Relationship between External Debt, Institutional Quality and Economic Growth: *In Selected East African Countries (Panel Data Analysis)*

A Thesis Submitted to the School of Graduate Studies of Jimma University for Partial Fulfilment of the Award of the Degree of Masters of Science (MSc) in Development Economics

BY:

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COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

JUNE 14, 2021

JIMMA, ETHIOPIA

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DECLARATION

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SCHOOL OF POSTGRADUATE

Relationship between external debt, institutional quality, and economic growth: *in selected East African countries (panel data analysis).*

By: Tola Alemu Degefa

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DECLARATION

I hereby declare that this thesis entitled *Relationship between external debt, institutional quality, and economic growth*: in selected East African countries (panel data analysis)*'*, has been carried out by me under the guidance of **Tekilu Tadesse (Assistant Professor) and Aleka Jeldu (MSc).**

The thesis is original and has not been submitted for the award of a degree or diploma in any university or institution.

Researcher's Name	Date	Signature
Tola Alemu	_____	_____

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''Let us be grateful to the people who make us happy. They are the charming gardeners who make our souls blossom''. Marcel Proust.

Above all, I am grateful to my heavenly father and immaculate Saint Merry; for all that you have done for me. Your love has never failed me in any way, despite all my shortcomings. Next, I am grateful to my main advisor Mr Tekilu Tadesse (Assistant Professor), for the rationality, valuable comments, and encouragement he gave to me and Co-advisor Mr Aleka Jeldu (MSc) for their constructive comments and research guidance. Truly thanks!

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ABBREVIATIONS AND ACRONYMS

AEO	Africa Economic Outlook,
ARDL	Autoregressive Distributive Lag
COMESA	Common Market for Eastern and South African countries
DEDH	Direct Effect of Debt Hypothesis
DOH	Debt Overhang Hypothesis
DFE	Dynamic fixed Effect
DGI	World governance indicators
EAC	Eastern Africa Countries
EDAR	Economic Development Africa Report
FE	Fixed Effect Model
EXD	External Debt stock
GCF	Gross capital formation
GDP	Gross Domestic Product
GMM	System Generalized Methods of Moments
GNI	Gross National Income
GNP	Gross National Product
HIPC	Highly Indebted Poor Country
IFC	International Financial Corporation
IMF	International Monetary Fund
IIF	Institutes of international finance
IDS	international debt statics
IQI	Institutional quality Index

LCH	Liquidity Constraint Hypothesis
LICs	Low-income countries
MENA	Middle East and North Africa
MDRI	Multilateral Debt Relief Initiative
MG	Mean group
PMG	Pooled Mean Group
RE	Random Effect Model
RGDP	Real Growth Domestic Product
SSA	Sub-Saharan Africa
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development programs
US	United State
WB	World Bank
WDI	World Development Indicators
WGI	World Governance Indicator

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Abstract

This study examines the Relationship between external debt, institutional quality, and economic growth in selected East African countries by using heterogeneous panel Autoregressive distributed lag (ARDL) model through pooled mean group (PMG) estimator for six countries over periods of 22 years starting from 1998-2019. Study employed fully modified panel least square to check the robustness of the estimate. We found that external debt stock as a percentage of GNI has a significant positive relationship on economic growth in the long run; whereas its square has a significant negative relationship with economic growth implying that there is a non-linear relationship and its positive effect exert on economic growth is up to 62.9% threshold level. The speed at which disequilibrium occurred in short run returns to long-run equilibrium is by 45.5 % as indicated by the coefficient of the error term. Moreover, we found that the indirect impact of institutional quality interacted with external debt has a significant positive impact on economic growth; which indicates that the negative effect of external debt on economic growth reduced as the quality of institutions improved in the region. This confirmed that the external debt economic growth relationship is the function of institutional quality; and improvements of institutional quality contribute to growth positively when above 1.72 threshold level. Consequently, the inclusive improvement of the status of institutional quality is necessary not only in reducing the deleterious impact of external debt but also in providing efficient benefits of governments borrowing, and the governments should reduce unproductive expenditure and to maintain proper fiscal management to stabilize the external debt.

***Key Words**: External debt, Institutional quality, Economic Growth, East Africa*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The term ‘External debt is a portion of a country's debt that is borrowed from foreign lenders, including commercial banks, governments, or the international financial institutions, and payable to non-residents which is repayable in currency, goods, or services. It is the sum of public, publically guaranteed and private nonguaranteed long-term debt and short-term debt ’World Bank, (2020). This external debt is a basic component for the capital formation in the Solow growth model, which indicates that the reasons why most of the developing countries borrowing from abroad (Martins and Villanueva, 2003). The attainment of growth and development of every economy cannot be understood without a contribution of capital formation, since debt or borrowing a means to boost domestic saving to enhance investment and finance development of any economy (Naeem et al., 2016). This capital formation through borrowed money can enhance economic growth when they invested it properly with a certain limit (certain point) otherwise it have a negative economic impact if not carefully used for the intended purpose beyond the stated point (Griffin and Enos, 1970).

At global level, following a debt crisis of 1980 the level of debt which implies both public and private is continuously raising up and even after the debt cancellation under the heavily indebted poor countries (HIPC) initiative and multilateral debt relief (MDR) initiative of 1996. Currently, the International monetary fund (IMF) and world bank stated that half of the low-income countries were highly indebted even though the large debt relief was granted for a low-income country under the initiative of heavily indebted poor countries and multilateral debt relief initiative between 2000 and 2012 (Berensmann, 2019).

According to World Bank, (2020), ‘the global debt stock at the end of 2018 was $188 trillion. And in low-income countries, total debt rose by 1.3 as a percentage of GDP in 2019 (IMF, 2019). This increase in global debt came from a higher public debt in emerging economies and advanced economies. Furthermore, the long-lasting internal and external problems for developing countries were the most significant causes of debt accumulation. This situation is common in low-income countries in African and this current condition is

unique from previous debt crises particularly for the creditors who had been involved mainly a granted non-concessional loans and not concessional loans (Berensmann, 2019). Moreover, sub-Saharan countries in general and eastern Africa countries in particular, were accumulated external debt rapidly than low income and middle-income countries in other regions of Africa (World Bank, 2020). The annual external debt stock average of African countries started from 2011-2013 was amounted to be $443 billion, $535 Billion in 2017. Currently, Africa has the largest share of a global debt due to the government and companies continuing to spend in response to the covid-19 pandemic (International Institutes of Finance, 2020).

The reason behind the rise of external debt burden in Africa was due to large currency depreciation against the U.S. dollar since 2014 and more in the year of 2019 due to the corona virus outbreak, which is the need to spend more finance by governments to save the life of civilian during the lockdown in Africa. As a result, most of the governments in Africa are forced to run wide fiscal deficits that are slowly translating into increasing debt and debt distress (COMESA, 2020). On another hand, as many African countries accessed to international capital markets over the last decade, their external debt also increased, with the composition of debt shifting toward higher-priced non-concessional financing. In addition to this, in SSA countries the ratio of external debt-to-GNI increased to 34.2 percentages in 2017 compared to 32 percentages in 2016 on average. Similarly, at the beginning of 2018 54 percentages of countries in the region had an external debt-to-export ratio over 150 percentages, as compared to 28 percent of countries in 2010 and the number of countries where the ratio outshined 200 percentages more than doubled with the same time from six countries to 14 countries. According to IMF, (2021), when compare this value with the debt burden threshold level determined by IMF (which is less than 140 as weak, greater than 140 to 180 as medium and up to 240 as strong debt burden of external debt as export ratio) was in the middle of debt burden. However, in 2019 external debt as percentage of GNI are 37.7 excluding high income countries according to World Bank report. On the other hand, for low and middle-income countries as a whole, the level of debt as a percentage of GNI is 25.9 in 2019. Moreover, in the same year, one-third of the countries in the region possessed a debt service-to-export ratio above 10 percentages (African Development Bank, 2018).

More specifically, external borrowing from different countries particularly from China has been on a raising stage in East Africa region considerably which is amounted to be in Djibouti 57 percent, Ethiopia 32 percent, Kenya 27 and Zambia 26 percent (Brautigam et

al., 2020). Even if some of the countries in eastern Africa have better performance in the level of debt distress than other regions of sub-Saharan countries. However, some countries in the region such as Ethiopia and Djibouti have been at high risk of debt distress since 2016. Even for some countries in the region, the increase was much larger, between 2010 and 2017 external debt stocks rose more than 200 percent in Ethiopia, Rwanda, Uganda, and Zambia and by more than 140 percent in Kenya (World Bank, 2018). Currently, five Eastern African countries Kenya, Tanzania, Uganda, Burundi, and Rwanda have accumulated more than $100 billion in domestic and foreign debt together. Among this countries Kenya and Burundi have the highest loan distress profiles relative to their EAC peers; with their debt to gross product ratio outshined 60 percent (African Development Bank, 2019).

On contrary, most of the time many developing and low-income countries were require external borrowing to achieve their planned development objectives and to increase investment in infrastructure which is critical for achieving sustained economic growth and augmenting their saving (Akanbi, 2014). This gives clue that; the final objective of the every economic policy is to attain a high and stable economic growth. Moreover, in developing countries, foreign borrowing is considered as an important resource for financing economic growth (Doğan and Bilgili, 2014). This shows that external debt may not be a big problem if the borrowed funds are invested in a sustainable project and growth is high enough to repay the debt as well as finance additional investment demand (African Development Bank, 2018).

However, in the case of eastern Africa, this has not been common, in which the world low-income countries were found. The study conducted by Naeem et al., (2016) shows that excessive accumulation of external debt harms economic growth through depressing long-run capital formation, which is an essential variable in the Solow growth model to attain sustained economic development. Particularly in emerging markets, public debt has the same conditions as during the debt crisis of 1980 which a sharp increase in their debt burden (IMF, 2019). This high debt burden can be very hard for having financial stability and result in the crowd out effect on investment which influences economic growth. So over the past decades, the general economic situations are turning less favourable, with growth slowing down, especially in oil and mineral exporting countries in sub-Saharan in general and eastern Africa in specific (Zamfir, 2016). The East Africa (EA) economic growth which was the part of sub-Saharan continued to deteriorate, mainly due to lower commodity prices, agricultural vulnerability, heavy reliance on primary commodity export, and persistent current account

deficit which leads to more increase in the level of external indebtedness (African Development Bank, 2019).

In addition to examining the issues of external debt and economic growth the issue of institutional quality for borrowing nation are becoming the important tools nowadays. The standard policy which was adopted by international monetary fund was good governance which enables governments to handle their debt management inadequacies and to promote debt management transparency (Ouedraogo, 2015). This implies that having good institutional quality indicators enables the borrower to control debt misuse and contribution for economic growth. Specifically, the differences in economic institutions have been found to illuminate the discrepancies in growth among different economies Aswata et al., 2018; Qayyum et al., 2014). Similarly, Abera and Mulugeta, (2018); North, (1990) explained that the improved level of institutional quality promotes economic development through a systematic transformation of the environment to becoming a favourable condition for economic growth.

Furthermore, different empirical studies were conducted at different time to examine the role of institution in growth model. Among them studies by Adigozalov and Rahimov, (2015); de Almeida, (2020); Lau et al., (2014) maintains that economic growth depends largely on the availability of and the environment of institutions conditions, which protect property rights, and individual freedoms, guarantee protection from external shocks, and essential for proper policy formulation. In the hot debate current existing between economic growth and external debt, the quality of institutions can give the way for efficient use of funds, thereby contributing to the total output. There are different countries which employed foreign loans properly for investment purpose with the improved institutional infrastructures to improve their economies among them South Korea and Taiwan are examples of such economies (Rodrik et al., 2004).

Therefore, this study examine that the effect of external debt on economic growth and the role of institutions played to mediate the impact of external debt on growth for selected east African countries. This study was motivated by due to the decreasing economic performance, the accumulation of large external debt stock, and growing concern and non-agreement among different scholars on the impact of debt on growth. This suggests the importance of further study on the impact of external debt on economic growth with the role played by institutional quality.

1.2 Statement of the Problem

From the beginning of the global debt crisis of 1980 to till now, the global debt stock as a whole and for African countries was continuous to be rose (IMF, 2019, UNCTAD, 2016). Nowadays, the effect of external debt on economic growth is one of the major areas of hot debate among different researchers and policymakers, and no clear consensus among the school of economics thought (the Keynesian, classical economists which argue that debt increases transitional growth and endogenous growth model argue that even though a reduction in public debt enhances the rate of economic growth, it cannot be Pareto-improving). Regarding these two macroeconomic variables, different studies were conducted by using different econometric models to examine the relationship between them; however, they failed to put down a convincing finding of their relationship. This non-consensus among researchers and policy designers made the issue of debt and economic growth to be more open for further studies.

In the context of Africa, there are the high burdens of external debt; this high level of external debt was due to the reduced export revenue and a massive current account deficit with the lower economic growth (UNCTAD, 2016). Specifically, The cause of having this high level of external debt for sub-Saharan countries is due to undiversified export base, and due to complex governance and instability problems, (Seid, 2017). However, a level of indebtedness concerning the east African nation was due to having lower commodity prices, agricultural vulnerability and heavy reliance on primary commodity export, and the persistent current account deficit, attributed to weak institutions prevailed in the region, which leads to more increase in the level of external indebtedness (African Development Bank, 2019, Aswata et al., 2018).

There is empirical evidence, which shows the relationship between external debt and economic growth was negative, positive, and mixed at some level. The study conducted by Gövdeli, (2019) Jayaraman and Lau, (2009); Okoye et al., (2017); Spilioti and Vamvoukas, (2015) and Musibau et al., (2018), found that there was a positive relationship between external debt and economic growth. However, another study conducted by Ejigayehu, (2013); Fosu, (1999); Gachunga, (2018); Mohd Daud, (2020); Senadza et al., (2017) and (Al Kharusi and Ada, (2018); Getinet and Ersumo, (2020); Moh'd AL-Tamimi and Mohammad, (2019) found that the external debt has a deleterious impact on economic growth. Similarly, a study by Udoh et al., (2020) by applying the ARDL model and found the negative effect of

intergenerational debt burden on economic growth in Nigeria, and a study by Awan and Qasim, (2020) found that external debt has negative contribution on economic growth of Pakistan by using ARDL time series approach.

Moreover, the relationship between external debt and economic growth was not confirmed to be a linear relationship in literature. This leads to a disagreement among different scholars on the effect of external debt on economic growth. There was some study that confirmed that the relationship between external debt and economic growth is positive up to a certain point and negative beyond it is a threshold which indicates that non-linearity. Therefore, there is no clear consensus on the functional form of debt growth relation in the literature they end up with inconclusive result this open the area for further studies. The early study by Griffin and Enos, (1970) in the area confirmed that the effect of external debt on economic growth is nonlinear. Likewise, studies by Chigeto, (2017; Doğan and Bilgili, (2014); Égert, (2012); Hassan, (2020); Kaur et al., (2014); Megersa, (2015); Mencinger et al., (2015); Pattillo et al., (2002); Reinhart and Rogoff, (2010); Swastika et al., (2013) and (Tefera, 2019) concluded that there is a non-linear relationship between external debt and economic growth. This implies that external debt has a positive effect on economic growth at a moderate level when they used the borrowed fund properly and has a deleterious impact on economic growth when they become over accumulated after a certain point.

In contrast to this, other non-linearity test studies by Senadza et al., (2017) and Herndon et al., (2014) noted that there is linear impact of external debt on economic growth. However, these studies did not carry about the contingency role of institutional quality in the mediation of this problem and they did not employ panel nonlinear model which used to analyse properly asymmetric (non-linearly) relationships.

In addition to this, the relationship between external debt and economic growth has a time-varying effect, differs across sample and differences across countries. There was a study conducted by Swastika et al., (2013) found that the effect of external debt on economic growth has time-varying nature on growth. The study by Herndon et al., (2014) and Gómez-Puig and Sosvilla-Rivero, (2015) states that the relationship between public debt and economic growth varies across time horizons and countries. Another study by Égert, (2012), displayed that the debt threshold level can be lower and the nonlinearity can change among samples and specifications. Such contradictions among researchers suggest that there is room for further studies to contribute to the existing literature in this area of hot debate. Therefore,

this study incorporated the recent data to analyse the effect of external debt on economic growth in selected eastern Africa countries with the role of institutional quality between nexus.

What has been analysed so far, most of them were not able to include the role of institutional quality in their debt and economic growth relation analysis particularly in eastern Africa. According to the economic theory of the Solow model, and the endogenous growth model and its extensions, they assume that distributive policies and institutional quality have important contribution for income to converge from former divergence (Daud and Podivinsky, 2014; Law et al., 2018). Furthermore, the international monetary fund reported that the challenge one must be considered in debt initiative was the quality of the political environment, the government legislation, the institutional framework, and the accessibility of basic services (IMF, 2013). This suggests that the importance of institutional quality to know the impact of external debt on economic growth analysis.

There is some empirical evidence regarding the role of institutional quality on the debt economic growth effect. Those are studies conducted by both Imbs & Ranciere, (2005) which states that relevant institutions playing their role in the regulatory framework and could lower the probability of a debt overhang but he did not say anything about the interaction effect of institutional quality on an external debt he controls for a variable. The study by Sani et al., (2019) found that the impact of public debt, institutional quality on the economic growth of sub-Saharan African countries have both direct and direct effects on economic growth. However, he did not state the functional relationship of debt and economic growth with institution variable inclusion. A study by Pattillo et al., (2004) states that the channel through which external debt affects economic growth is through the quality and efficiency of the investments than it is level but he failed to include the role of institutional quality.

On the other hand, the study conducted in financial analysis by Kirch and Terra, (2012) stated that the level of institutional quality of countries has a significant impact on the long-run debt of the firm's financial structure; thus suggesting that it is an important determinant of corporate financing and debt maturity. In contrary to this, the study by Cordella et al., (2010) states that having good institutional and good policies does not guarantee to have less debt overhang situation, countries with good policies and institutions still experience negative effects of external debt (a strong debt overhang position). In a

country with bad policies, the debt threshold is lower, but the evidence of debt overhang is weaker (Cordella et al., 2010).

According to Mohd Daud, (2020) a debt overhang is less likely to occur with a good effective governance environment and a better legal and contractual environment, and at an extreme level of external debt; the impact of institutional quality on growth is too small. The study conducted by Hassan, (2020) using annual secondary data between 1985 and 2017 for thirty sub-Saharan countries by using dynamic panel ARDL concluded that there is external debt hurts economic growth beyond the threshold; however, the negative effect is improved by institutional quality. In addition to this study by Aswata et al., (2018) examined that the relationship between public debt, corruption, and investment by using a panel of four east African countries by employing the ARDL panel. He confirmed that public debt crowds out both private domestic investment and foreign direct investment in the long run. This study failed to analyse the composite index institutional quality with external debt nexus economic growth it focused on the impact on investment.

