LM test for **serial correlation**	CHSQ(2)=17.638	0.0001
Ramsey's RESET using the square of the fitted values of Red.	CHSQ(2) = 3.78	0.0403
Durbin-Watson	D(11 26) =2.767	

Model stability: CUSUM Square test

The two parallel lines as shown below indicate that the 5% significant level of the model stability for Ethiopia. They are parallel and inside them there is a CUSUMSQ graph lies between two straight lines, therefore the null hypothesis is failed to reject (the model specification is correct), otherwise reject if the CUSUMSQ falls outside the two straight lines. This implies that the model is miss-specified, and lack of stability.

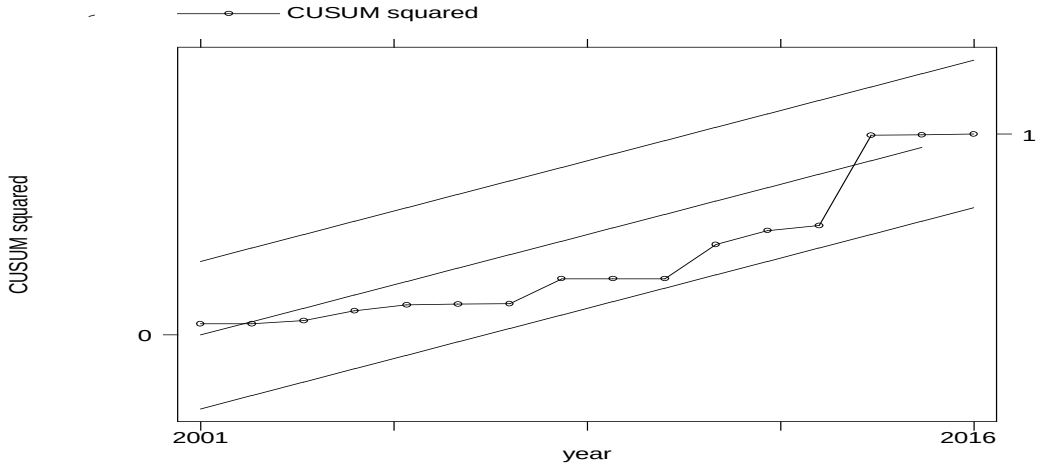
We concluded that the model for Ethiopia and Uganda are showing robust in the short run and long run estimations of the model and they cannot suffer from model instability,

Figure 4.10: Plot of Cumulative Sum of Squares of Recursive Residuals (Ethiopia)



Source: Model result (Ethiopia)

Figure 4.11: Plot of Cumulative Sum of Squares of Recursive Residuals



Source: model result (Uganda)

CHAPTER FIVE

5. CONCLUSIONS AND POLICY IMPLICATIONS

5.1. Summary and Conclusions

The paper attempts empirically to investigate the impact of institutional quality on income inequality and to examine the implications of institutional quality indicators in addressing income inequality in Ethiopia and Uganda by using annual time series data from 1991 to 2019. In order to examine the existence of co-integration among the variables we used ARDL bounds co-integration test approach. The ARDL is used to investigate the short run and long run relationship between the institutional quality and income inequality for both countries.

The study also describes empirically as follows; the estimated mean/average) values of institutional quality variables such as voice and accountability (Va), rule of law (Rl), regulatory quality (Rq), government effectiveness (Ge), political stability and absence of violence/terrorism (Ps) and control of corruption (Cc) for Ethiopia is less than the average values of Uganda except control of corruption which is greater for Ethiopia than Uganda over the period. From these average results we concluded that Uganda performs better in terms of institutional quality, but among the average values of institutional quality indicators Ethiopia performs better only in terms of control of corruption.

The trends of income inequality for both countries, in terms of income inequality (Red) in Ethiopia indicating that income inequality for Ethiopia looks stable than Uganda, as we mentioned in the literature part, in Ethiopia the majority people are living in rural areas and they have similar incomes across every regions than people living in urban areas, income inequality in across the urban society are moving up while the average income inequality for Ethiopia is still lower than Uganda, this is due to the dominant people are living in rural areas and have similar living standards in Ethiopia, the average income inequality is still pretty and that is why the average value of income inequality is lower than that of Uganda. Moreover, the trends of market income

inequality for both countries are indicating that the proportionate of incomes acquired by the richest 1% of the population in the countries. Therefore based on the results, currently market income inequality in Ethiopia is indicating more variability than Uganda.

The trends of rule of law and regulatory quality have been increasing on average for Uganda over the given period. While the study tries to compare the trends of voice and accountability, government effectiveness, political stability and absence of violence/terrorism and control of corruption on average both countries are at a good conditions. For Ethiopia, currently the trends of voice and accountability, government effectiveness and control of corruption have showing a better performance during the sample periods.