The problem of having poor economic growth leads to external indebtedness in most developing countries in general and eastern Africa in particular. Therefore, the medium through which external debt affects economic growth could be observable to the poor economic mismanagement generated by the poor institutional quality. This requires a systematic study to stress the role of institutional quality on the debt-growth relationship, particularly in eastern Africa where the external debt crisis has been a remaining issue over the years. Most of the studies in the literature of east Africa were used a different dynamic model to analyse the non-linearity relationship between this variable. However, they did not employ the ARDL model which is used to analyse properly asymmetric relationships. Generally, to the best of my knowledge, none of the researchers has been conducted a study on external debt, institutional quality, and economic growth for eastern African countries using a heterogeneous panel ARDL approach. Therefore, this study analyse the role of institutional quality in external debt economic growth nexus by using a principal component index for institutional quality in selected eastern African countries to fill this time, knowledge and methodological gap across the region.

1.3 Research Questions

- Does the relationship between external debt and economic growth for EA countries are non-linear?

- ❖ Does the rapid external debt accumulation affect economic growth in Eastern Africa countries?
- ❖ What is the role of institutional quality in the nexus between external debt and economic growth?

1.4 Objectives of the Study

1.4.1 General Objective of the Study

This study investigates the relationship between external debt, institutional quality, and economic growth in selected eastern Africa countries.

1.4.2 Specific Objectives

- ➢ To examine a functional relationship between external debt and economic growth in selected eastern African countries.
- ➢ To show whether external debt-economic growth relationship is the function of institutional quality in eastern Africa countries.
- ➢ To recommend appropriate policy implication in the region.

1.5 Significance of the Study

The issues of indebtedness have been a serious economic problem in most developing countries in general and Eastern Africa countries in particular. Moreover, because of this, the burden of external debt has been a matter of great concern to the government of all nations in Eastern Africa countries for their fiscal policy formulation. Therefore, this study analyse the effect of institutional quality on the debt economic growth relationship which increases better understanding in the area for policy designers. But, previous studies were attempted to explain the effect of external debt on economic growth in the area but they failed to address the contingency role of institutional quality in the debt economic growth relationships. Accordingly, the finding this study is helpful for a better understanding of the position of external debt in Eastern Africa countries and its impact on economic growth. In addition, the study is alarming for other concerned bodies and financial institutions in their respective area to take optimal action.

1.6 Scope and Limitation of the Study

The study is confined to analyse the effect of external debt on economic growth with the role of institutional quality in some selected eastern African countries. The study analysis the relation of this macroeconomics variable in this region with data covering a period of (22) from the 1998- 2019 time interval and six eastern African countries: Ethiopia, Kenya, Rwanda, Tanzania, Uganda, and Burundi which used as the proxy for the remain eastern African countries. This period and countries were chosen to consider recent times and according to data availability of these selected Eastern Africa countries. However, this study is confined to six east African countries did not consider all east African countries in the region due to the unavailability of data for some east African countries regarding some variables used in the study analysis. On other hand, this study also used three indicators of institutional quality indicators for the institutional index in the region but did not consider all institutional quality indicators but the study selected the most influential to the study. This may be the limitation of this study under the study periods.

1.7 Organization of the Study

This study comprises five chapters. Chapter one deal with the introduction of the study and chapter two encompass reviews of the related theoretical and empirical literature. Chapter three includes the methodology of the study and chapter four presents descriptive analysis and empirical result discussions. Lastly, chapter five concluded that the study with the main findings and forward some policy implications based on the finding.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This part briefly analysis some theoretical and empirical part related to the debt economic growth relationship of economic theories and role of institutions in mediating and improving economic growth.

2.1 Theoretical Literature Review

2.1.2 The Disincentive Theory

A) Debt Overhang Hypothesis Theories

Debt overhang is a situation in which a country's level of debt is much high than the debtor country loses it is the ability to attract the new investments due to the present inability to services or pay the current debt to the existing debt holder (Krugman, 1988). Moreover, this situation clarifies a view of the dropping of the investment returns fully into future debt servicing. He concluded that the current debt overhang has a negative relationship with economic growth through having a disincentive effect on investment by depressing future investors. Different scholars supported the theoretical bases of debt overhang. Among them were studied by Krugman, (1988) and Chowdhury, (2001) those who confirmed that the existence of a phenomenon of debt overhang theory and the direct effects of external debt which affect economic growth via its influence on the productivity of investment. And also study by Getinet and Ersumo, (2020) who examined the impact of public external debt on economic growth in Ethiopia by using time series analysis through ARDL approach over the period of 1983-2018 confirmed that there is the existence of debt over hang effect in country.

B) Debt Laffer curve

The ideology behind the debt Laffer curve was developed by the early supply-side economist of 1978 by Arthur B. Laffer and he used this concept in the tax rate and tax revenue of government sources of income. This debt Laffer curve was used in the debt overhang context by Jeffrey Sachs in 1998. However, Krugman, (1988) was legalized the actual derivation of the curve and the underlying the logic behind the concept. According to

this debt Laffer curve logic, if a country borrowing too much above the endogenous threshold level of debt it has resulted in efficiency losses. This curve shows that there is an inverted U shape relationship between economic growth and debt. This curve concludes that the functional relationship between debt and economic growth is a nonlinear form. The shape of the debt Laffer curves displays that there is some specific threshold level of debt and if the existing debt above the level they will retard the growth of the economy.

Normally, the debt Laffer curve has two parts the first part is the part that start from a left side to the right side up to threshold level which shows the positive impact of the debt on economic growth. In addition, the next part is part begins beyond the threshold level to the down to the right side, which displays the negative relationship between debt and economic growth after the threshold level of debt.

Contribution of debt to GDP

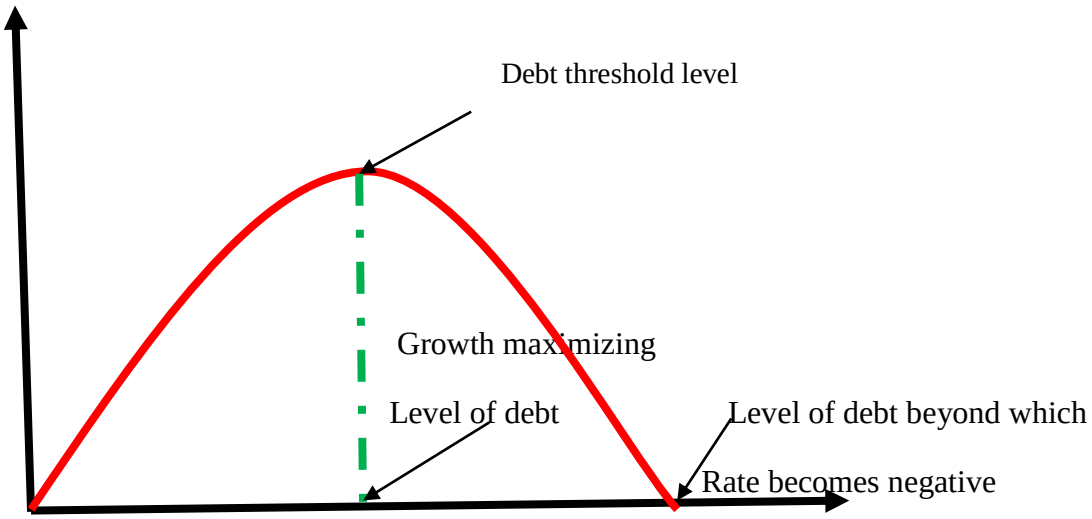


Figure 1: Debt Laffer curve

2.1.3 School of Economic Thought Views

The Classical views on External Debt

The main ideology of the classical economist was the laisser faire strategy which highly stresses that the government intervention in economic activity to be minimal and confined to maintain law order and to protect the security of the public resource only. Moreover, they assume that full employment level and the perfect competition and mobility of the factor of production in a market of the economy. According, to their views when the economy is not in equilibrium they will be a self-equilibrating tendency in the end no need

for government intervention in the economy to maintain equilibrium condition. So, when the government playing the minimum functions in the economy, then the public resource can be reserved for the other development investment (Smith, 1776).

Moreover, this influence the government to restraining itself from requiring the massive funds in the form of external debt and the government expenditure should not be wasteful and unproductive. According to this theory, as the money supply is fixed any sum that is transferred to the government could be at the cost of the private expenditure, private employment and the money borrowed will be into unproductive uses than to the productive investment purpose.

According to Smith, (1776), the problems of external public debt are the result of the excessive a rise in government expenses. So, he addressed that it is because of the understanding that there will be loans available in times when the state needed it that motivate the state not to have financial savings during peace time. As a result, in wartime, loans are considered as eminent tools to meet the extra expenditure. Smith argued that with the concept of national debt is an extra capital in an economy; rather the fund represents the transfer of funds from the private into the public hands. This money is loaned out to meet war and other unfruitful expenses, concerning that public debt shift from putting capital into productive use to unproductive ones. The payment of such a public expense that generated from the destruction of the annual produce and from the country existing funds creates the productivity of labour toward unproductive labour. Fortunately, during this actual war, additional savings of the people compensate the demerit of reduction of capital because of rising of public debts to some extent.

The Neoclassical Growth Theory

According to neoclassical economists, underdevelopment is purely a consequence of the misallocation of resources, which mostly arise from inefficient pricing and uncontrolled government interference (Todaro and Smith, 2006). The neoclassical growth theory explains how growth can be reached with the right combinations of labour, capital, and technology, which are described as the driving forces of economic growth. The theory also rejects the Harrod-Domar model's assumption of fixed proportions of labour and capital as the main drivers of growth. Instead, the model extended it with the addition of labour as a factor of

production and varied capital-labour ratios. By this refinement, capital intensity is differentiated from technological progress.

The prominent of neoclassical theory also promotes the free market system, liberalization of domestic markets, and the importance of price mechanism for efficient allocation of resources in the economy. This theory also indicates that the price mechanism encourages the factor inputs by causing the sizes of labour and capital in the production function to vary in an attempt to attain the equilibrium state, such that with the addition of new technology, labour and capital would be adjusted to maintain the equilibrium level of growth. Among the advocators of this theory were that who attempt to explain growth in line with the neoclassical framework is the models of (Solow, 1956; Swan, 1956). Their model which signals the starting point for most studies on growth up to the present day portrays labour, capital, and technological change as the main factors responsible for long-run growth, where the level of technological change is exogenously determined and independent of the other factors. The critical assumption of this model is that it has constant returns to scale as a feature.

Other assumptions of this model are the availability of complete information and perfect competition, as well as an absence of externalities. Moreover, regarding the macro economic issues of the relationship between debt and economic growth, some neoclassical economists have made some important contributions, which have continued to be subjects of hot debate among scholars and policy designers until the present day. Notable among such contributions is that of Diamond, (1965) who through his overlapping generation model differentiates the impacts of foreign and domestic debts on the economy. From his perspective, the effects of foreign and domestic debts on the economy are grouped into two. From the first classification, external and domestic debts can affect the level of utility by causing changes in taxes paid and in the relative factor payments. In line with this first classification, the effects of the taxes required to finance either external or domestic debt are the same in the end for individuals in society. As for the second classification, he assert that changes in utility arising from internal debt classified into the impacts of external debt and the impacts of a debt swap, which are equivalent to four effects, two on factor payments and the remaining two in the form of changes in taxes.

In his analysis, Diamond had given attention mainly on the effect of taxes on factor payments, as other aspects of the effects of debt on the economy had been dealt with by other

neoclassical economists. From his theoretical model, he illustrated that in cases where both external and domestic debts are present, while domestic debt reduces utility in the efficient case; it might increase or decrease it in the inefficient case, but would enhance it in the inefficient case in the absence of external debt. Moreover, he posits that external debt reduces utility in the efficient case and might depress or enhance it in the inefficient case, regardless of whether or not domestic debt exists.

Likewise, in a related theoretical modelling Blanchard, (1985) considers that the impact of regular fluctuations in output on an open economy and the role of debt. In his model, the economy's total financial wealth is defined as the sum of its foreign assets and government debt. His equation of motion indicates that the two components follow symmetrically, but opposite paths. That is, an increase in government debt depresses the foreign assets in the country's portfolio, which does not affect the open economy's rate of interest and capital accumulation. However, he demonstrated that the same debt policy would have a debilitating effect on a closed economy, as changes in capital stock would affect both rates of interest and capital accumulation. Some other neoclassical contributions to the role of debt in the economy include those of Modigliani, (1961) and Vickrey, (1961) who theoretically analyse the fall in the stock of capital because of substituting capital with debt, and Bowen et al., (1960) who discuss the tax effects of domestic debt on the economy. Generally, this theory stated that debt increases transitional growth since the model allows capital mobility and lending. This shows capital-scarce countries with an incentive to get a loan and invest since the marginal output of capital is greater than the global interest rate (Pattillo et al., 2002).

The Endogenous Growth Theory

The endogenous growth theory is a theory that attributes the growth in an economy to be endogenous, rather than exogenous forces. The theory was proposed in the mid-1980s because of continued dissatisfaction among certain theorists such as Lucas Jr, 1988 and Romer, (1986) with the popular view that exogenous forces determine long-run growth. They are opposed to the model of growth that entails the exogenous growth variable in the form of unexplained technical progress in favour of a growth model within which the key determinants of growth are elucidated. Specifically, the neoclassical growth model of Solow, (1956); and Swan, (1956) operates under the assumption that the rate of technological progress which is a major variable in the model is driven by a process that is unlinked with

economic forces, thereby implying that the long-run growth can be taken as exogenous to the economic system. The endogenous growth theorists who suggest the channels through which technical progress can be determined by economic forces reject this proposition. They begin their analysis with the proposition that innovation can endanger technological progress, as it brings about new products, processes, and markets, which are mostly products of economic activities. Consequently, growth is achieved on the one hand, by saving and investment in human capital (Lucas Jr, 1988) and on another hand, by investment in research and development (Mattana, 2004).

The endogenous growth model (AK), which does not differentiate capital accumulation from technological progress, constitutes the first edition of the endogenous growth theory. In an earlier variant of the AK model, Frankel, (1962) argues that a constant or even increasing marginal product of capital could characterize the aggregate production function, hence the model is predicated on being characterized by the absence of diminishing returns to capital. In addition, Romer, (1986) Introduces a similar variant of the model; nevertheless, with the assumption that inter-temporal utility maximization formulates savings. Furthermore, Lucas Jr, (1988) who gave much greater prominence to human capital than to physical capital formulated a similar model. As a major assumption, both technical progress and human capital are equated. The second category of the endogenous growth model theories is the innovation-based endogenous growth theory, which differentiates between innovations induced intellectual capital /technological progress and saving (Romer, 1990).

In endogenous growth models, the public debt has a harmful effect on growth. The proponents of these models could find no way to make a case for public debt as opposed to the neoclassical growth model where it is held that an increase in public debt can be beneficial only if the economy is growing faster than the rate of interest. This leads to over-accumulation of capital (Blanchard, 1985; Diamond, 1965). This neoclassical model by Blanchard, (1985) was extended by Saint-Paul in 1992 within an endogenous growth framework in line with Romer, (1986) and Lucas Jr, (1988) with the assumption of constant returns to capital at the aggregate level. From the resulting endogenous growth model, it established that even though a reduction in public debt enhances the rate of economic growth, it cannot be Pareto- improving as it constitutes a fiscal action with negative consequences for a current generation.

Furthermore, Diamond, (1965) overlapping generations model is extended to discuss the impacts of public debt on endogenous growth by Bräuninger, (2005) within the framework formulated by Roomer in 1986 and Lucas in 1988 and with the assumption of an endogenous growth or production structure which summarizes the basic ideas of the models. It assumed that the government is in control of three instruments in connection with budget deficits the government purchase ration, the budget deficit ratio, and the tax rate. From his endogenous model, it established that capital growth and public debt growth are both functions of the deficit ratio and the budget capital ratio is constant. If the deficit ratio falls below a critical level, then no steady-state exists and by implication, the growth of capital falls continuously, even to zero in finite time.

The Keynesian Theory

The foundation for the Keynesian theory emanates from his original publication of the general theory of employment, interest, and money, which completely rejects the classical economist assumption of absolute flexibility of wages and prices (Keynes, 1936). It also rejects say's law, supply creates its own demand' by arguing that given the scale of macroeconomic activities and enormity of resources in the modern economy, full production and full employment cannot be attained only by relying on the market mechanism, which was the classical economist referred to as the ''invisible hand ''(Keynes, 1936).

From Keynes's argument, the level of real national income, and therefore, employment is determined mainly by the level of aggregate demand, which implies that demand determines how much is supplied. Therefore, he attributes the existence of unemployed resources in the economy to inadequate spending in the aggregate, as all income generated by an economy's output is not necessarily expended on goods and services produced since the overall level of spending depends mainly on the disposable income of consumers. He advocates the need for government intervention through expansionary policy to enhance aggregate spending and consequently reduce the unemployment rate directly.

The Keynes theory, which is primarily a short-run analysis, adopts the aggregate demand aggregate supply framework to model the relationship between output, employment, and inflation. He assumes that the aggregate supply curve is upward sloping and that changes in the demand side of the economy affect both prices and output. This is because such factors as fiscal and monetary policies, changes in expectations, and labour force can influence

inflation rate and output level in the short run. As such, the theory establishes a positive relationship between inflation and output such that increase in the prices of goods and services would not lead to a decline in output because producers would have to satisfy the demand requirements of consumers. It argued further that an increase in the quantity of money leads to a fall in interest rate, which in turn stimulates investment and aggregate demand, thereby enhancing output and employment. By this, the Keynesian theory analysis the link between the real and the monetary sectors of the economy, as portrayed by the remarkable IS-LM model, which shows equilibrium in the goods and money markets.

As opposed to the position of the classical economists, Keynesian economics does not regard some government expenditure or any other expenditure as unproductive expenditure; therefore, incurring debt to finance consumption expenditure deemed comparable to incurring debt for investment purposes, because consumption expenditure enhances investment. From Keynes's perspective, an increase in debt would enhance growth in the economy through the multiple effects: notable among these is stimulation of effective demand, which would lead to increased employment and output. Furthermore, Keynesian economics links public debt with deficit financing, thereby rejecting the traditional classical position that an incessantly unbalanced budget and rapidly increasing public debt is harmful to the economy. Hence, from Keynes's view, extensive government debt is considered a national asset rather than a liability.

The argument of Keynesian economist on public debt extents its high point with the functional finance theory by Lerner (1955) which holds that the absolute size of government debt does not matter at all and that interest payment on public debt does not constitute any burden to the economy, no matter how it is. Rather, he proposes that the appropriateness or public debt should be scrutinized in light of the nature of expenditure for which it would be employed and its income-generating potential. This study is grounded on certain basic assumptions. First, experiencing public debt does not require any transfer of the real debt burden to the future generation. Second, the similarity between public debt and private debt is wrong, and lastly, a very clear distinction exists between domestic debt and foreign debt. Moreover, he asserts that as public debt growth, channels of saving in the economy expanded through the development of a more institutionalized source of savings such as money and capital markets, and this translates to improved investment and economic growth.

Meanwhile, in the 1950s in the face of accumulated and rising public debt coupled with uncontrolled public expenditure with very high unproductive components, some post-Keynesian theorists bring back the disagreement related to the influence of government debt on economic growth. Notable among these theorists was (Buchanan and Buchanan, 1958) who disproved that the three basic assumptions of the functional theory, which he referred to as the new orthodoxy.