Based on the ARDL model long run estimated results, our findings of institutional quality indicators especially voice and accountability and rule of law, they revealed that statistically and more significantly reduce income inequality for Ethiopian the long run relative to macroeconomic variables that are selected by the researchers for using the study. We find that regulatory quality and government effectiveness are not significant impact on income inequality in the long run for Ethiopia. Likewise we find that among the institutional quality indicators that is political stability and absence of violence/terrorism has been impacting on income inequality positively in the long run and its implication is not reduce income inequality in Ethiopia.

As per the ARDL regression results for Uganda, our findings confirm that among institutional quality indicators such as rule of law and political stability and absence of violence/terrorism statistically and significantly reduce income inequality in Uganda. Furthermore, we find that no significant impacts on income inequality in Uganda, namely market income inequality, regulatory quality and government effectiveness.

The sign and magnitude of the coefficient of error correction term is found appropriate value and its duty is to adjust the long run equilibrium. The speed of adjustment values for Ethiopia and Uganda are-0.7646395 and -0.6537046 respectively, the implications of these values are approximately 76.5 and 65.4 percents deviations from the long run equilibrium are adjusted every

year for both countries. But the remaining fractional amounts such as 23.5 and 34.6 percents will be adjusted for the coming year.

Generally our findings such as GDP per capita trade openness, rule of law, regulatory quality and government effectiveness are consistent with the results of Uganda, but the remaining others are varying

5.2. Policy Implications

The study has positive implications for policy and future researches in the area of quality of institutions for economic development, dynamics of income inequality and the redistribution of income in Ethiopia and Uganda. If the government plans to reduce income inequality by using institutional arrangements which is imperative in the country, therefore, the government shall be given great attention to incorporate those institutional quality indicators particularly such as voice and accountability and rule of law good for the country's income inequality reduction. In addition, the country has more expected to do on political stability and absence of violence/terrorism in order to reduce income inequality.

Ethiopia has threatened by different economic, social and political aspects as well as absolute poverty and disparity of income among the society due to lack of quality institutions, even if in the country the level of income inequality is lower as well as economic growth is satisfactory but it may benefits the poor much less than the non-poor. The impact related to income inequality and lack of existing quality institutions that are retarding the pace of income redistribution, economic growth and development in the country.

Currently Ethiopia needs quality of institutions that might be reduced unequal distribution of economic outcomes as well as political tensions which are bad for economic growth and income distribution in the long run, it is the fact that without having better institutions that enhance economic development and shifting market income from those at the top of the income scale to those at the bottom are not projected smoothly, so the government efforts on institutional reforms.

There is a crucial economic policy used as an instrument for both managing income inequality and to make more equal distribution of resources, that may be good for economic development and social cohesion in both countries, which is income redistribution through progressive taxation and income transfer to the poorest segment of society are most direct way to keep control income inequality, thus it has also policy that helps narrowing the gap between the poor and the rich in the future in countries with high income inequality through income redistribution from the richest to the poorest in the long run; which is a good policy implication for the government of Ethiopia and Uganda.

In general we suggest that the government efforts shall be more dedicated to the preventing exploitation of the poor by the richest elites in the economic bargaining process to guarantee equal distribution of national economic outcomes and decrease economic discriminations in Ethiopia and Uganda. All in all it is important and necessary to strengthen the existing institutions.

5.3. Limitations of this Paper and Areas for Future Research

The major drawback of this thesis is some main variables are not included in the study such as Gini coefficient of Ethiopia, due to lack of secondary data in the country and one of the institutional quality indicators which is control of corruption is not consistently go along with our study, this is due to co-linearity problems, thus future research shall be minimized this limitation by using primary data for both Gini coefficient and by changing model for control of corruption.

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Appendices

Appendix 1.Augmented Dickey-Fuller Test of Unite Root (Stationarity test

I. Red in level form

```
Dickey-Fuller test for unit root                    Number of obs   =        28

                                 ------------ Z(t) has t-distribution ------------
                      Test       1% Critical       5% Critical      10% Critical
                    Statistic       Value             Value            Value
------------------------------------------------------------------------------
 Z(t)                -1.844          -2.479            -1.706           -1.315
------------------------------------------------------------------------------
p-value for Z(t) = 0.0383
```

II. Red after first difference (intercept)

```
Augmented Dickey-Fuller test for unit root          Number of obs   =        26

                                 ------------ Z(t) has t-distribution ------------
                      Test       1% Critical       5% Critical      10% Critical
                    Statistic       Value             Value            Value
------------------------------------------------------------------------------
 Z(t)                -4.012          -2.500            -1.714           -1.319
------------------------------------------------------------------------------
p-value for Z(t) = 0.0003
```

III. Red after first difference (intercept and trend)

```
Augmented Dickey-Fuller test for unit root          Number of obs   =        26

                                 ------------ Interpolated Dickey-Fuller ---------
                      Test       1% Critical       5% Critical      10% Critical
(0)                 Statistic       Value             Value            Value
------------------------------------------------------------------------------
 Z(t)                -4.059          -4.371            -3.596           -3.238
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0072
```

IV. GDPpc after difference

```
Dickey-Fuller test for unit root                    Number of obs   =        27

                                 ------------ Z(t) has t-distribution ------------
                      Test       1% Critical       5% Critical      10% Critical
                    Statistic       Value             Value            Value
------------------------------------------------------------------------------
 Z(t)                -3.099          -2.485            -1.708           -1.316
------------------------------------------------------------------------------
p-value for Z(t) = 0.0024
```

V. GDP per capita after first difference

Dickey-Fuller test for unit root — Number of obs = 27

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-4.776	-4.362	-3.592	-3.235

MacKinnon approximate p-value for Z(t) = 0.0005

VI. Lnopen at level

Augmented Dickey-Fuller test for unit root — Number of obs = 27

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-5.038	-4.362	-3.592	-3.235

MacKinnon approximate p-value for Z(t) = 0.0002

VII. Ge at level

Dickey-Fuller test for unit root — Number of obs = 28

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Z(t) has t-distribution		
Z(t)	-3.265	-2.479	-1.706	-1.315

p-value for Z(t) = 0.0015

VIII. RL at leve

Augmented Dickey-Fuller test for unit root — Number of obs = 27

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-3.259	-4.362	-3.592	-3.235

MacKinnon approximate p-value for Z(t) = 0.0733

Appendix2. Outcomes of ARDL Bounds test co-integration (Ethiopia)

```
Pesaran/Shin/Smith (2001) ARDL Bounds Test
0): no levels relationship                F =  11.341
                                          t = -5.383

Critical Values (0.1-0.01), F-statistic, Case 3

        |  [I_0]    [I_1]  |  [I_0]    [I_1]  |  [I_0]    [I_1]  |  [I_0]    [I_1]
        |    L_1      L_1  |    L_05     L_05 |   L_025   L_025  |    L_01     L_01
--------+--------------------+--------------------+--------------------+-------------
  k_8   |   1.95     3.06  |   2.22     3.39  |   2.48     3.70  |   2.79     4.10
ccept if F < critical value for I(0) regressors
eject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), t-statistic, Case 3

        |  [I_0]    [I_1]  |  [I_0]    [I_1]  |  [I_0]    [I_1]  |  [I_0]    [I_1]
        |    L_1      L_1  |    L_05     L_05 |   L_025   L_025  |    L_01     L_01
--------+--------------------+--------------------+--------------------+-------------
  k_8   |  -2.57    -4.40  |  -2.86    -4.72  |  -3.13    -5.02  |  -3.43    -5.37
ccept if t > critical value for I(0) regressors
eject if t < critical value for I(1) regressors
```

Appendix 3. Outcomes of ARDL Bounds test co-integration (Uganda)

```
Pesaran/Shin/Smith (2001) ARDL Bounds Test
H0: no levels relationship                F =  5.009
                                          t = -3.731

Critical Values (0.1-0.01), F-statistic, Case 3

        |  [I_0]    [I_1]  |  [I_0]    [I_1]  |  [I_0]    [I_1]  |  [I_0]    [I_1]
        |    L_1      L_1  |    L_05     L_05 |   L_025   L_025  |    L_01     L_01
--------+--------------------+--------------------+--------------------+-------------
  k_8   |   1.95     3.06  |   2.22     3.39  |   2.48     3.70  |   2.79     4.10
accept if F < critical value for I(0) regressors
reject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), t-statistic, Case 3

        |  [I_0]    [I_1]  |  [I_0]    [I_1]  |  [I_0]    [I_1]  |  [I_0]    [I_1]
        |    L_1      L_1  |    L_05     L_05 |   L_025   L_025  |    L_01     L_01
--------+--------------------+--------------------+--------------------+-------------
  k_8   |  -2.57    -4.40  |  -2.86    -4.72  |  -3.13    -5.02  |  -3.43    -5.37
accept if t > critical value for I(0) regressors
reject if t < critical value for I(1) regressors

k: # of non-deterministic regressors in long-run relationship
Critical values from Pesaran/Shin/Smith (2001)

.
```

Appendix 4. Error correction estimation of ARDL model (Ethiopia)

Sample: 1994 - 2019	Number of obs	=	26
	R-squared	=	0.8763
	Adj R-squared	=	0.7938
Log likelihood = 69.202928	Root MSE	=	0.0222