2.2 Historical Review on the African Debt Status

In African history, the late fifties and early sixties were considered as the golden age especial for developing countries. It is time for African countries to increase their investment by relying on external debt (IMF, 2000). The sixties, early seventies, and the second period by early turbulence in the fuel inflation in the world market of commodity prices fell highly in 1974 which were followed by the growth of coffee and cocoa in 1977. The response or the reactions during this time in most African countries were an increase in public spending particularly it was common in the infrastructures sector. Even if the government cannot reduce spending when commodity prices fall, but it also needs to control on-going operations. This is accompanied by an increase in debt due to continued demand consumer prices rise and fall (Geda, 1997). The main issue is the increase in public spending, followed by rising commodity prices and access to credit. Given the inherited colonial system that required spending on infrastructures as shown in many African debt records and it is not a mistake to spend more on government which leads to the beginning of debt consolidation (Geda, 1997).

A) The late 1970s and early 1980s

In history, the end of the 1970s had been remembered for the condition of the second oil shock. In these decades majority of market commodity prices become continued to decline which was stimulated by the situation of a recession that happened in industrial countries. However, the early 1980s are also commonly known for an increase in real interest rate in industrial countries; due to the slack fiscal and tight monetary policy of the USA. Moreover, By 1981, the level of real foreign interest rate was 17.4% compared to -17.9% in 1973 (Khan and Knight, 1983). The latter intensified the interest rate cost of the non-concessional and private debts that became increasingly important during this period (Geda, 1997). This development prompted many African governments to continue borrowing (and get credit) on the assumption of a cyclical turnaround in commodity prices. These new loans were used to

finance enlarged oil bills and to avoid sharp politically/socially disruptive decreases in public expenditure. The experiences of most countries, such as Ghana, Zambia, Malawi, Tanzania, Sierra Leone, Libya, and Nigeria during this period generally confirm this pattern (Geda, 1997).

B) The late 1980s to the 1990s

The next period refers to the late 1980s to the 1990s. This period, similarly to the late1970s, was marked by continually declining commodity prices and the deterioration of terms of trade. For the period 1985-90 when a large number of African countries undertook adjustment programs, the deterioration in the barter terms of trade of nine major export commodities resulted in a 40% decline in average export revenue (compared to 1977-79 average) despite a 75% increase in export volume (Husain, 1997). Due to this most African countries have become more sensitive to indebtedness. Moreover, the capitalization of amortization and interest payment through the Paris and London clubs rescheduling had also started pushing the debt stock upward (Geda, 1997). Given this general pattern from the mid-1980s to early 1990s, African economies had become extremely indebted by the 1990s.

Moreover, differently from investment in infrastructure but in the transport sector which needed external finance for its maintenance, almost all countries had become dependent on external finance for securing imported intermediate inputs and ensuring the smooth functioning of their economy. The condition of capital stock becoming downward due to situations including infrastructure compounded this recurrent import demand problem. Accordingly, by the end 1980s and at the beginning of the 1990s, such historically organized economies in Africa become exposed to different conditions such as the recession of the industrialized economies, due to the global monetary shock of 1979-81, which distorts the commodity market price. This was also a time when the world economy was witnessed by the emergence condition of high, positive real interest rate throughout the 1980s which accelerate the debt service burden of indebted countries. And it is the time of Protectionism and low technology in the world market for agricultural products and low technology manufacturing which hindered diversification attempts (Geda, 1997). The increases in external debt over the years in developing countries has brought the issue of external debt impact on the economic growth of one's nations and has become a matter of concern both to the international and local community.

2.3 Empirical Literature Review

This part analysis the empirical studies about the impact of external debt on economic growth. Different studies found that the relationship between external debts was positive, negative, and combined at some level. Then in this part the role of institutions on economic growth, the positive, negative, and duality impact is examined.

2.3.1 Institutional Quality and Economic Growth

Nowadays, there is growing emphasis among economists and policy analysts that institutional quality plays a crucial role in determining the growth differential among the countries. Particularly the main growth difference and poor economic performance across east African countries were linked to their weak institutional quality. The study by (Abera and Mulugeta, 2018) confirmed that institutional quality and economic institutions, in particular, have a significant impact on the economic growth performance of the East African region. Specifically, control of corruption and government effectiveness was the main influence in the region. However, the rule of law has a negative effect but regulator quality did not have a statistical significance impact in east Africa.

On contrary, Butkiewicz and Yanikkaya, (2006) in their study of factors that determine the rates of economic growth, confirmed that the maintenance of the rule of law has a positive impact in stimulating the rate of economic growth in the sample study under the study period. Moreover, there is a study that confirms that corruption has a significant positive effect on economic growth which supports the so-called hypothesis of ‘’grease the wheels’’. This hypothesis stated that corruption should be tolerated as much as it provides an effective way of mitigating the distortions created by ineffective bureaucratic procedure (Green, 2011; Habibov et al., 2017, 2019; Winters and Weitz-Shapiro, 2013). This provides that corruption is a way of eliminating the bureaucratic problem, especially in countries burdensome and often changing regulations under the study period. So, bribes provide an important incentive to bureaucrats to work, especially in countries where public service is not well developed and such competition may allow for a more efficient distribution of scarce resources.

Furthermore, a study by Kilishi et al., (2013) employed a system GMM approach to determine whether the institutional quality matters to the economic growth of SSA. He found that institutional quality matters to the economic growth of SSA. This suggests that the

economic performance of SSA could be enhanced by the improvement of the regulatory quality in the region. A study by Vianna and Mollick, (2018) was investigated that the role of institutional quality on economic development for 192 countries in Latin America from 1996-2015 and he found that institutions have a positive influence on world development. This confirmed the evidence of a missing opportunity to achieve sustainable development primarily due to the weak nature of rule in Latin America. The study estimate that the effectiveness of fiscal/monetary policies will certainly improve when the institutional quality and fiscal responsibility improved in the region. A study by Gurvich, (2016) analysed that the development program largely failed in the Russian economy due to a rigid institutional framework, and therefore the economic growth cannot improve without institutional reforms.

2.3.2 Institutional Quality, External Debt, and Economic Growth

In this section, the study present some related empirical studies on the role of institutional quality on the external debt economic growth relationship. The new wave of research highlighted that poor institutional quality is not only the reason for the depressing economic performance of the developing countries but also explains why they are heavily indebted. This has been demonstrated by several researchers, such as (Jalles, 2011) who examined that the impact of democratic accountability and control of corruption on the debt growth relationship on a panel study of 72 developing countries for a period of 1970-2005. He found that countries with a lower level of corruption could utilize their debt effectively. Also in the same way Aswata et al., (2018); E. Kim et al., (2017) confirmed that the effects of corruption on the debt growth relation and witnessed a statistically significant positive impact of corruption control on the debt growth relationship by reducing the use of public authority for personal gains, low cost of production or investment this creates efficient use of funds that leads to a reduction in debt levels.

Similarly, Tarek & Ahmed, (2017) test that the hypothesis that poor institutions lead to public debt accumulation in the MENA region. Likewise, Coray, (2017) examined that the relationship between corruption, shadow economy, and government debt over the period 1996-2012. The study confirmed that the shadow economy was found to increase the impact of corruption on public debt and that they act complementarily. The study also found that the shadow economy reduces the revenue generation from tax, which eventually increases the debt burden. In a related development, Daud and Podivinsky, (2014) was used a threshold approach and examined that the relationship between public debt, economic freedom, and

economic growth in Malaysia. The result of this study was confirmed that the existence of a contingency influence of the institutional quality on the debt growth relationship in Malaysia. The study confirmed that political stability and the absence of violence, regulatory quality, and rule of law have a statistically significant impact on poor institutions in the declining GDP growth rate. A study by Fan et al., (2008) examined that the relationship between public external debt and economic growth in a panel of 114 developing countries focusing on the impact of policy and institutional framework. His result revealed that this relationship depends largely on the role of institutions and policies. According to a study by Asiedu, (2003), the study used 12 institutional quality measures to explore the linkage between debt relief and institutional quality in highly indebted countries. The result confirmed that most HIPCs are characterized by poor institutions that are weaker than that of the rest of the developing countries. He argued that a specific threshold level of institutional quality needs is will be attained for countries to benefit from the debt relief program.

Therefore, while the problem of poor economic growth has been attributed to public indebtedness in most developing countries, the medium through which public debt affects economic growth could be distinguishable to the poor economic mismanagement generated by the poor institutional quality. This requires a systematic study highlighting the role of institutional quality on the debt growth relationship, an area that was rarely explored particularly in EA where the public debt crisis has been a remaining issue over the years. This paper attempts to fill this gap.

However, the region having institutional quality can be benefited from public debt (Jalles, 2011; E. Kim et al., 2017). However, countries in sub-Saharan in general and eastern Africa, in particular, continue to accumulate public debt with a long history of depressing economic performance cited in (Sani et al., 2019). Several debt management strategies like debt rescheduling, structural Adjustment Programs, debt relief initiatives have been adopted as conventional approaches to debt management, yet the presence of indebtedness and poor economic performance continue to raise its unpleasant way in the region (Hussain et al., 2015; Lekomola, 2010). Furthermore, some empirical evidence has been shown that institutional quality has great power for the growth divergence among countries (Acemoglu et al., 2003; Butkiewicz and Yanikkaya, 2006; Daud, 2020) and (Siba, 2007).

Moreover, to date, there is a lack of consensus in the literature on the effect of external debt on a country's economic growth (Chowdhury, 2001; Cordella et al., 2010;

Mohd Daud and Podivinsky, 2012; Pattillo et al., 2002). On contrary, Cordella et al., (2010); Imbs and Ranciere, (2005); Pattillo et al., (2004) find that the effect of external debt on growth is positive up to a certain limit of external debt then began to have a negative impact beyond a cut-off point. Thus, no clear consensus exists on the relationship between external debt and economic growth.

Despite this lack of consensus, managing debt is an important issue, since it also involves risks and costs, and paying off debt simultaneously. A seminal work on the sources of growth, including the Solow model, and the endogenous growth model and its extensions, assume that distribute policies and institutional quality are in place for income to converge (Daud and Podivinsky, 2014; Law et al., 2018) and (Law et al., 2013). Moreover, appropriate and efficient institutions playing their role in the regulatory framework and could lower the probability of a debt overhang (Imbs and Ranciere, 2005). On the other hand, the challenges which one might highlight in debt initiatives are the quality of the political environment, government legislation, institutional framework, and delivery of basic services (IMF, 2013). This implies that the importance of institutional quality in debt effectiveness and its impact on the economic growth of one's country.

Meanwhile, the quantity and productivity of factors of production such as capital or labour would be influenced by the institutional environment (Gwartney et al., 2004). One might wonder that whether the environment and the institutions, including economic freedom, complement the impact of debt on economic growth. This translated to the potentially important factors explaining the adverse effect of debt on growth, which be summed up as the quality of policy and institutions. On other hand, the institutional quality of a country has a significant and positive effect on the level of long-term debt on a firm's financial structure, this indicates that it is an important determinant of corporate financing and debt maturity (Kirch and Terra, 2012). This suggests that the need to explore the role of institutional quality on debt growth linkage analysis, which has been broadly ignored in EAC.

There are some studies, which incorporate the role of institutional quality in the relationship analysis between debt versus economic growth with different measurement (Aswata et al., 2018; Cordella et al., 2010; Imbs and Ranciere, 2005; Mohd Daud, 2020) and (Mensah et al., 2018). A study by Mensah et al., (2018) focusing on emerging economies by taking a dynamic threshold specification to a panel data consisting of 53 countries, found that external debt has an adverse effect on a country's economic growth; while institutional

quality improves it and he suggested that, the effect of external debt on economic growth depends on the level of institutional quality of these emerging economies. In addition to this Cordella et al., (2010), by focusing on highly indebted countries from the time interval of 1970-2002 found that countries with good policies and viable institutions still experience negative effects of external debt (a strong debt overhang position), if countries held debt over 25 % of gross domestic product (GDP). In a country with bad policies, the debt threshold is lower, but the evidence of debt overhang is weaker (Cordella et al., 2010).

2.4 Conceptual Framework

According to Smyth, (2004) the term conceptual framework is a research tool used to assist a researcher to develop awareness and understanding of the situation under study and to communicate it. When clearly defined, a conceptual framework has potential usefulness as a tool to assist a researcher to make meaning of subsequent findings. It informs part of the agenda for negotiation to be examined, tested, reviewed, and reformed because of investigation and it explains the possible connections between the variables. It is the theoretical way in which independent variables are related to the dependent variable under the study. So, to guide the study, the interrelationship between variables discussed above is presented in the conceptual framework model as following.

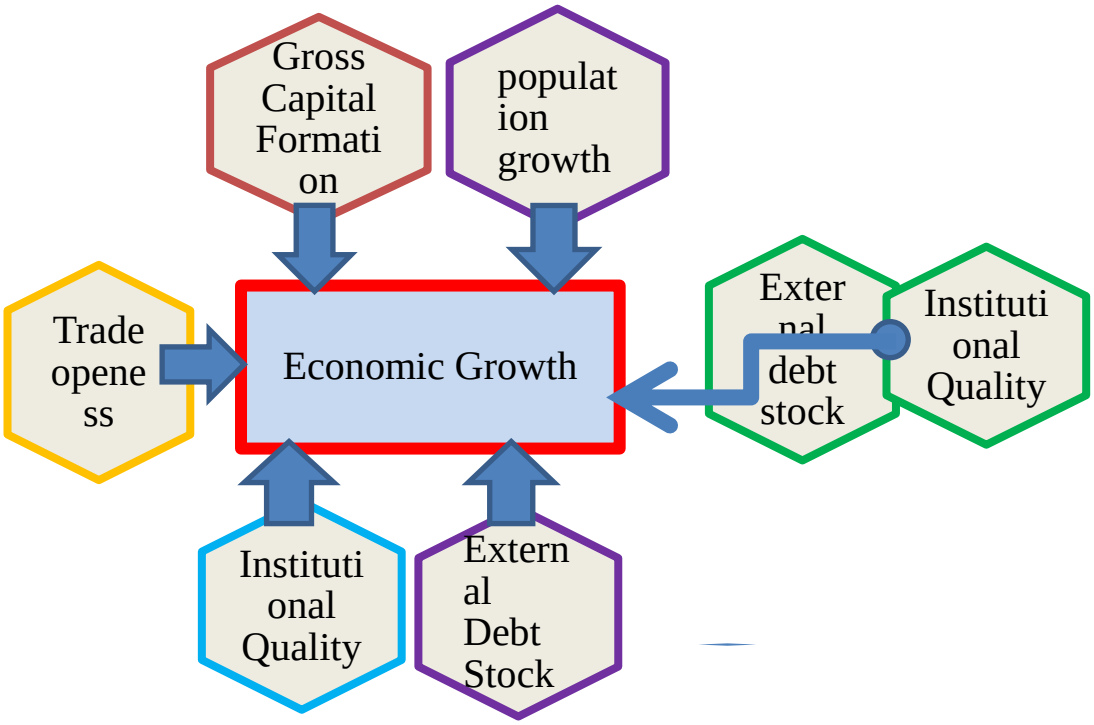


Figure 2. Conceptual framework

Figure 2 represents the summary of both the discussed and the reviewed literature which comprises that economic growth is directly affected by trade openness, capital formation, population growth, institutional quality, and External debt stock and indirectly affected by the interaction of external debt and institutional quality.

CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1 Data Types and Sources

To analysis, the role of institutional quality on a debt growth relationship, secondary annual data for six eastern African countries throughout (1998- 2019), was collected by the researcher. Data for RGDP (% annual), Gross capital formation as a share of GDP, Population growth annual, and trade openness as the ratio of GDP was collected from the World Development Indicator database, African Development Bank, and World Bank. However, data for external debt percent of GNI was from world economic outlook and World development indicator database, IMF and WB. Finally, the data for the variable institutional quality indicators was collected from the World governance indicator database. The selection of this variable is in line with the existing empirical literature of the growth model (Hassan, 2020; Law et al., 2018; Sani et al., 2019). These data sets were employed within a panel framework, which stems from a combination of both time series and cross-sectional observations (Hsiao, 2007).

3.2 Methods of Data Analysis

To analysis the study results we employed both descriptive and econometric methods of data analysis. Descriptive statistical tools such as tables and graphs were employed to make the analysis.

3.3 Econometric Model

3.3.1 Theoretical Framework

Examining the effect of external debt at enhancing economic growth needs a theoretical linkage between these two variables (economic growth and external debt). One way to generate such a link is to introduce external debt flows as one source of capital formation into the existing growth theories. This study linked external debt and economic growth relationships through the neoclassical growth models. This Neoclassical growth theory analyses that the achievements of economic growth could be through three main factors of production those are capital, labour, and technology. However, this theory does not agree with the earlier theory of growth which states that underdevelopment could be resulted

in from high reliance on external forces (it may be foreign borrowing) and growth could be only attained through high capital accumulation**.** However, neoclassical theory advocators strongly state that under-development is due to misallocation of resources and large government interference in the economy (Todaro and Smith, 2006).

Furthermore, the prominent growth model which tried to illuminate growth in line with the neoclassical framework was the Solow (1956) and Swan (1956) and the commonly known growth model along with this theory. According to these model labour, capital, and change of technology were the main determinant of long-run growth, whereas the level of technology in this model is exogenously determined and independent of others factors. Based on these prominent growth theory and their concept of a Cobb- Douglas production function were used and in line with the existing literature of (Aswata et al., 2018; Hassan, 2020; Lau et al., 2014; Qayyum et al., 2014; Sani et al., 2019) to develop the theoretical way for this study. Therefore, based on this we assume that the output for each selected east African country in our sample is determined following Cobb- Douglas production function in line with the existing literature (Aswata et al., 2018; Hassan, 2020; Sani et al., 2019).

$$Y_{it} = {K_{it}}^{\alpha}{}_{it}(A_{it}L_{it}).^{1-\alpha} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.1)$$

In this equation, the variable above stands for:

Y_{it} = is the level of real income of the countries at i country and at time t

K_{it}= stands for the level of capital stock in country i at time t

L_{it}= is the level of labour in countries i and time t

A_{it}= whereas stands for the level of technology in countries i and time

Where the subscript of a factor of production α stands for the elasticity of output as a share of capital whereas $1-\alpha$ is the share of labour where $0 < \alpha < 1$.

In the above cobb-Douglass production where AL is known as effective labour; however when the level of technological progress enters the model, then Cobb-Douglas production is becoming labour augmenting or Harrod neutral model. Moreover, this cobb-Douglas production function in equation 3.1 is characterized by constant returns to scale and can be formed as output per unit of effective labour by dividing it by effective labour (AL).

$$\frac{\boldsymbol{Y_{it}}}{\boldsymbol{A_{it}L_{it}}} = \frac{\boldsymbol{K^{\alpha}{}_{it}(A_{it}L_{it})^{1-\alpha}}}{\boldsymbol{A_{it}L_{it}}} = \frac{\boldsymbol{K^{\alpha}{}_{it}}}{(\boldsymbol{A_{it}{L_{it}}^{\alpha}})} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.2)$$

Then it becomes capital to effective labour ratio as following

$$y_{it} = \boldsymbol{k^{\alpha}}_{\boldsymbol{it}} \ldots\ldots \quad (3.3)$$

The above equation 3.3 represents that the intensive form of Solow sawn production function. This generated equation would be assumed that the intensive production function f (k) satisfies this three condition, those are f (0) = 0, f' (k) > 0, f'' (k) < 0. In addition to the first and the second derivatives, f(k) are also assumed to attain the Inada conditions in line with the existing literature (Barelli & de Abreu Pessôa, 2003) which were described as $\lim_{k\to\infty} f'(k)$=0 and $\lim_{k\to 0} f''(k)= \infty$ form.

These basic assumptions were employed to ensure that the economy's path does not diverge and the Cobb- Douglas production function satisfies the basic features of the neoclassical production function. According to this marginal product capital is large when the stock of capital in the economy is very small. However, the marginal product of capital becomes very small when the stock of capital becomes large. This assumption in short implies the prerequisite of the law of diminishing returns to capital (Färe and Primont, 2002). In addition to this, the model also deals with how the stock of capital, labour, and technology change over time. This model is grounded and defined on the continuous-time dimension, labour, and initial capital and technology as given and strictly positive. As well, the growth rates of labour and technology in the model also considered being constant. Therefore, based on this logic the growth rate of labour and technology would be framed in mathematical form as the following way.

$$\frac{dY_{it}}{dx} = nL_{it} \ldots\ldots \quad (3.4)$$

$$\frac{dA_{it}}{dx} = gA_{it} \ldots\ldots \quad (3.5)$$

From this mathematical growth equation of labour and technology, the coefficient of labour and technology n and g represent the exogenous growth rate of labour and technology in the model. Given that the growth rate of a variable is equivalent to the rate of change of its natural log, equations 3.4 and 3.5 at time zero transformed as follows.

$$logL_{it=}logL_{i0} + n_t \ldots\ldots \quad (3.6)$$

$$logA_{it=}logA_{i0} + g_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . \ldots (3.7)$$

This natural logarithm expression can be converted exponentially by arranging the equations 3.6 and 3.7, and then the following equations could be derived*:*

$$L_{it} = (L_{i0})^{e^{nit}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.8)$$

$$A_{it} = (A_{i0})^{e^{git}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.9)$$

Considering other factors which influence the level of technology constant according to the existing literature, the derived equation of 3.9 could be framed in the following ways.

$$A_{it} = (A_{i0})^{e^{git} + M_{it}\psi_i} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . . \ldots\ldots (3.10)$$

From the formed equation of (3.10) g_{it} is used to expressing the exogenous rate of technological progress in country i overtime the period of t and 'e' used to express the exponential form of the equation. Whereas, Mit is standing for to explain a vector of external debt, institutions, and other variables that affect total factor productivity and technological progress in country i, and time t while ψi is standing for the vector of parameters for these variables. These confirm that the exogenous technological progress and level of external debt, as well as institutional quality, are highly influenced labour-augment technology (A). According to a study by Riffat and Munir, (2015), most of the time governments are not desire to implement costly reforms when they realize that the main beneficiaries would be their foreign creditors. He also argued that obstacles to improvement to technological progress were due to external debt accumulation and its payment.

By the same token, a Study by Checherita-Westphal and Rother, (2012) and Pattillo et al., (2004) also confirmed that the existence of these conditions. In addition, a study by Aswata et al., (2018); Demetriades and Hook Law, (2006); E. Kim et al., (2017); Sani et al., (2019) also reflected that the existence of good institutions to be very important for labour productivity in the economy and growth. In nutshell, this literature illustrated that ineffective and inefficient institutions could produce unproductive labour and stuck in rent-seeking activities. Similarly, a study by Nelson and Sampat, (2001); North, (1990) state that weak institutions are negatively related to labour productivity in the economy.

Furthermore, from the above mentioned we could be assumed that output per effective labour is constant and progress according to equation 3.3. But, the level of output per labour Y/L develops at the exogenous rate of g, and advances as following in line with the existing literature (Aswata et al., 2018; Hassan, 2020; Sani et al., 2019).

$$\frac{Y_{it}}{L_{it}} = \frac{A_{it}L_{it}^{1-\alpha}}{L_{it}} \ldots \ldots (3.11)$$

$$y_{it} = A_{it}\,(k_{it})\alpha \ldots \ldots (3.12)$$

Then by converting the above equation into a natural logarithm, we can get the following form:

$$Lny_{it} = lnA_{it} + \alpha lnk_{it} \ldots \ldots (3.13)$$

Then after equation 3.11 could be converted to natural logarithm it could be expressed by substitute it in equation 3.12 then the following equation could be derived as follows:

$$\text{Ln}y_{it} = \ln\ \ln A_{0t} + (1-\alpha)g_{it} + (1-\alpha)\psi_i M_{it} + \alpha \ln k_{it} \ldots \ldots (3.14)$$

The above equation (3.14) shows that the vector of external debt and institutions and the level of physical capital affect output per labour. For the efficient estimations, this equation could be expressed as functional form by adding an error term in equation 3.14.

$$\text{Ln}y_{it} = \ln A_{0t} + (1-\alpha)g_{it} + (1-\alpha)\psi_i M_{it} + \alpha \ln k_{it} + \varepsilon it \ldots \ldots (3.15)$$

From the above equation 3.14, the variable M1 is used to express external debt; M2 is used to handle the institutional quality indicators and εit is the error term. Moreover, a non-linear functional form of equation 3.15 can be developed for the analysis of threshold for the study concerning M1so as to include a nonlinear term of external debt in the equation:

$$\text{Ln}y_{it} = \ln A_{0t} + (1-\alpha)g_{it} + (1-\alpha)\psi 1_i M1_{it} + (1-\alpha)(\psi 2_i M2_{it}) * 2 + (1-\alpha)\psi 3_i M2_{it}\text{t} + \alpha \ln k_{it} + u_{it} \ldots \ldots (3.16)$$

In this case u_{it} is a stand for a new error term for the equation.

Furthermore, to investigate the contingency role of institutional quality the interaction term between external debt and institutional quality could be included in equation 3.15. This can be framed in the following ways:

$$\text{Ln}y_{it} = \ln A_{0t} + (1-\alpha)g_{it} + (1-\alpha)\psi 1_i M1_{it} + \left((1-\alpha)\psi 2_i M1_{it} * M2_{it}\right) + (1-\alpha)\psi 3_i M1_{it} * M2_{it} + \alpha \ln k_{it} + \mu it \ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.17$$

Where in this equation $\mu_{it}$is the new error term.

3.4 Model Specification

Now, in line with the above model to evaluate the role of institutional quality in the external debt nexus, economic growth analysis this study considers a panel of i countries over t periods. Based on the study objectives discussed in chapter one in this section appropriate model would be specified for the study to deal with the aforementioned objectives. The variables in the above model used would RGDP growth, total external debt stocks as a percentage of GNI, trade openness, population growth, institutional quality index, and gross capital formation would be employed with a level for this study because the variables data were expressed and used as a ratio in line with the work of (Hassan, 2020; Mensah et al., 2018).

Therefore, following the study objective, the first objectives were to examine the functional no-linearity effect of external debt on the economic growth of the selected eastern African countries. Developing the empirical model for the study equation derived in 3.15, 3.16, and 3.17 is very important. Therefore, these equations can be explained as the reduced form by inserting our variables in the model in line with an existing empirical study on the subject by (Aswata et al., 2018; Hassan, 2020; Ouedraogo, 2015; Presbitero, 2008; Sani et al., 2019) for non-linearity analysis. Therefore, based on the above theoretical framework our main dynamic model is specified for the stated objectives as follows.

$$Y_{it} = \beta_{0i} + \beta_{1i} Y_{it-1} + \beta_{2i} EXD_{it} + \beta_{3i} (EXD_{it})^2 + \beta_{4i} X_{it} + u_{it} + E_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.18)$$

Where i, t is country i in time t Y_{it} represent the real GDP growth for a country equivalent to real GDP growth i at time t annually. Whereas,Y_{it-1} represent the initial real GPD or the first lag of the dependent variable. The explanatory variable EXD represents a total external debt stock as the percentage of GNI. In addition, $(EXD_{it})^2$ the squared of this variable in a model would be used to test for the existence of nonlinear relation between external debt and economic growth for East Africa countries under the study. Moreover, the variable X_{it} stands for all control variables used in the model for i country at time t.

Moreover,$\mu_{it} = u_i + E_{it}$, μ_{it} is mean zero scalars. Whereas u_i is shows that the time-invariant country-specific effect, and E_{it} captures all other white noise in the specified model. Whereas, the coefficient of an explanatory variable $\beta_1, \beta_{2,}\beta_3 \& \beta_4$ would be our parameters used in the equation. The logic behind this model to examine the impact of external debt on economic growth is not always positive or negative so that external debt at lower levels could enhance growth before reaching the threshold level of the Laffer curve beyond it begins to have a negative impact on growth. Therefore, in this model to have a nonlinearity relationship between external debt and economic growth both the parameters of external debt $\beta_{2i,}\beta_{3i}$ must have significance and have an opposite sign if not the relationship will be linear.

From the above model, the study would generalize that the effect of external debt on the economic growth of eastern Africa countries can be positively or negatively at the beginning or end of the Laffer curve. If $\beta_{2i,}$and β_{3i} both are significant, and when $\beta_{2i,}$is positive value and $\beta_{3i,}$ have a negative value then the relationship will be stated as inverted U shaped or concave. But, If $\beta_{2i,}$and β_{3i} both are significant, and when $\beta_{2i,}$is negative value and $\beta_{3i,}$ have a positive value then the relationship will be state as U shaped or convex. Furthermore, if $\beta_{2i,}$and β_{3i} value of these parameters does not have the opposite sign the relation said to be a linear form of relationship between the external debt and economic growth for selected eastern African countries under the study period.

Based on the above-stated model it is possible to estimate the external debt threshold through the partial derivative of the real GDP growth with respect to external debt when the coefficient parameters above ($\beta_{2i,}$and β_{3i}) are significant and have an opposite sign in the model.

$$\frac{\partial Y_{it}}{\partial EXD_{it}} = 0 \quad => \quad \beta_{2i} + 2(\beta 3_{it} EXD_{it}) = 0 \;\; => \;\; \frac{-\beta_{2i}}{2\beta 3_{it}} = 0 \ldots\ldots\ldots\ldots\ldots\ldots (3.19$$

Furthermore, to examine the role of institutional quality in the model of external debt growth in line with the pre-stated objectives of the study then, we can include the linear interaction term in the model with the external debt. In line with the empirical literature of Aswata et al., (2018); Hassan, (2020); Law et al., (2018); Mohd Daud, (2020) and based on the above-developed equation of (3.17) as following ways.

$$Y_{it} = \beta_{0i} + \beta_{1i} Y_{it-1} + \beta_{2i} EXD_{it} + \beta_{3i}(IQI_{it} * EXD_{it}) + \beta_{4i} IQI_{it} + \beta_{5i} X_{it} + \beta_{6i} k_{it} + u_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.20)$$

Where i and t are cross-sectional units and time respectively. Whereas, Y_{it} is the real GDP growth, EXD is the external debt as a percentage of GNI, IQI is an index of institutional quality indicators included in the study. Whereas, EXD*IQI is the term used to interact both external debt and institutional quality index and the variable X_{it} is the sum of all control variables which include gross capital formation, population growth, trade openness and Y_{it-1} is stands for the lagged dependent variable used as explanatory in the model. Whereas, u_{it} is the sum of country-specific effect (μ_i) and the error term E_{it}. Based on this developed equation if the institutional quality index coefficient is statistically significant and positive at the introduction of this term in the model then it illustrates that the effect of external debt on economic growth is through institutional quality. This implies that whether the positive or negative effect of external debt on economic growth is through countries' institutional quality under the study period.

However, to evaluate economic growth performance and difference between countries with different levels of institutional quality through deriving the partial derivative of real GDP growth in the above equation (3.20) with respect to external debt as follows.

$$\psi = \frac{\partial Y_{it}}{\partial EXD_{it}} = \beta_{2i} + \beta_{3i} IQI_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots . \dots\dots\dots\dots\dots\dots (3.21)$$

This derived equation of (3.21) ψ indicates that the marginal effect of external debt on economic growth. This illustrates the sensitivity of the steady-state level of economic growth to the level of external debt. In addition, the interaction impact of the institutional quality circle in four possibilities for the above marginal effect equation in nexus between external debt and economic growth relationship with these two parameters of β_{2i}, β_{3i} in line with a study by (Hassan, 2020). From the marginal effect equation derived above if the value of $\beta_{2i} > 0$ and $\beta_{3i} > 0$ then external debt affects economic growth positively and institutional quality enhance that a positive effect. But, If the value of $\beta_{2i} > 0$ and value of $\beta_{3i} < 0$ external debt affects economic growth positively and institutional quality reduces that a positive effect. In contrast to this if $\beta_{2i} < 0$ and $\beta_{3i} > 0$ external debt affects economic growth negatively and institutional quality reduce that a negative effect. However, if $\beta_{2i} < 0$ and $\beta_{3i} < 0$ external debt affects economic growth negatively and institutional quality increase that a negative effect.

The cut-off point of institutional quality at which institutions begin to have a dual impact on economic growth can be determined from equation 3.21. Therefore, the threshold

level of institutional quality beyond which external debt would be beneficial to economic growth is attained when $IQI_{it} > \frac{-\beta_{2i}}{2\beta_{3i}}$.

3.5 Variable Descriptions and Measurement

Different empirical studies investigated that the relationship between debt and growth they used GDP growth, Real GDP growth, GNP growth, GDP per capita growth as a measure of economic growth and as a dependent variable. However, this study used RGDP growth as a measure of economic growth, which is consistent with the works of (Ighodalo Ehikioya et al., 2020).

Independent Variables

External debt to GNI and institutional quality index are our main variables of interest in independent variables. The set of control variables are consists of gross capital formation (as a proxy for investment), population growth rate, and trade openness. In the standard economic growth theory, gross capital formation rates expected to have positive coefficients and trade openness will expect to be boost productivity through transfers of knowledge and efficiency gain but population growth has a negative impact on economic growth. Let them see separately.

Trade Openness: Trade openness treated as a control variable in the growth model; would be measured by total trade as a percentage of GDP that is the ratio of import plus export to the GDP (import + export)/GDP) for this study, the sign of trade openness in the growth models is will be expected to be positive. A study by Aswata et al., (2018); Hassan, (2020); D.-H. Kim, (2011); Ouedraogo, (2015) used this variable as a control variable. The data set for trade openness would be sourced from WDI (2019).

Population Growth Rate: The rate of population in this study would be considered as the control variable in line with the existing literature (Checherita-Westphal and Rother, 2012; Hassan, 2020; Riffat and Munir, 2015). It refers to the growth rate of all residents in a country, although their citizenship or legal status. However, it excludes all refugees not permanently settled in the country, as they are considered part of their own country's population. Data on population growth rate annual for this study would collect from WDI and measured by rate.

External Debt: External debt refers to credit owed to foreign lenders. This variable measured as or expressed as a percentage of GNI in line with existing literature (Hassan, 2020). Data would be sourced from (WDI, 2019) database. For this variable, we expect both signs.

The Gross Capital Formation (GCF): This variable comprises all forms of investment to improve the land (fences, ditches, and drains), purchases of equipment and machinery, the construction of roads and railways, and the building of the school, hospitals, industries, and residential houses. As a proxy of investment, we used physical capital; it is widely used in the growth literature (Aswata et al., 2018; Daud, 2020; Hassan, 2020; Sani et al., 2019). We will expect to have a positive sign.

Institutional Quality Indicators

This refers to the humanly devised constraints that shape the interaction among the people living in a particular country; it has been used in the growth model in many studies (Aswata et al., 2018; Daud, 2020; Hamdi et al., 2017; Hassan, 2020; Sani et al., 2019). There are six institutional quality indicators among them, which are assembled by the world indicators WGI and collected from WGI published by World Bank in (2020). For this variable, the study used the average principal component index by generating three institutional quality indicators from six indicators using Stata software 16. Its values range from -2.5 and +2.5 which represent bad and good governance respectively. The three subcategories of this institutional quality we would be briefly explained below. We will expect a positive sign.

Government Effectiveness: This variable measures the government's ability to formulate and implement sound policies. It measures the quality of the public and civil services as well as the extent to which the government is free from political pressures. It emphasizes the government's abilities to design and implement policies as well as the delivery of public goods.

The Rule of Law: This captures the perceptions of the extent to which the agents have confidence in and accept the rules of society. These include, among others, the property right, quality of contract enforcement, the police force, courts, and likelihood of crime and violence.

Control of Corruption: This captures the perceptions of the extent and magnitude of corrupt practices using public offices for private gain. This comprises both the petty and grand forms of corruption, as well as the state of the elites and private interests.

Table 3. 1 **Variables Description and Measurement**

No	notations	Description	Expected sign	measurement	Sources
		Dependent variable			
1	RGDP	RGDP		annual %	WB, WDI
		Independent variables			
2	EXD	External debt stock	mixed	% GNI	IMF &WB WDI
3	TO	Trade openness	Positive	ratio of GDP	WB
4	GCF	Gross capital formation	Positive	Annual %	WB, AFDB, WDI
5	PG	Population growth rate	Negative	annual %	WB, WDI
6	IQ	Institutional quality index	Positive	index	WGI

3.6 Techniques of Estimations

In the meantime, the level of economic growth in previous periods could affect the current growth in our specified model and that explanatory variables could be endogenous, estimating our model with static techniques would be inappropriate and mislead the outcomes of parameters estimated. Moreover, when some independent variables in the model are endogenous, as is the case in the relationship between external debt and economic growth, where most of the explanatory variables employed in the growth models are endogenous to the dependent variable, both RE and FE static panel data estimators would generate a biased parameter estimate (Kinoshita and Campos, 2008). Evidence in the literature states that both institutional variables indicators and debt indicators in growth models are a strong potential to be endogenous, (Panizza and Presbitero, 2014) and (Gómez-Puig and Sosvilla-Rivero, 2017; Hassan, 2020). Therefore, to handle the problem various dynamic techniques can be used among them dynamic panel ARDL and system generalized methods of moments (GMM) have been the most popular. However, the GMM technique is best when the cross-sectional (N) have greater than the times (T).

Otherwise, employing GMM method would be suffering from small sample bias and leads to the loss of degrees of freedom as the number of observations falls (Baltagi, 2005). Therefore, since the panel consists of a large T (in our case 22) and small N (six countries for

this study), the Autoregressive distributed lag model (ARDL) would be appropriate. Furthermore, the approach performs quite relatively well under a circumstance where mixed integration of order zero, I (0) and, I (1), exist. However, we suspect endogeneity in our model. According to Alam and Quazi, (2003) the ARDL estimation is possible not only where we have a lagged dependent variable as an explanatory but also when the explanatory variables are endogenous. The significance of this technique is that it offers the long and short-run results simultaneously, removing problems associated with omitted variables bias and autocorrelation.