D.red2	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ADJ						
red2						
L1.	-.7646395	.1420526	-5.38	0.000	-1.067417	-.4618616
LR						
gdppc	.0004263	.0001134	3.76	0.002	.0001845	.0006681
ln_OPEN2	.4110244	.0869498	4.73	0.000	.2256952	.5963535
gini_mkt2	.0619619	.0137594	4.50	0.000	.0326344	.0912894
va2	-.3397216	.1311011	-2.59	0.020	-.619157	-.0602862
rl2	-.4110662	.1477678	-2.78	0.014	-.7260259	-.0961065
rq2	.2950863	.1726123	1.71	0.108	-.0728281	.6630007
ge2	-.128915	.0823931	-1.56	0.139	-.3045317	.0467017
ps2	.2578506	.0454711	5.67	0.000	.1609313	.35477
SR						
rl2						
D1.	.1828804	.0824605	2.22	0.042	.0071201	.3586407
_cons	-.1055123	.549925	-0.19	0.850	-1.27765	1.066625

.

Sample: 1995 - 2019	Number of obs	=	25
	R-squared	=	0.7947
	Adj R-squared	=	0.5894
Log likelihood = 52.559298	Root MSE	=	0.0427

D.REDu	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ADJ						
REDu						
L1.	-.6537046	.1752285	-3.73	0.003	-1.035495	-.2719145
LR						
gdppc	.0003591	.0001326	2.71	0.019	.0000701	.0006481
ln_Open2	.3811172	.2018807	1.89	0.083	-.058743	.8209774
Gini_mktu	-.0457122	.0819394	-0.56	0.587	-.2242429	.1328185
AVu	1.006933	.2454997	4.10	0.001	.472035	1.541831
RLu	-.7485649	.3479744	-2.15	0.053	-1.506736	.0096061
RQu	.3761123	.4022798	0.93	0.368	-.50038	1.252605
GEu	.501973	.4800947	1.05	0.316	-.5440635	1.548009
PSu	-.3710699	.1449156	-2.56	0.025	-.6868137	-.055326
SR						
gdppc						
D1.	-.0005203	.0002087	-2.49	0.028	-.000975	-.0000656
RQu						
D1.	.56201	.2871246	1.96	0.074	-.0635807	1.187601
GEu						
D1.	-.4275714	.2716902	-1.57	0.142	-1.019533	.1643906

Appendix.5. Error correction estimation of ARDL model (Uganda)

.

Sample: 1995 - 2019			Number of obs	=	25
			R-squared	=	0.7947
			Adj R-squared	=	0.5894
Log likelihood = 52.559298			Root MSE	=	0.0427

D.REDu	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ADJ						
REDu						
L1.	-.6537046	.1752285	-3.73	0.003	-1.035495	-.2719145
LR						
gdppc	.0003591	.0001326	2.71	0.019	.0000701	.0006481
ln_Open2	.3811172	.2018807	1.89	0.083	-.058743	.8209774
Gini_mktu	-.0457122	.0819394	-0.56	0.587	-.2242429	.1328185
AVu	1.006933	.2454997	4.10	0.001	.472035	1.541831
RLu	-.7485649	.3479744	-2.15	0.053	-1.506736	.0096061
RQu	.3761123	.4022798	0.93	0.368	-.50038	1.252605
GEu	.501973	.4800947	1.05	0.316	-.5440635	1.548009
PSu	-.3710699	.1449156	-2.56	0.025	-.6868137	-.055326
SR						
gdppc						
D1.	-.0005203	.0002087	-2.49	0.028	-.000975	-.0000656
RQu						
D1.	.56201	.2871246	1.96	0.074	-.0635807	1.187601
GEu						
D1.	-.4275714	.2716902	-1.57	0.142	-1.019533	.1643906

Appendix6. Post Estimation Diagnostic Tests

```
 estat dwatson

urbin-Watson d-statistic( 11,    26) =   2.76699

 estat bgodfrey, lags(2)
```

```
. estat bgodfrey, lags(2)

Breusch-Godfrey LM test for autocorrelation
```

lags(p)	chi2	df	Prob > chi2
2	17.638	2	0.0001

H0: no serial correlation

```
. estat imtest, white

White's test for Ho: homoskedasticity
          against Ha: unrestricted heteroskedasticity

          chi2(25)      =     26.00
          Prob > chi2   =    0.4076
```

```
. estat imtest
Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	26.00	25	0.4076
Skewness	16.91	10	0.0765
Kurtosis	0.02	1	0.8767
Total	42.93	36	0.1985

```
. estat hettest, normal

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of red2

         chi2(1)       =     5.42
         Prob > chi2   =   0.0200
```

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of red2
       Ho:  model has no omitted variables
                  F(3, 12) =      3.78
                  Prob > F =      0.0403
```