The ARDL panel model offers three estimators: The mean group estimator (MG), pooled mean group (PMG), and dynamic fixed effect estimator (DFE). The MG suggested by Pesaran & Smith, (1995), involves estimating separate regressions models for each country and then derives the long-run coefficients as the average of each country. Therefore, the MG estimator allows both the short-run and long-run coefficients among countries to varying and does not impose restrictions on the coefficients to remain the same. This is due to policies and response to shock may vary among countries. The DFE estimator is located in between PMG and MG, in that it constrains both the long-run and short-run coefficients to be the same across the individual units, but allows the intercepts of the cross-sections to vary. This estimator might not produce consistent and valid estimates if the sample size is small, in which case it could suffer from simultaneous equation bias arising from the endogeneity of the lagged dependent variable with the error term (Blackburne III and Frank, 2007). On the other hand, the PMG estimator involves the pooling and averaging of individual regression coefficients.

However, the GM, PMG estimators allow the short-run coefficients including intercepts, speed of adjustment to the long-run equilibrium values, and error term to vary across countries, while the long-run slope coefficients are restricted to be homogenous. Short-run coefficients, including intercepts, the speed of adjustment to the long-run equilibrium values, and error variance are heterogeneous across countries due to different impacts of vulnerability to external shocks, fiscal policies, and financial crises. On the other hand, Long-run results remain the same across countries. PMG is especially useful when there are reasons to expect that the long-run equilibrium between variables is similar across sections (Aswata et al., 2018). The validity of PMG requires that the existence of a long-run relationship among the variables of interest require.

Nevertheless, before estimation of co-integration relationship, the ARDL model requires that variables are stationary at level, at the first difference, or both at the level and first difference. The technique may not work in cases where variables are not stationary at both level and first difference. To check the stationarity condition the study adopted the Im et al., (2003) test which allows for individual unit root processes and hence heterogeneous autoregressive coefficients across countries and Levin Lin Chu stationarity test, which were introduced by Levin et al., (2002) under the assumption of a common unit root process across units in a panel data set.

Therefore, to estimate the parameters of our above model under heterogeneous panel model or (ARDL) the pooled mean group (PMG) would be used among three estimators of heterogonous panel ARDL. Due to the less informative of the MG and it is a need of sufficiently large N and time dimension to be consistent, and valid we didn't employed (Hassan, 2020). Due to this applying MG to small N (which is six in this case) results in inconsistent estimates. Furthermore, considering the time dimension for this study which is 22 years, the MG estimators would be inefficient due to the loss of degrees of freedom. In addition to this, the estimator does not consider the issue of cross-sectional dependence due to this we cannot employ MG; however, PMG useful to test cross sectional dependence and robust to the outliers and lag orders (Lau et al., 2019).

Furthermore, using the DFE model estimator for this study is also not sufficient with this small sample of the study. This estimator might not produce consistent and valid estimates if the sample size is small, in which case it could suffer from simultaneous equation bias arising from the endogeneity of the lagged dependent variable with the error term (Blackburne III and Frank, 2007). Therefore, the right estimator for this study is the pooled mean group estimators of the panel ARDL method for this study analysis.

In line with the work of Pesaran et al., (1999) and Lau et al., (2019) the PMG panel ARDL model with lag of (p, q) can be framed for equations as follows.

$$y_{it} = \alpha_i + \gamma_{it} lny_{i,t-j} + \theta_{1i} lnEXD_{it-1} + \theta_{2i} lnEXD^2{}_{i,t-1} + \theta_{3i} IQI_{i,t-1} + \theta_4 lnEXD_{it-1} * IQI_{i,t-1} + \alpha'_{ij} lnX_{i,t-j} + \sum_{j=1}^{p-1} \gamma_{1i} ln\, y_{i,t-j} + \sum_{j=0}^{q-1} \beta_{2i}\, lnEXD_{it-1} + \sum_{j=0}^{q-1} \beta_{3i} lnEXD^2{}_{i,t-1} + \sum_{j=0}^{q-1} \beta_{4i} IQI_{i,t-1} + \sum_{j=0}^{q-1} \beta_{5i} lnEXD_{it-1} * IQI_{i,t-1} + \sum_{j=0}^{q-1} \alpha'_{ij}\, lnX_{i,t-j} + \pi i + \epsilon_{it} \dots\dots\dots\dots\dots\dots (3.22)$$

In this model where y_{it} is the scalar dependent variable, x_{it} is a set of control variables for group i (countries in this case) population growth, trade openness, and gross capital formation. Moreover, πi represents the country-specific effects and $IQI_{i,t-1}$ institutional quality variables. The coefficient of γ_{it}, θ_i and β_i shows the coefficient of lagged dependent variable, long run and short run for independent variables. However, $\alpha'_{ij}$is representing the vector of coefficients of independent variables and their lagged values in the model. While ϵ_{it},πi and (p, q) are disturbances terms, fixed effects, and optimal lag length for the model respectively. In addition, the unrestricted error correction ARDL (p, q...q) for equations (3.18) (3.20) and (3.21) can be re-parameterized as follows:

$$\Delta y_{it} = \alpha_i + \Psi'_i(\Delta\gamma_{ij} lny_{i,t-j} + \theta_1 ln\Delta EXD_{it-1} + \theta_2 \Delta lnEXD^2{}_{i,t-1} + \theta_3 \Delta IQI_{i,t-1} + \theta_4 ln\Delta(EXD_{it-1} * IQI_{i,t-1}) + \alpha'_{ij} ln\Delta X_{i,t-j} + \sum_{j=1}^{p-1} \gamma_{ij} ln\, \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \beta_1\, ln\Delta EXD_{it-1} + \sum_{j=0}^{q-1} \beta_2 ln\Delta EXD^2{}_{i,t-1} \sum_{j=0}^{q-1} \beta_3 \Delta IQI_{i,t-1} + \sum_{j=0}^{q-1} \beta_4 ln\Delta(EXD_{it-1} * IQI_{i,t-1}) + \sum_{j=0}^{q-1} \alpha'_{ij}\, ln\Delta X_{i,t-j} + \pi i + \epsilon_{it} \dots\dots\dots\dots\dots\dots (3.23)$$

With i and t representing country, and time respectively, y stands for the real GDP, EXD is external debt stock as percentage GNI; X is a set of all control variables in the model such as trade openness, gross capital formation, population growth. The notations βi are the short-run coefficients of the lagged dependent and control variables. However, the

coefficients term θ_i illustrate the long-run coefficient for external debt and control variables. Furthermore,Ψ'_i is illustrates a speed of adjustment which is expected to be negative and less than one, and significant for the long-run relationship to exist among the variables in the model.

3.7 Panel Diagnostic Test

Panel Unit Root Test

Currently, the issue of stationary in panel data has it originates from time series (Baltagi, 2005). Different panel unit root takes a look at had been evolved mainly in reaction to the troubles of homogeneity, sample bias, and cross-sectional dependence; the presence may spoil the estimation process in dynamic panel analysis (Baltagi, 2005). The assumption of homogeneity in most panel analyses to permit pooled regression should bring about incorrect inferences.

Im-Pesaran-Shin (IPS) Unit Root Test

The IPS unit root test is a first-generation test developed by (Im et al., 2003) and operates under the assumption of individual unit root processes. Put differently, it gives room for heterogeneity by allowing the coefficient of the various cross-sections to differ, as this will adjust the power of the test in case a unit root is present. While developing this test the authors suggest that individual unit root tests can be combined to generate a panel-specific result. Moreover, the test employs regression that is lagged in order to address the issue of autocorrelation. These with individual cross-sectional ADF regression proceeds as follows:

$$\Delta y_{it} = \rho y_{it} + \sum_{p=1}^{j} \theta y_{i,t-1} + \beta X_{it} + \epsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.24)$$

The null hypotheses for this test can be framed as follows;

H_0: $\rho_i = 0, \forall_i$

And the alternative hypotheses are given as

H_1: $\rho_i = 0$, For $i = 1, 2 \ldots . N1$ or

$\rho_i = 0$ for $i = N + 1, N + 2, \ldots \ldots \ldots . N$

This displayed that a nonzero fraction of the individual process is stationary. From the individual ADF regressions, the average of the t-statistics for ρ_i is adjusted to obtain the needed t-statistics.

Consequently, for this IPS panel unit root test

H_0 : Series contains unit root $\rho = 0$

H_1: Series does not contain unit root$\rho \neq 0$

Levin Lin Chu (LLC) Unit Root Test

The LLC is one of the first generation unit root tests; which were introduced by (Levin et al., 2002) under the assumption of a common unit root process across units in a panel data set. The prerequisite of this test was the data must be a strongly balanced panel. On the other hand, LLC specification requires the inclusion of the number of lags used in each cross-sectional unit, the kernel choices were used in the computation and the exogenous variables employed. His unit root test equation can be as follows.

$$\Delta Y_{it} = \theta + \rho y_{it-1} + \sum_{j=1}^{p} \gamma_j y_{i,t-j} + \beta x_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.25)$$

In the equation above, t and i denote that the time and the cross-sections respectively. The LLC tests the null hypothesis of $\rho_i = \rho = 0$ against the alternative hypothesis is$\rho_i = \rho < 0$ in another way; the LLC tests the null hypothesis that the series contain a unit root, against the null hypothesis that the series is not containing a unit root.

H_0: $the\ series\ contain\ unit\ root (\rho = 0)$

H_1: $the\ series\ does\ not\ contain\ unit\ root (\rho \neq 0)$

Cross Sectional Dependence

The reports of an ever-growing financial and monetary integration of nations and financially implies strong interdependence among cross-sectional units. As the result of the upward push within the side, the numbers of panel statistics literature stated that the existence of cross-sectional dependence in the error is usual. The reason behind this may be the presence of common shocks and unobserved components that ultimately become part of the error term. In addition to this ignoring, the cross-section dependence may cause failure in the properties of standard panel estimators such as biasedness and consistency (Sarafidis and Wansbeek, 2012). As the result of the rise in the numbers of panel data literature that, When

units forming the panel are related to error term in panel data the econometric analysis of cross-sectional dependence could be explained by considering a situation that units forming panel are affected by a shock, then other units of the panel are affected as well. The model representation is;

$$y_{it} = \theta_i + \beta_i x_{it} + \varepsilon_{it} \quad \ldots\ldots (3.26)$$

$$\text{Cov-}(\varepsilon_{it}, \varepsilon_{ij}) \neq 0$$

Although there are, various tests to analyse cross-sectional dependence in the panel data, this study uses the (Pesaran et al., 2004) CD_{LM} for the analysis. This test is selected based on suitability for large T and small N of panel data.

$$CD_{LM1} = T \sum_{i=1}^{N-1} \sum_{j=i-1}^{N} \tau\hat{}2_{ij} \quad \ldots\ldots (3.27)$$

This test uses the OLS-based sum of correlation squares among cross-section residuals and has N (N-1)/2 degrees of freedom. The null and alternative hypotheses of the test are;

$H_{0:}$ No relations between cross-sections

H_1: Relation exists between cross-sections.

CD_{LM} test is to examine cross-sectional dependency in panel data and calculated with the following formula.

$$\frac{\sqrt{2T}}{N(N-1)} \sum_{j=1}^{N-1} \sum_{j=i+1}^{N} \tau\hat{}2_{ij} \quad , N(0,1) \quad \ldots\ldots (3.28)$$

This test is based on an asymptotically standard normal distribution with similar other features and hypotheses for the above test. $\tau\hat{}2_{ij}$, is the sample estimate of the pair-wise correlation of the model residuals.

Panel Co-integration Test

Co-Integration test is always common in time series analysis. Time series is said to be co-integrated if the time series taken individually are integrated of order one meaning that it is non-stationary with unit root while some linear combination of the series is stationary or I (0). Co-integration means although many developments can cause a permanent change in the individual element of series there is some long-run equilibrium connecting the individual components together. Thus, testing the presence of this long-run relationship is the most

important elements of time series analysis and current become popular in panel data analysis (Barbieri, 2008). The widely used panel co-integration when the independents in the model are more than seven in number Kao co-integration test is efficient.

H_0: This based on null hypothesis of no co − integration

H_1: All panels are co − integrated

Lag Length Selection Criteria

In the nature of time-series data to test serial correlation having appropriate lag length is mandatory. Determining the maximum lag in time series data needs choose of parameters that minimize information criteria. The highly know information criteria are, Akaike information criteria (AIC), Schwarz information criteria (SC), and Hannan- Quin information criteria. Commonly the model with a lower value is preferred.

CHAPTER FOUR

RESULT AND DISCUSSION

In this part the study analysis the descriptive statistic and inferential statistics on the debt status for east Africa countries and trend of economic growth, level of the external debt stock, and institutional quality by using RGDP, EXD, and IQI respectively as a means of trend analysis for six selected eastern African countries.

4.1 Debt Status of East African Countries

From Table 4.1, based on the debt measure, on average, total debt stock as percentages of GDP and external debt as percentages GNI in east Africa stands at 59.2 and 35.1 percentages respectively. This has been compelled by an attempt to sustain the economies through borrowed funds spent mainly on infrastructural development within revenue underperformances. However, on average the region has recorded 31.2% external debt as a percentage of GDP. The total debt as percentages of GDP for east African countries was so large this indicates that the region is highly indebted. Among the listed east African countries the total public debt as a percentage of GDP ranged from 24.3 percentages in Comoros to 165.1 in Eritrea. The total debt to GDP ratio is greater than 60 percentages for Burundi, Eritrea, and Kenya, but between 50 and 60 percent for Ethiopia and Seychelles and less than 50 percentages for Comoros, Rwanda, Tanzania, and Uganda. However, the level of external debt ranges from 14.1 percentages for Burundi to 58 percentages for Eritrea. The lowest external debt ratio as GNI percentages is 19.15 which recorded in Burundi and the highest is recorded in Rwanda amounted to be 62.0 percentages within this period.

Table 4. 1 Government Debt in the East Africa Region, by Country 2019

Government Debt in the East Africa Region, by Country 2019			
Countries	**Total debt /GDP**	**External debt /GDP**	**External debt /GNI Percent**
Burundi	63.5	14.1	19.15
Comoros	24.3	22.7	25.6
Eritrea	165.1	58	-
Ethiopia	59.1	29.9	29.68
Kenya	61.6	32.1	36.56
Rwanda	49.1	42.3	62.0
Seychelles	53.8	26.5	-

South Sudan	34.4	-	-
Tanzania	37.7	26.2	31.8
Uganda	43.6	29.2	40.8
East Africa	59.2	31.2	35.1

***Source**: East African Economic Outlook (2020) and own survey, 2021, **Note**: data on other east African countries was not available.*[1]

Furthermore, East African countries have facing an increasing debt burden over time. This creates debt vulnerability in the region. Specifically, debt liabilities have increased over time in some countries during the 2013-2019 periods. Among them, Ethiopia went from low debt distress to high level of debt distress, Kenya went from low to moderate debt distress, South Sudan went from moderate to extreme debt distress, and Eritrea and Sudan went from high to extreme debt distress from 2013 to 2019 in the East African region as displayed in table 4.2. This situation is very alarming which depicts that debt accumulation and indebtedness are mainly driven by the weak institutional quality for east African countries domestically.

Table 4. 2 Risk of Debt Distress for the East African Countries, between 2013 and 2019

Risk of Debt Distress for the East African Countries, between 2013 and 2019					
The transition from row to column		2019			
		Low	Moderate	High	Distress
2013	Low	Tanzania Uganda	Kenya	Ethiopia	
	Moderate	Rwanda			South Sudan
	High		Comoros	Burundi Djibouti	Eritrea Sudan

***Source**: East African Economic Outlook (2020)*

4.2 Trend of External Debt, Institutions and Economic Growth for Six East African Countries

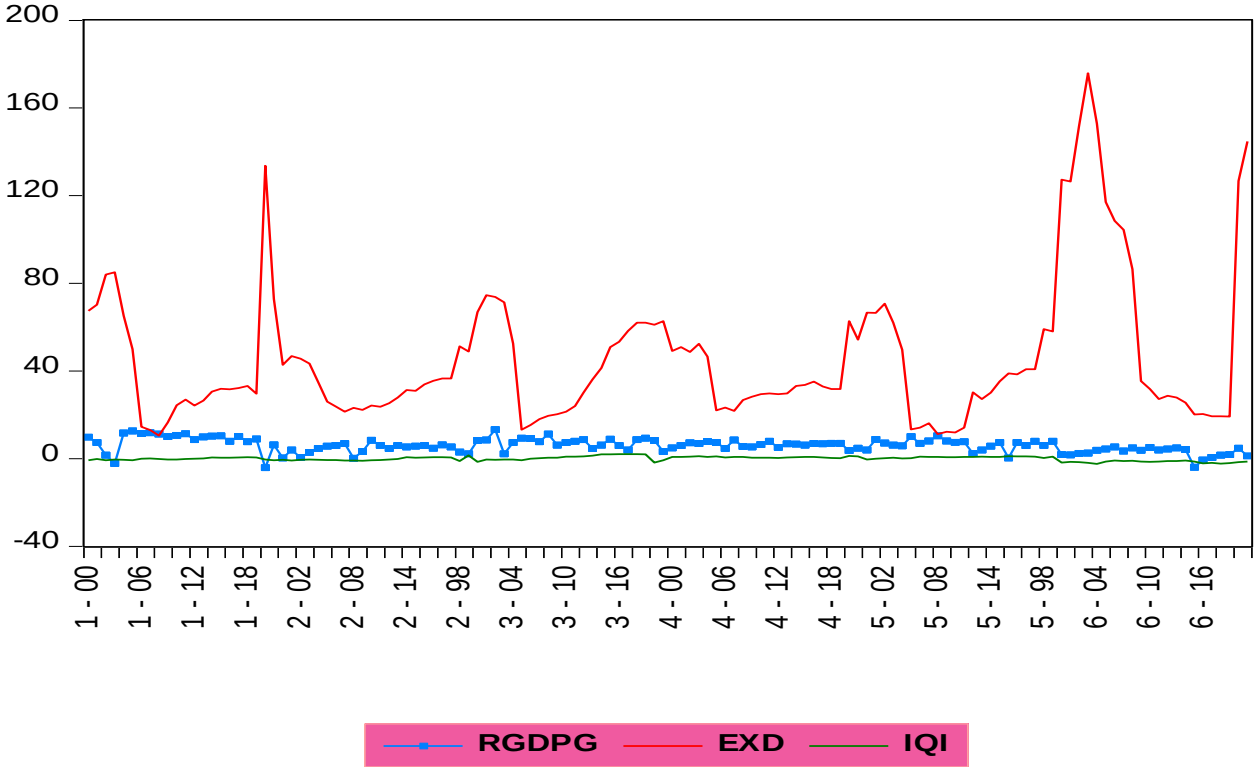
To deals with the analysis of the economic situation, the level of institutions and external debt stock of east Africa countries RGDP growth, IQI index, and EXD as a percent

[1] *Where RGDPG represent the growth of real gross domestic product, EXD (External debt as percentage of Gross national income and IQI (Stands for institutional quality composite index of three institutions such as control of corruption, rule of law and government effectiveness. The numerical number 1, 2, 3, 4, 5 and 6 are stand for those countries under the study for period of 1998-20019 for 22 years. Those are Ethiopia, Kenya, Rwanda, Tanzania, Uganda and Burundi respectively.*

of GNI was used for selected six east African countries. Accordingly, figure 4.1 below shows that the trend of their economic growth within the region. For the sake of analysis numeric number (1-6) is the show the name of country code used in the study which represents Ethiopia, Kenya, Tanzania, Rwanda, Uganda, and Burundi respectively on the graph. The economic performance of Ethiopia, Kenya, Burundi, and Tanzania between 1998- 2002 was experiencing downturns in which their real GDP growth was negative across the time interval. However, among these countries in the region, Ethiopia was the least in terms of economic performance by having negative economic growth during this period. Moreover, in Rwanda and Uganda from the time interval of 1998-2002 they were undergoing a positive economic performance; but at a low level.

Furthermore, the trend of external debt for six selected east African countries is fluctuating over time. The level of external debt stock with countries remains high averaging 45.52 percentages of GNI from 1998 to 2019. Consequently, regarding the level of debt accumulation under the study period, Burundi was the most indebted east African country in 2003 which amounted to be 175.85 percentage of the country's gross national income. However, in 2008 Ethiopia was the less indebted country with total external debt stock as a percentage of gross national income (GNI) amounted to be 10.50 percentages. This justifies that the selected East African countries are heavily dependent on external debt to fill their financial gaps. On the other hand, the improvement of institutional quality over the year which indicates good governance level and bad institutional quality index of east African countries is recorded by Rwanda and Burundi respectively in 2017 and 2004 among the selected countries for the study.

Figure 4. 1.Trend of External debt, Institutional quality and Economic Growth in East African countries



***Source**: own plot by using WB data, 2021*

4.3 Descriptive Statistics

From table 4.3 We can point out that the descriptive statistics of the variables, which is the mean of real growth domestic product rate (RGDPG) for six east African countries used in the empirical analysis averaged 6.02 percentage 1998 and 2019 ranging from the negative 4.2 percentage for Ethiopia in 1998 to a maximum positive 13.2 percentages economic performance recorded in Rwanda in 2001 with a standard deviation of 3.2. This difference in economic growth among the countries may be due to vulnerability or shocks in domestic and external factors such as global economic collapse, deteriorating of commodity market price, deterioration of term of trade, and financial crisis in global economies.

Furthermore, the level of external debt stock with countries remains high averaging 45.52 percentages of GNI for the six countries for the period of 1998 to 2019. Consequently, regarding the level of debt accumulation understudy period, Burundi was the most indebted east African countries in 2003 which amounted to be 175.85 percentage of the country's gross national income. However, in 2008 Ethiopia was the least indebted country with total external debt stock as a percentage of gross national income (GNI) of 10.50. This justifies

that the east African countries heavily dependent on external debt to bridge up to their financial gaps. On the other hand, the improvement in institutional quality over the year which indicates a good governance level and a bad institutional quality index which implies a low governance level for east African countries was recorded by Rwanda and Burundi respectively in 2017 and 2004.

Table 4. 3. **Descriptive Summary**

	Mean	Median	Maximum	Minimum	Std. Dev.	Sum	Sum Sq. Dev.	obs
RGDPG	6.028	6.2	13.2	-4.2	3.222998	795.8	1360.791	132
EXD	45.513	33.410	175.849	10.508	32.512	6007.75	138469	132
EXDIQI	-11.545	4.124	129.909	-359.427	72.928	-1524.06	696740.1	132
EXD^2	3119.29	1116.29	30923.22	110.460	5121.5	411747.4	3.44E+09	132
GCF	21.857	21.057	39.417	2.781	7.925	2885.101	8228.111	132
GE	-0.604	-0.568	0.267	-1.582	0.375	-79.702	18.46	132
IQI	2.20E-08	0.179	2.121	-2.350	1.000	2.90E-06	131.0061	132
PG	2.908	2.824	8.118	1.031	0.781	383.8909	79.927	132
CC	-0.683	-0.779	0.762	-1.458	0.464	-90.134	28.285	132
RL	-0.662	-0.595	0.129	-1.537	0.373	-87.358	18.226	132
TO	44.075	45.136	67.514	22.448	9.835	5817.94	12673.2	132

Source: *Stata output, 2021*

Note: where RGDPG real GDP growth, EXD stands for external debt %GNI, EXD^2 external debt squared, PG population growth, EXDIQI, the interaction between external debt and institutional index, IQI, institutional quality index, CC control of corruption, RL rule of law, GE government effectiveness, GCF gross capital formation and TO trade openness of the economy.

Trade openness of the economy is measured by the sum of export and imports value dividing by gross domestic product. The mean value of openness of the economy is 44.07 percentages for the period of 1998 to 2019. The minimum and maximum values for this variable are ranging from 22.44 percentages for Burundi in 1999 to 67.51 percentages again in Burundi in 2009. The variation from the mean is 9.8 percentages. The summary statistics also showed that the annual population growth for the period 1998 to 2019 stood on average at 2.90 percentages with a standard deviation of 0.78 percentages. However, the minimum

and maximum population growth rate recorded is 1.03 and 8.11 percentages annual in Burundi in 1998 and Rwanda in 1998 respectively.

As per summary statistics based on table 4.3, the average gross capital formation as a percentage of GDP is 21.85 from the period of 1998 to 2019. The ratio is ranging from a minimum value of 2.78 percentages for Burundi 2000 to a maximum value of 39.41 for Ethiopia in 2015. The variable standard deviation is also 7.92 percentages.

4.4 Correlation Analysis

Correlation analysis is a statistical method used to evaluate the strength of a relationship or a degree of association between two or more quantitative variables. A high correlation means that two or more variables have a strong relationship with each other, while a weak correlation means that the variables low related. However, the correlation coefficients are a numeric value of a relationship between two or more variables and it is a sign that represents the direction of the relationship. The correlation coefficient ranges from -1 to 0 to +1. A Correlation coefficient of zero indicates that no association exists between the measured variables. But the closer value to (+1) correlation coefficients, regardless of their sign, the stronger association exists between the variables. The result of correlation in table 4.4 below confirmed that most of the variables exhibit positive association with real GDP; few others exhibit negative association with real GDP growth. Specifically, external debt and it is the squared have a negative association with real GDP growth rate.

Table 4. 4. Correlation Analysis

Variables	***RGDP***	***EXD***	***TO***	***PG***	***GC***	***GE***	***RL***	***CC***	***EXD2***	***EXDIQI***
RGDP	1									
EXD	-0.34	1								
TO	0.106	-0.37	1							
PG	0.002	-0.04	-0.02	1						
GCF	0.472	-0.48	0.02	-0.02	1					
GE	0.346	-0.4	0.26	-0.06	0.37	1				
RL	0.353	0.35	0.22	-0.16	0.58	0.74	1			
CC	0.342	0.03	0.09	-0.18	-0.31	0.60	0.60	1		
EXD^2	-0.34	0.9	-0.36	-0.083	-0.497	-0.51	-0.42	-0.07	1	
EXDIQI	0.303	-0.69	0.31	-.065	0.550	0.739	0.810	0.398	-0.79	1

Source: *Stata output, 2021*

4.5 Panel regression Diagnostic Test

4.5.1 Panel Unit Root Tests

To check whether our variables have unit root or not in the model the two commonly known panel unit root tests were used are (Levin et al., 2002) test and (Im et al., 2003). Accordingly, the table below the display that the value of t- statistics and the probability value with the order of zero (level) and order of one (first difference) for the used variables in the model. The base of this test was based on the null hypothesis which states that the series contain unit root; meaning that the series is non-stationary in the model. Then to accept or failed to reject the null hypothesis we compared it t-statistic with a probability value. If the probability value t-statistics is less than the 5% or 0.005 critical values, then the null hypothesis is rejected and confirms that the series is stationary. However, if the probability value t-statistics is greater than the 5% or 0.005 critical values, then the null hypothesis failed to reject and confirm that the series is non-stationary.

From table 4.5, the t-statistics and the probability values of the variables displayed that the interaction term of external debt and institutions (EXDIQI), real GDP growth (RGDPG), and population growth (PG) was stationary at a level. This means the variables have no unit root at the level. However, variables such as external debt (EXD), and External debt squared (EXD^2), gross capital formation (GCF), and trade openness (TO) become stationary after the first difference. This implies that variables are containing unit root at the level and become stationary after the first difference. Furthermore, the test of this variables unit root was by including both individual intercept and trend except for the variables debt square (EXD^2) which used with scenarios of None without including both the trend term and intercept. This indicates that the panel ARDL Approach is very useful due to the combined stationarity of variables at the level I(0) and the first difference I(1) of the explanatory variables.

Table 4. 5 Panel Unit Root Test

Variables	LLC Test		IPS Test	
	Level	**1st difference**	**Level**	**1st difference**
RGDPG	-3.62329 0.0001	-6.71034 0.0000*	-3.04608 0.0012*	-7.24919 0.0000*
EXD	0.86233 0.8057	-1.39822 0.0810***	1.73250 0.9584	-1.73556 0.0413**
EXD^2	1.42240 0.9225	-7.30357 0.0000*	1.29514 0.9024	64.6276 0.0000 *

IQI	-2.66155 0.0039*	-1.83880 0.0330**	-2.41821 0.0078*	-5.35524 0.0000*
EXDIQI	-6.50625 0.0000*	-2.73748 0.0031*	-5.16915 0.0000*	-7.52484 0.0000*
GCF	0.66715 0.7477	-4.44945 0.0000*	1.31935 0.9065	-4.49138 0.0000*
PG	-20.5938 0.0000*	-6.57987 0.0000 *	-22.9478 0.0000*	-6.93638 0.0000 *
TO	-0.36794 0.3565	-3.86378 0.0001*	1.12054 0.8688	-4.46156 0.0000 *

***Source**: Eviews 10 output, 2021*

***Note**: where * ** and *** represent the level of significance at 1%, 5% and 10% respectively. LLC stands for Levin, Li, and Chu; IPS implies Im, Pesaran, and Shin test of panel unit root test. Whereas, RGDPG real GDP growth, EXD stands for external debt %GNI, EXD^2 external debt squared, PG population growth, EXDIQI, the interaction between external debt and institutional index, IQI, institutional quality index, CC control of corruption, RL rule of law, GE government effectiveness, GCF gross capital formation and TO trade openness of the economy.*

4.5.2 Cross-Sectional Dependence Test

To test the cross-sectional dependence of whether the residuals are correlated across entities or not, the study employed the Pesaran CD test. According to the Pesaran CD test, the result is not statistically significant at 5% level of significance to reject the null hypothesis of no cross-sectional dependence. Therefore, the null hypothesis of no cross-sectional dependence is accepted. These show residuals are not correlated across entities.

4.5.3 Normality Test

An assessment of the normality of data is a prerequisite for many statistical tests because normal data is very important for parametric testing. Non-normal error components in the panel affect the performance of several tests like the performance of panel data heteroscedasticity test severely affected. To check the normality of the error term, this study used the Jarque-Bera test for a panel data model. The error is to be normal it must them a probability value greater than 5% or 0.05. From the result of Jarque-Bera result, we can conclude that the error term is normal distributed because of the p-value greater than 0.05 of the level of significance.

4.5.4 Co-integration Test

Co-Integration test is always common in time series analysis. Time series is said to be co-integrated if the time series taken individually are integrated of order one meaning that it is non-stationary with unit root while some linear combination of the series is stationary or I (0). Co-integration means although many developments can cause a permanent change in the individual elements of series there is some long-run equilibrium connecting the individual components. Thus, testing the presence of this long-run relationship is the most important element of time series analysis after the panel unit root test. This test can be conducted by Pedroni (Engle-Granger based), Kao (Engle-Granger based), and Fisher (Combined Johansen). Panel co-integration by Pedroni is applicable when we have less than seven variables in the model. However, for this reason, we cannot apply Pedroni due to our variables greater than seven in number. Therefore, we test co-integration among series through the Kao panel co-integration test. The null hypothesis of the test is no co-integration among the variables. From table 4.6 we can reject the null hypothesis of no co-integration at 1% level of significance. This implies that there is co-integration among the explanatory variables in the long run.

Table 4. 6. Kao panel co-integration test

	t-statistic	*Prob.*
ADF	*-6.440642*	*0.000**

Source*: Eviews 10 output, 2021*

4.6 Lag Length Selection Criteria

In the nature of time series data to test serial correlation having appropriate lag, length is mandatory. Determining the maximum lag in time series data needs choose of parameters that minimize information criteria. The highly know information criteria are Akaike information criteria (AIC), Schwarz information criteria (SC), and Hannan-Quin information criteria. This study used the automatic lag selection with the option of Akaike information criteria (AIC) to run a regression of both non-linearity and the role of institutions on economic growth with different lag lengths. Therefore based on the graphical summary which was attached in the appendix the maximum lag length for the non-linearity test was 3 for the dependent variable and 1 for each independent variable. However, in the case of the impact institutional-quality analysis, the maximum lag length was 2 for the dependent variable and 1 for each independent variable this was based on Akaike information criteria.

4.7 Econometrics Result Discussion

4.7.1 The Effect of External Debt on Economic Growth

4.7.2 Test for Non-Linearity ARDL-PMG Result Estimation

In order to examine the non-linearity objective of the study between external debt and economic growth the pooled mean group estimator of the panel ARDL model is employed to run the long-run and short-run growth model. From the result of the long-run output below, the parameters of external debt and its squared term bear the positive and negative sign and statistically significant at 1 percentage of the level of significance. More specifically, holding other variables constant, a one percent increase in external debt could cause increase economic growth by 0.71 % annually. However, beyond its threshold level, a unit increase in external debt begun to reduce the economic growth by 0.006% amounts annually.

This significant change of the sign of external debt from a positive sign to the negative sign of squared external debt confirmed that there is a nonlinear impact of external debt on economic growth for the selected East African countries for the study period. This set that the relationship between economic growth and external debt in the selected east Africa countries follows an inverted U-shaped pattern. This finding consistent with or get conformability from Chigeto, (2017); Doğan and Bilgili, (2014); Égert, (2012); Hassan, (2020); Kaur et al., (2014); Megersa, (2015); Mencinger et al., (2015); Pattillo et al., (2002); Reinhart and Rogoff, (2010); Swastika et al., (2013), those who concluded that there is a non-linear relationship between external debt and economic growth with inverted U-shaped pattern of external debt.

Moreover, the finding also consistent with the non-linearity analysis of Apere, (2014; Aswata et al., (2018) which states that the effect of external debt and institutional quality on investment through the channel of economic growth variable. However, the finding contradicts the finding of Ejigayehu, (2013); Fosu, (1999); Gachunga, (2018); Jayaraman and Lau, (2009); Musibau et al., (2018); Okoye et al., (2017); Senadza et al., (2017); Spilioti and Vamvoukas, (2015) and Al Kharusi and Ada, (2018); Awan and Qasim, (2020); Ayomitunde, (2020); Getinet & Ersumo, (2020); Herndon et al., (2014); Udoh et al., (2020) those who claimed that there is the linear impact of external debt on economic growth.

Furthermore, the significant and opposite sign of external debt, in the long run, justifies that external debt has a dual effect on the economic growth of six east African countries; which that at a moderate level external debt stock sustain economic growth before reaching its threshold level of having a negative contribution to growth.

Table 4. 7. Growth Model: PMG Estimation Result of non-linearity of external debt on growth

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Estimates				
EXD	0.713333	0.089522	7.968212	0.0000*
EXD^2	-0.005670	0.000725	-7.81936	0.0000*
IQI	6.637787	0.963923	6.886222	0.0000*
TO	0.033520	0.003519	9.524908	0.0000*
PG	4.437782	0.435068	10.20020	0.0000*
GCF	-0.123706	0.050299	-2.45943	0.0173**
CC	-6.878865	1.713389	-4.01477	0.0002*
Short run Estimates				
EC	-0.454657	0.258094	-1.76159	0.0840***
D(RGDPG(-1))	-0.483331	0.164134	-2.94473	0.0048*
D(RGDPG(-2))	-0.364572	0.142876	-2.55166	0.0137**
D(EXD)	-0.509046	0.396306	-1.28447	0.2047
$D(EXD^2)$	0.005590	0.004249	1.315646	0.1941
D(IQI)	1.653346	3.061600	0.540027	0.5915
D(TO)	0.028619	0.034876	0.820596	0.4156
D(PG)	-12.41569	6.251851	-1.98592	0.0523***
D(GCF)	0.255630	0.375829	0.680177	0.4994
D(CC)	9.654013	6.172799	1.563960	0.1239
C	-9.363324	4.511768	-2.07531	0.0429**

***Source**: Eviews 10 output, 2021*

Note*: The asterisks of *,**, and *** stand for the significance level of coefficient at 1%, 5%, and 10% level of significance respectively.*

4.7.3 The Effect of Control Variables on Economic Growth

The gross capital formation has a negative significant long-run effect on economic growth with the unexpected sign. This show holding other factors constant, one percentage increase in gross capital formation has negative effect on economic growth by 0.12 percent amount in long run but it has positive impact and increases growth by 0.25 percent in short run. This finding contradicts in long run both the classical and neoclassical growth model which argues that if there is no capital, there is no investment and growth but supports the finding of (Kendrick, 1993). This confirms that having accumulated capital alone in fewer developing countries does not lead to economic growth when there is inefficiency in

allocating capital from less productive to more productive sectors. This may be due to accumulated capital in the hand of some top officials in East African countries through looting which has no countries development contribution rather its capital warehouse. However, in the short-run gross capital formation has a positive insignificant effect on economic growth. Trade openness has a positive effect on economic growth in the long run and short run this contradict the finding of (Aswata et al., 2018) . This justifies that the expansion of trade leads to higher level of economic growth through technological and knowledge diffusion from advanced countries for home economy.

Moreover, the level of population growth has an unexpected positive significant effect on economic growth, in the long run. More specifically, holding other factors constant, one percentage increase in population growth is increase economic growth by 4.43 percent annually in long run. This confirmed the theory of population growth developed by Boserup, (1965) which argue that high population growth increases the pressure to use the available resource more effectively and make people innovative to supply the population with food and other necessary resources; this in return have positive impact on economy in long run. But they have a significant negative effect in the short run. But, the coefficient of control of corruption has an unexpected negative significant effect on economic growth; which implies that the existence of corruption has a positive impact on growth. This confirms the hypothesis of ‘’grease the wheels’’ which stated that corruption should be tolerated in as much as it provides an effective way of mitigating the distortions created by ineffective bureaucratic procedure and especially in countries burdensome and often changing regulations under the study period and agree with (Green, 2011; Habibov et al., 2017, 2019; Kéita and Laurila, 2016, Winters and Weitz-Shapiro, 2013).

On another hand, the institutional composite index has a positive significant impact on economic growth in the long run for the study period. This show holding other factors constant, one percentage improvement in institutional quality level would increase economic growth by 6.63 percent annually. However, in the short run the positive effect is not statistically significant to increase growth. This shows that countries with improved institutional quality have improved levels of economic growth in the long run. This agrees with the finding of Aswata et al., (2018); Imbs and Ranciere, (2005); Kirch and Terra, (2012); Sani et al., (2019) which concluded that viable institutions play a positive role in economic growth. And also get conformability with the study Vianna and Mollick, (2018) who investigated that the role of institutional quality on economic development for 192

countries in Latin America from 1996-2015 and found that institutions have a positive impact on world development. On other hand, the finding also supports Gurvich, (2016) who examined that the failure of the development programs in the Russian economy was due to a rigid institutional framework, and conclude that economic growth cannot improve without institutional reforms.

Moreover, the PMG regression result displayed the sign and value of error correction term in the short run which is used to analyse the co-integration among the variables under the study period. The error term coefficient measures the speed of adjustment toward long-run equilibrium after a long disturbance or shocks in the short run. This coefficient of the EC is expected to be less than one and significant if the variables in the model are to be co-integrated. From the above table, the EC bears a negative sign, less than one, and significant at 10% level of significance. This confirmed that there is a long-run relationship exists among all the variables in the model and any shock in the short run is adjusted toward long-run equilibrium by 45.5% speed annually.

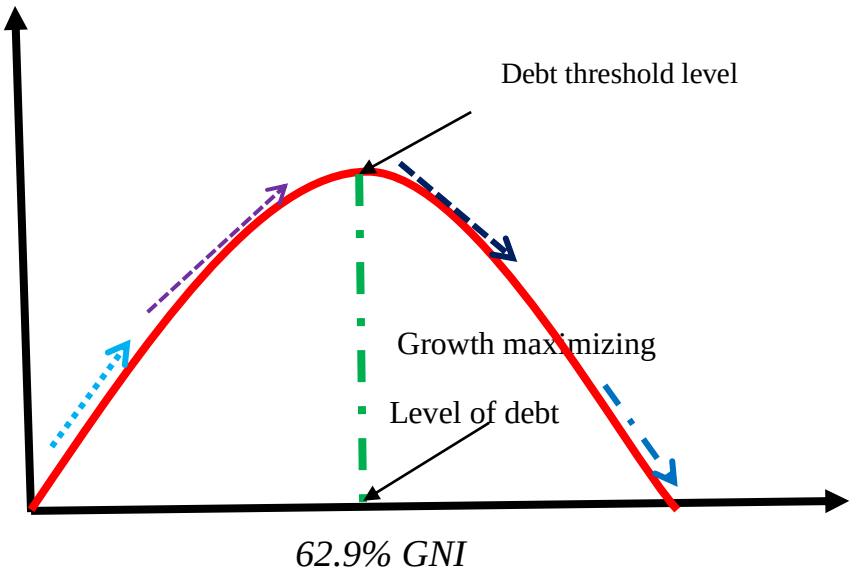
On the other hand, in the short run, both external debt and also its square brought an opposite sign with a U-shape pattern but, not statistically significant to confirm non-linearity in the short-run with the U shape pattern. This implies that external debt has no significant impact on economic growth in the short run for the study period. In addition, the lagged dependent variable growth of economy has a statistically significant negative impact on its self under the study period. This contradict study by Ayomitunde, (2020) who found the negative effect of external debt and economic growth and the past economic growth does not contribute to the current economic growth.

4.7.4 Threshold Level of External Debt

The finding suggested that external debt has a dual effect on economic growth. This implies that the existence of a turning level of external debt depresses economic growth beyond certain point. This threshold level of external debt is determined by using a model derived in 3.21 equations. The threshold level of external debt for six east African countries which become negatively affect their economic growth beyond the determined level is 62.9 $(\frac{-0.713333}{-2(0.005670)} = 62.9)$ as a percent of GNI for the study period. However, the maximum average external debt as % of GNI for east African countries in 2019 is 35.1 but for six selected East African countries under the study periods are 176 percentages from descriptive statics'. This confirms that countries in East Africa countries under the study period are

accumulated excess amount external debt over their threshold amount which is 62.9% to other countries in the region. This over accumulated amount of external debt has a negative impact on their economic growth. But this amount is too large than sub-Saharan African countries excluding high-income countries which were about 37.7 as a percentage of GNI in 2019 evidence-based on World Bank data. On the other hand, for low and middle-income countries as a whole, the level of debt as a percentage of GNI is 25.9 in 2019 compared to this finding. This result shows that external debt become negatively affect economic growth after reaching this maximum level of external debt for east Africa countries under the study period. Moreover, before the turning point of 62.9 % of inverted U shape pattern at an initial level, external debt has a positive effect on economic growth and becomes deleterious effect on economic growth after reaching this stated level to the right from below graph.

Contribution of debt to GDP



Source: Author draw, 2021. ***Figure 3.*** Debt Laffer curve

Robust Checks

To check the robustness of the ARDL estimate result, this study employed an alternative co-integration technique, namely the grouped mean panel fully modified ordinary least squares (FMOLS). This technique is best for its efficiencies to control for the endogeneity bias of the explanatory by integrating the semi-parametric correction of (Phillips and Hansen, 1990) to the OLS estimator. Moreover, FMOLS estimators are adjusted for serial correlation, which results in the efficiency of the estimates. Let us check the test of co-

integration before estimation of the model. from the table, four of the panel co-integration test result scenarios are within dimension-based statistics and called panel co-integration statistics, whereas the remaining three result scenarios are based on the between dimension and called group mean panel co-integration statistics. Furthermore, the result of the panel co-integration test is presented in table 4.8 is with both intercept and trend. From the total seven statistics, majority of them are rejecting the null hypothesis of no co-integration but three of them support the null hypothesis of no co-integration. Therefore, based on the overall result we reject the null hypothesis of no co-integration, meaning that there is co-integration in the long run among the variables.

Table 4. 8. Panel Co-integration Test

	Within dimension	
	Statistic	Prob.
Panel v-statistic	-2.5455	0.9945
Panel rho-statistic	1.915150	0.9723
Panel pp-statistic	-16.22303	0.0000*
Panel ADF-Statistic	-6.254292	0.0000*
	Between dimension	**Prob.**
Group rho-statistic	2.54554	0.9970
Group pp-statistic	-21.0311	0.000*
Group ADF- statistic	-7.082516	0.000*

Source: *Eviews 10 outputs, 2021* **Note** *: The asterisks of *,** and *** stands for the significance level of coefficient at 1%, 5% and 10% level of significance respectively.*

The robust estimates of FMOLS are reported in table 4.9. From robust estimates, the external debt and its squared coefficient have bear positive and negative signs. This confirmed that the existence of the non-linearity impact of external debt on real GDP growth at 1% level of statistical significance. Specifically, the opposite sign of both external debt and external debt square justifies that the relationship between external debt and economic growth follows an inverted U shape pattern. This robust estimate agreed with the ARDL estimates of the dual impact of external debt on economic growth.

Table 4. 9. Panel FMOLS Robust Estimates

Variables	Coefficient	Std. error	t- value	Prob.
EXD	0.140818	0.035376	3.980624	0.0001*
EXD^2	-0.002693	0.000501	-5.379241	0.0000*
IQI	0.280421	0.179877	1.558961	0.1218
GCF	0.220846	0.026447	8.350571	0.0000*
PG	-3.583529	0.624993	-5.733708	0.0000*
TO	0.056764	0.010121	5.608336	0.0000*

Source: *Eviews 10 output, 2021.* ***Note*** *:The asterisks of *,** and *** stands for the significance level of coefficient at 1%, 5% and 10% level of significance respectively.*

4.8 Role of Institutions in Relationship between External debt and Growth

Nowadays, the effects of institutional quality become interesting issues-particularly in developed countries but have got less concern in developing countries in the literature. Several studies were conducted in an area particularly for developed countries. However, the study in east Africa countries was so rarely regarding this issue and no study determined the turning point of institutional quality required for external debt to sustain economic growth for east African countries.

Now before going to check the contingency role of institutional quality in the relationship between external debt and economic growth knowing the direct effect of institutions on economic growth is an important issue. The effect of the institutional index has a positive significant impact on economic growth from the above table non-linearity check. This shows in east Africa the level of institutional quality is very important for positively contributes to economic growth in the region. However, to analyse the contingency role played by institutional quality this study compared the individual and composite index of three variables as the effect of institutional quality in the nexus between economic growth and external debt for the study period.

Table 4. 10. PMG result Estimates: The role of Institutions on External debt nexus Economic Growth.

Variables	Coefficient	Std. Error	t-Statistic	Prob.*
long run estimates				
EXD	-2.773268	0.302987	-9.153088	0.0000*
EXDIQI	1.616444	0.171865	9.405322	0.0000*
EXDCC	0.061177	0.017575	3.481004	0.0010*
EXDGE	-0.051611	0.036935	-1.397349	0.1676

EXDRL	-4.264408	0.430845	-9.897770	0.0000*
GCF	0.028443	0.017640	1.612481	0.1123
PG	2.904274	0.379374	7.655444	0.0000*
TO	-0.043092	0.008385	-5.139000	0.0000*
	short run estimates			
EC	-0.652096	0.241598	-2.699096	0.0091*
D(RGDPG(-1))	-0.077686	0.116409	-0.667351	0.5072
D(EXD)	1.088304	1.485417	0.732659	0.4667
D(EXDIQI)	-0.708103	0.810179	-0.874008	0.3857
D(EXDCC)	-0.081041	0.085593	-0.946812	0.3477
D(EXDGE)	0.074325	0.076675	0.969353	0.3364
D(EXDRL)	1.828742	2.161157	0.846187	0.4009
D(GCF)	0.120872	0.185577	0.651328	0.5174
D(PG)	-8.990101	5.672483	-1.584862	0.1184
D(TO)	0.089342	0.050208	1.779451	0.0804***
C	-1.663382	0.737832	-2.25441	0.0280**

***Source*:** *Eviews 10 output, 2021,* **Note** *:The asterisks of *,** and *** stands for the significance level of coefficient at 1%, 5% and 10% level of significance respectively. EXCC external debt interacted with control of corruption, EXDGE external debt interacted with government effectiveness and EXDRL external debt interacted with rule of law.*

From table 4.10 above the long-run estimates of PMG external debt has a negative impact on economic growth and statistically significant at 1% level of significance. This suggests that there is a negative effect of external debt on economic growth in the long run. Moreover, the coefficient of interaction term of external debt and a composite index of the institutional quality index is positive and statistically significant at 1% level of significance. This confirms that the negative effect of external debt on economic growth, in the long run, could be reduced as the level of institutions is improved. Specifically, holding other factors constant, when a unit increase in external debt stock has a deleterious impact on growth by 2.77 percent, this adverse effect of external debt is reduced with those countries have a more improved institutional quality by 1.6 annually and increase economic growth by this amount annually. This finding agrees with finding by Hassan, (2020); Mohd Daud, (2020); Sani et al., (2019) and Gurvich, (2016); Vianna and Mollick, (2018); which state that external debt has a significant negative effect on economic growth and the improvement of institutional quality in sub-Saharan Africa countries mitigates such negative effect exerts on economic growth from external debt. Besides, the finding also confirms that Tarek and Ahmed, (2017) test the hypothesis that poor institutions lead to public debt accumulation.

On another hand, the individual interaction of external debt with government effectiveness and rule of law has a negative coefficient but government effectiveness failed to have a significant negative impact. However, the individual interaction of rule of law has a negative significant effect which implies that the rule of law intensifies the negative impact of external debt on economic growth. This coefficient sign is not with the expected sign of the study and contradict the previous finding of, Coray, (2017); Jalles, (2011); Kilishi et al., (2013); E. Kim et al., (2017) those found that the effects of rule of law on the debt growth relation and witnessed a statistically positive significant impact of rule of law on the debt growth relationship. However, this finding confirms that study by Abera and Mulugeta, (2018) who concluded that the significant negative effect of rule of law on Real GDP growth. A contradictory result of rule of law with an unexpected sign for the study may due to a fragile situation in east Africa over time and over the expense of African governments for military purposes under the wear of rule of law. On the other hand, the estimate values recorded by world governance indicators for rule of law is very weak and a negative value. This indicates that under-development of institutional quality in the region.

Furthermore, the result of study regression confirmed that external debt to enhance economic growth for East African countries under the study period needs to attain institutional quality more than 1.72 level of threshold (-2.773268/1.616444). However, the descriptive statistic shows that the average institutional quality composite index for the sample stands at 2.20E-08 which is expressed as exponential, too small, and far below the stated threshold level. This implies that institutional quality in the region is underdeveloped. Therefore, an increase in external debt stock would depress economic growth in those countries in the sample within those have below this threshold level of the average institutional quality composite index. Population growth has positive impact on economic growth holding other variables constant and statistically significant at 1% level of significance in long run. This implies in the long run the growth of population increase the number of educated, skilled and innovators which have positive contribution on economic growth. However, the coefficient of trade openness in this model brings negative impact and statistically significant at 1% level in the long run. This implies that when economy highly open to the global market the domestic industry discouraged and overflowed by external product due to more import from outside this make infant industries to produce less and indirectly reduce the level of domestic economy through cash out flow from inside. On other hand trade openness creates high inflation and low exchange rate this have negative impact

on economic growth. Since investment is the component of economic growth this decrease in investments leads to decrease in economic growth in the long run.

Robustness Checks

This section presents the robustness by using other different measures of institutional quality for the estimated PMG results. This robust estimate used political rights and civil liberties and averaged them into principal component analysis to form a simple index as a measure of institutional quality to check their robustness with former results in the model. Table 4.11 reported that robust estimates of both the long run and short run pooled mean group estimates. From table 4.11, the robust estimate of external debt has a negative significant effect at 1% on economic growth in the long run. The robust result of interaction terms of institutions and external debt has a positive significant effect on economic growth at 1% level of significance. This confirmed that the negative effect of external debt on economic growth in the long run. Thereby, an increase in external debt stock has a deleterious impact on growth, this adverse effect of external debt on economic growth is reduced as the level of institutional quality improved and those countries that have a more improved institutional quality under the study period have a low negative impact of external debt on growth.

Table 4. 11. PMG Robust estimate results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
EXD	-0.040119	0.013111	-3.059866	0.0030*
GCF	0.195405	0.016174	12.08123	0.0000*
PG	0.401584	0.188755	2.127539	0.0363**
TO	-0.007438	0.010487	-0.709229	0.4801
IEXD	0.009263	0.002716	3.410701	0.0010*
Short Run Equation				
EC	-0.871642	0.183081	-4.760958	0.0000*
D(EXD)	-0.081227	0.060681	-1.338582	0.1843
D(GCF)	0.169757	0.118286	1.435137	0.1549
D(PG)	-1.871480	2.492049	-0.750981	0.4547
D(TO)	0.098817	0.047755	2.069266	0.0416**
D(IEXD)	0.003862	0.017267	0.223690	0.8235

***Source**: Eviews 10 output, 2021,* **Note** *:The asterisks of *,** and *** stands for the significance level of coefficient at 1%, 5% and 10% level of significance respectively. Whereas, IEXD interaction with new institutional quality index and external debt.*

Moreover, the effect of control variables results on growth was also confirmed to be robust. The robust estimate confirmed that gross capital formation and population growth have positively affected economic growth in the long run. However, trade openness has an insignificant impact on economic growth in the long run but has a statistically significant impact on real GDP growth in the short run. It confirmed robustness in the short run by having a positive significant impact on economic growth at 5% level of significance.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

This part presents the conclusion; recommendation based on the study finding under the study period and finally put the directions for further researchers. Conclusions for the estimated result in the previous part are presented in section 5.1 and the recommendation is presented in section 5.2 for this study. Finally, section 5.3 presented the directions of further researches.

5.1 Conclusions

This study examined the relationship between external debt and economic growth with the role played by institutional quality for selected 6 east African countries for 22 (1998-2019) periods by employing the ARDL approach. Over these two decades, East African countries have been heavily depending on foreign capital inflows to overcome the problem of a financial gap in the region. This resulted in the region being heavily indebted over time. This occurs due to the limited supply of domestic financial flows with the region to complement low domestic savings. Then, due to this borrowing assumed that it is vital to finance the dual gap problem for these low-income countries and promote their economic growth.

Different empirical studies concluded that the relationship between external debt and economic growth is a linear form. This implies that external debt has a single impact on economic growth whether a negative or positive effect on economic growth. However, some empirical studies confirmed that the relationship between these macroeconomic variables is not limited to a linear impact on growth rather is non-linear. This suggests that external debt has dual impact on economic growth by having a positive contribution to economic growth when moderately used and having a negative contribution to economic growth when excessively used beyond the certain limit.

This non-consensus among different empirical literature on the external debt and economic growth and the absence of current studies in east African countries with mediation role of institutions between external debt and economic growth distinguishes this study from the previous empirical literature. This study examined the non-linearity impact of external debt on economic growth and the role of institutional quality in the nexus between external

debt and economic growth for six countries east African countries with the period of (1998-2019).

The study was carried out in line with the general objective of the effect of external debt, institutional quality, and economic growth and with its specific objectives. The study used the PMG panel ARDL estimator to examine the non-linearity impact of external debt and economic growth. The estimated result confirmed that external debt has a dual impact on the economic growth of East African countries under the study. This implies that at a moderate level external debt has a significant positive contribution to economic growth and becomes a deleterious impact on economic growth beyond 62.9 percentages as GNI which is a maximum level of debt threshold for countries under study in the East African region. This study confirmed that there is an inverted U-shaped pattern impact of external debt and the connection between lower economic growth and high external debt accumulation and vice versa. This implies that countries that have high external debt stock have low economic performance with time and countries under the study.

Regarding the objective of whether the external debt-economic growth relationship is the function of institutional quality in eastern Africa countries and its effect on growth; the result of this study confirmed that the non-linearity impact of external debt on economic growth and to be a function of institutional quality. This implies that the negative effect of external debt on economic growth, in the long run, could be reduced as the level of institutions is improved. Specifically, when an increase in external debt stock has a deleterious impact on growth, this adverse effect of external debt is reduced with those countries that have a more improved institutional quality. Having good institutional quality is not only restricted to have an only positive impact on economic growth but also has basic a role in reducing the deleterious impact of external debt on economic growth.

Furthermore, the study confirmed that external debt to enhance economic growth for East African countries under the study period it must to be attain institutional quality more than 1.72 level of threshold (-2.773268/1.616444). But, the environment of institutional quality in the region is underdeveloped which their average is far below this threshold. Therefore, an increase in external debt stock would depress economic growth in those countries in the sample within those have below this threshold level of the average institutional quality composite index.

5.2 Recommendations

The study generates different policy implications based on the study result with the study period and countries. This policy implication may give the way for the policymakers and a government of the country under the study period to control external debt get out of hand in the region. The study found that external debt has a nonlinear impact on economic growth in eastern African countries under the study period. This illustrates external debt at moderate levels sustains growth, whilst external debt at high levels depresses economic growth. Moreover, the threshold of external debt beyond which it becomes deleterious to economic growth was computed at 62.9 % of GNI.

- Therefore, the sound policy implication of this is that the government of East Africa countries should harshly reduce their heavy dependence on external debt for their aspiration to grow below the stated threshold level; beyond this level external debt begun to have a negative effect on economic growth in the region.
- The governments of East Africa should reduce unproductive expenditure and have to maintain proper public finance systems and fiscal policy management to stabilize the external debt.
- Instead of heavily depend on external debt for development it may be better for governments of East Africa by mobilizing domestic resources to stimulate the domestic revenue collection process to fill their financial gap in their region domestically. This can be achieved by devising creative strategies for developing their tax base and reforming their tax collecting systems to control the level of tax evasion and avoidance in so doing governments generate revenue.
- Furthermore, the government should be allocated properly the accumulated debt to address poverty eradication, supplement infrastructural shortfalls, stimulate production and promote the development of an economy. This enables the government to stimulate inclusive growth in the economy and in that way may reduce the burden of external debt on economic growth in the region.

Regarding the quality of institutions or governance indicators in EA countries which is low and it constitutes a problem that hinders various efforts to made suitable economic reforms and sustainable development.

- The government of east African countries should be paid attention in improving their level of institutional quality and fiscal policy. Because,

without paying attention and without overcoming this obstacle in their region, government efforts towards maintaining optimal debt stock with the aim of promoting economic growth and financial stability can be depressed by these institutional factors. Therefore, handling this issue would improve the investment environment for investors thereby result in inflows of foreign capital which have a positive contribution to economic growth in the region.

5.3 Directions for Future Research

This research was confined to analysis the relationship between external debt, institutional quality and economic growth by employing three indicators of institutional quality to examine contingency role played by it. Therefore, for the future research it may be better if include all indicators of institutional quality for further studies on this topic to examine the relationship between external debt and economic growth. Next, this study is limited to six east African countries; so, the coming researchers should increase the sample of countries to check non-linearity impact of external debt on economic growth for east African countries as whole.

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Appendix

Descriptive Summary Stata 16 Result

```
. sum rgdpg exd to pg gcf ge rl cc iqi exdiqi exdsq
```

Variable	Obs	Mean	Std. Dev.	Min	Max
rgdpg	132	6.028788	3.222998	-4.2	13.2
exd	132	45.51327	32.51177	10.50851	175.8492
to	132	44.07536	9.835754	22.44825	67.51417
pg	132	2.908264	.7811104	1.030779	8.117929
gcf	132	21.85683	7.925277	2.781138	39.41705
ge	132	-.6038022	.3753917	-1.581981	.2668521
rl	132	-.661803	.3730079	-1.53741	.1286223
cc	132	-.6828312	.4646713	-1.45847	.7624834
iqi	132	2.39e-08	1.000023	-2.350273	2.120731
exdiqi	132	-11.5459	72.92892	-359.4272	129.909
exdsq	132	3119.298	5121.501	110.4601	30923.22

Correlation Result

	rgdpg	exd	to	pg	gcf	ge	rl	cc	exdsq	exdiqi
rgdpg	1.0000									
exd	-0.3401	1.0000								
to	0.1060	-0.3755	1.0000							
pg	0.0020	-0.0414	-0.0250	1.0000						
gcf	0.4724	-0.4873	0.2625	-0.0024	1.0000					
ge	0.3465	-0.4468	0.2602	-0.0660	0.3756	1.0000				
rl	0.3536	-0.3583	0.2237	-0.1619	0.5828	0.7459	1.0000			
cc	0.3423	-0.0329	0.0955	-0.1852	0.3169	0.6093	0.6036	1.0000		
exdsq	-0.3399	0.9572	-0.3629	-0.0834	-0.4970	-0.5126	-0.4231	-0.0764	1.0000	
exdiqi	0.3035	-0.6914	0.3120	-0.0659	0.5501	0.7394	0.8106	0.3983	-0.7960	1.0000

Panel Unit Root Test by Eviews 10

Panel unit root test: Summary
Series: RGDPG
Date: 05/15/21 Time: 11:53
Sample: 1998 2019
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs

Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.62329	0.0001	6	120
Breitung t-stat	-2.90518	0.0018	6	114
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.04608	0.0012	6	120
ADF - Fisher Chi-square	30.1609	0.0026	6	120
PP - Fisher Chi-square	56.3659	0.0000	6	126

Panel unit root test: Summary
Series: D(EXD)
Date: 05/15/21 Time: 11:54
Sample: 1998 2019
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.39822	0.0810	6	114
Breitung t-stat	-3.96659	0.0000	6	108
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.73556	0.0413	6	114
ADF - Fisher Chi-square	19.5411	0.0763	6	114
PP - Fisher Chi-square	35.8364	0.0003	6	120

Panel unit root test: Summary
Series: D(EXDSQ)
Date: 05/15/21 Time: 11:55
Sample: 1998 2019
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	0.36040	0.6407	6	114
Breitung t-stat	-3.93543	0.0000	6	108

Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.60010	0.0047	6	114
ADF - Fisher Chi-square	26.0355	0.0106	6	114
PP - Fisher Chi-square	50.5994	0.0000	6	120

Panel unit root test: Summary
Series: IQI
Date: 05/15/21 Time: 11:56
Sample: 1998 2019
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.66155	0.0039	6	120
Breitung t-stat	-2.23441	0.0127	6	114
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.41821	0.0078	6	120
ADF - Fisher Chi-square	26.6006	0.0088	6	120
PP - Fisher Chi-square	35.1955	0.0004	6	126

Panel unit root test: Summary
Series: EXDIQI
Date: 05/15/21 Time: 11:57
Sample: 1998 2019
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-6.50625	0.0000	6	120
Breitung t-stat	-1.80559	0.0355	6	114
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.16915	0.0000	6	120
ADF - Fisher Chi-square	50.2346	0.0000	6	120
PP - Fisher Chi-square	43.0349	0.0000	6	126

Panel unit root test: Summary
Series: D(GCF)
Date: 05/15/21 Time: 11:57
Sample: 1998 2019
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.44945	0.0000	6	114
Breitung t-stat	-2.71355	0.0033	6	108
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.49138	0.0000	6	114
ADF - Fisher Chi-square	41.3758	0.0000	6	114
PP - Fisher Chi-square	97.2329	0.0000	6	120

Panel unit root test: Summary
Series: PG
Date: 05/15/21 Time: 11:58
Sample: 1998 2019
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-20.5938	0.0000	6	120
Breitung t-stat	0.48895	0.6876	6	114
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-22.9478	0.0000	6	120
ADF - Fisher Chi-square	375.883	0.0000	6	120
PP - Fisher Chi-square	10.3608	0.5843	6	126

Panel unit root test: Summary
Series: D(TO)
Date: 05/15/21 Time: 11:58
Sample: 1998 2019
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.86378	0.0001	6	114
Breitung t-stat	-5.48548	0.0000	6	108
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.46156	0.0000	6	114
ADF - Fisher Chi-square	40.9703	0.0000	6	114
PP - Fisher Chi-square	78.9183	0.0000	6	120

Eviews Result

Cross Sectional Dependency Test

Residual Cross-Section Dependence Test
Null hypothesis: No cross-section dependence (correlation) in residuals
Equation: Untitled
Periods included: 22
Cross-sections included: 6
Total panel observations: 132
Note: non-zero cross-section means detected in data
Cross-section means were removed during computation of correlations

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	25.27854	15	0.0463
Pesaran scaled LM	1.876596		0.0606
Pesaran CD	-0.180536		0.8567

Kao Residual Cointegration Test
Series: RGDPG EXD EXD IQI EXDSQ GCF IQI PG TO CC
Date: 05/14/21 Time: 22:05
Sample: 1998 2019
Included observations: 132
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend

Automatic lag length selection based on SIC with a max lag of 5
Newey-West automatic bandwidth selection and Bartlett kernel

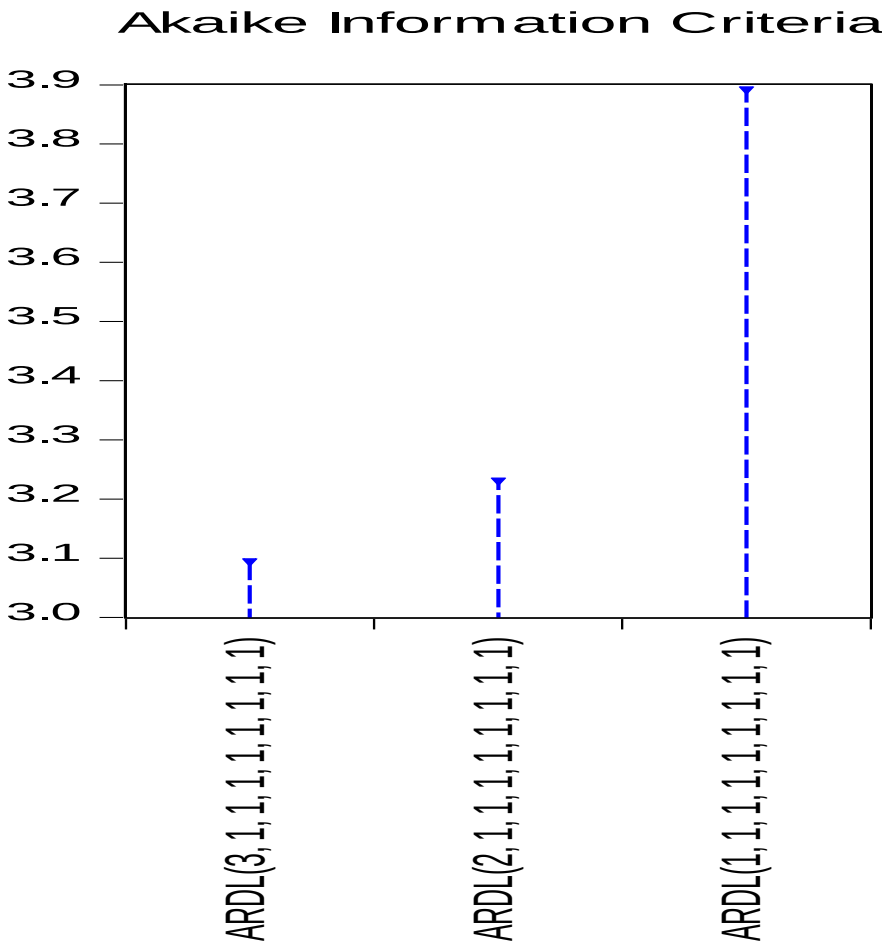
	t-Statistic	Prob.
ADF	-6.440642	0.0000
Residual variance	8.022466	
HAC variance	4.238331	

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Least Squares
Date: 05/14/21 Time: 22:05
Sample (adjusted): 1999 2019
Included observations: 126 after adjustments

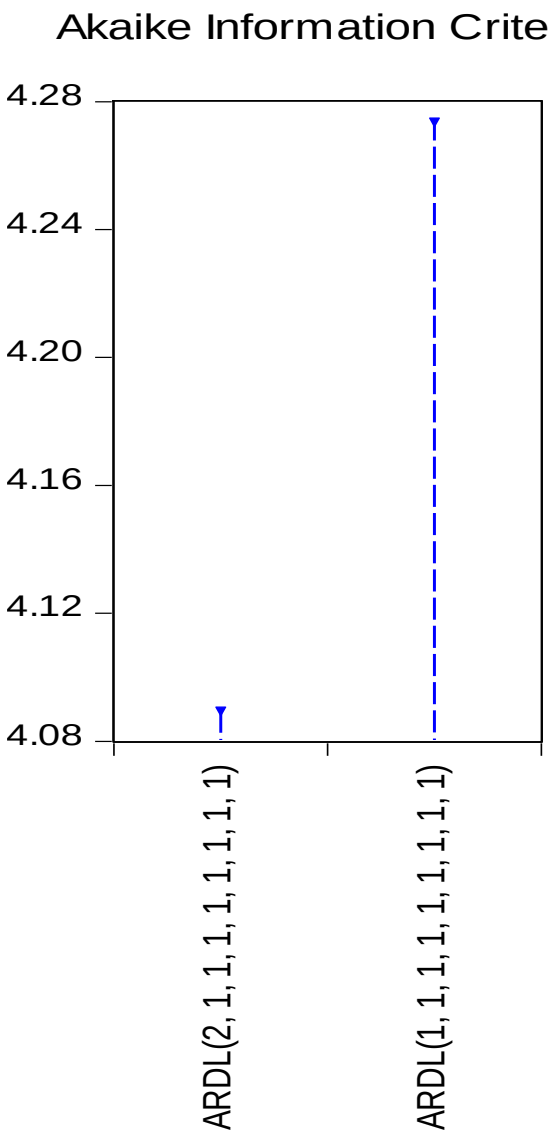
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.808614	0.085879	-9.415760	0.0000

R-squared	0.414601	Mean dependent var	0.072255
Adjusted R-squared	0.414601	S.D. dependent var	2.974722
S.E. of regression	2.276001	Akaike info criterion	4.490622
Sum squared resid	647.5225	Schwarz criterion	4.513132
Log likelihood	-281.9092	Hannan-Quinn criter.	4.499767
Durbin-Watson stat	2.000581		

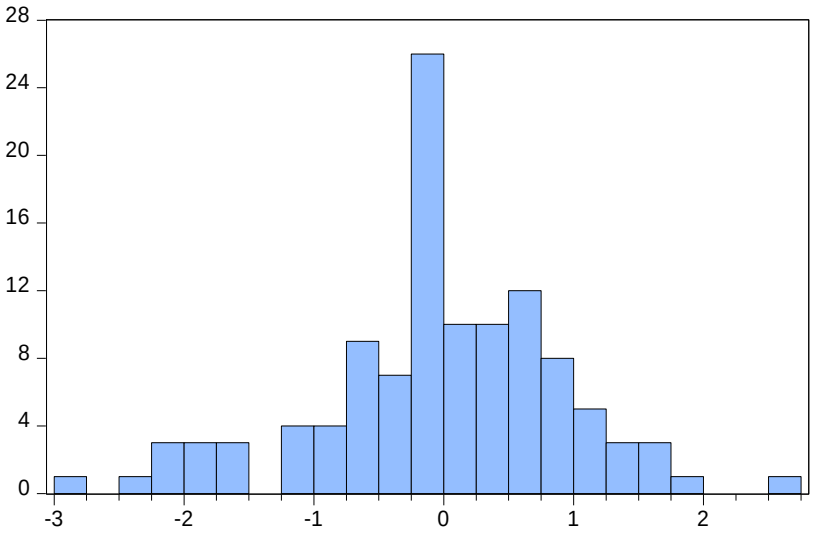
Lag Selection Based on AIC 1(model selection summary graph)



For Model 2



Normality Test



Series: Residuals
Sample 1998 2019
Observations 114

Mean	-0.013044
Median	-0.026374
Maximum	2.634475
Minimum	-2.943474
Std. Dev.	0.946907
Skewness	-0.418213
Kurtosis	3.744323
Jarque-Bera	5.954719
Probability	0.050927

Eviews Result

Dependent Variable: D(RGDPG)
Method: ARDL
Date: 05/13/21 Time: 13:21
Sample: 2001 2019
Included observations: 114
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic): EXD EXDSQ EXDIQI IQI TO PG GCF CC
Fixed regressors: C
Number of models evalulated: 3
Selected Model: ARDL(3, 1, 1, 1, 1, 1, 1, 1, 1)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
	Long Run Equation			
EXD	0.713333	0.089522	7.968212	0.0000
EXDSQ	-0.005670	0.000725	-7.819369	0.0000
IQI	6.637787	0.963923	6.886222	0.0000
TO	0.033520	0.003519	9.524908	0.0000
PG	4.437782	0.435068	10.20020	0.0000
GCF	-0.123706	0.050299	-2.459438	0.0173
CC	-6.878865	1.713389	-4.014772	0.0002
	Short Run Equation			
COINTEQ01	-0.454657	0.258094	-1.761596	0.0840
D(RGDPG(-1))	-0.483331	0.164134	-2.944732	0.0048
D(RGDPG(-2))	-0.364572	0.142876	-2.551660	0.0137
D(EXD)	-0.509046	0.396306	-1.284478	0.2047
D(EXDSQ)	0.005590	0.004249	1.315646	0.1941
D(IQI)	1.653346	3.061600	0.540027	0.5915

D(TO)	0.028619	0.034876	0.820596	0.4156
D(PG)	-12.41569	6.251851	-1.985922	0.0523
D(GCF)	0.255630	0.375829	0.680177	0.4994
D(CC)	9.654013	6.172799	1.563960	0.1239
C	-9.363324	4.511768	-2.075311	0.0429

Mean dependent var	0.101754	S.D. dependent var	3.019611
S.E. of regression	1.396004	Akaike info criterion	2.671895
Sum squared resid	101.3390	Schwarz criterion	4.419048
Log likelihood	-96.34509	Hannan-Quinn criter.	3.381858

Dependent Variable: D(RGDPG)
Method: ARDL
Date: 05/15/21 Time: 09:13
Sample: 2000 2019
Included observations: 120
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic): EXD EXDIQI EXDCC EXDGE EXDRL GCF PG TO
Fixed regressors: C
Number of models evalulated: 2
Selected Model: ARDL(2, 1, 1, 1, 1, 1, 1, 1, 1)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
	Long Run Equation			
EXD	-2.773268	0.302987	-9.153088	0.0000
EXDIQI	1.616444	0.171865	9.405322	0.0000
EXDCC	0.061177	0.017575	3.481004	0.0010
EXDGE	-0.051611	0.036935	-1.397349	0.1676
EXDRL	-4.264408	0.430845	-9.897770	0.0000
GCF	0.028443	0.017640	1.612481	0.1123
PG	2.904274	0.379374	7.655444	0.0000
TO	-0.043092	0.008385	-5.139000	0.0000
	Short Run Equation			
COINTEQ01	-0.652096	0.241598	-2.699096	0.0091
D(RGDPG(-1))	-0.077686	0.116409	-0.667351	0.5072
D(EXD)	1.088304	1.485417	0.732659	0.4667
D(EXDIQI)	-0.708103	0.810179	-0.874008	0.3857
D(EXDCC)	-0.081041	0.085593	-0.946812	0.3477
D(EXDGE)	0.074325	0.076675	0.969353	0.3364
D(EXDRL)	1.828742	2.161157	0.846187	0.4009
D(GCF)	0.120872	0.185577	0.651328	0.5174
D(PG)	-8.990101	5.672483	-1.584862	0.1184
D(TO)	0.089342	0.050208	1.779451	0.0804

C	-1.663382	0.737832	-2.254419	0.0280

Mean dependent var	0.123333	S.D. dependent var	3.023347
S.E. of regression	2.403367	Akaike info criterion	3.717830
Sum squared resid	335.0180	Schwarz criterion	5.333946
Log likelihood	-171.3768	Hannan-Quinn criter.	4.374545

Robust Co-integration Test

Pedroni Residual Cointegration Test
Series: RGDPG EXD EXDSQ GCF IQI PG
TO
Date: 05/14/21 Time: 22:13
Sample: 1998 2019
Included observations: 132
Cross-sections included: 6
Null Hypothesis: No cointegration
Trend assumption: Deterministic intercept and trend
Automatic lag length selection based on SIC with a max lag of 2

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-2.545543	0.9945	-3.250545	0.9994
Panel rho-Statistic	1.915150	0.9723	2.290246	0.9890
Panel PP-Statistic	-16.22303	0.0000	-14.36199	0.0000
Panel ADF-Statistic	-6.254292	0.0000	-4.927944	0.0000

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	2.750328	0.9970
Group PP-Statistic	-21.03116	0.0000
Group ADF-Statistic	-7.082516	0.0000

Robust Result

Dependent Variable: RGDPG
Method: Panel Fully Modified Least Squares (FMOLS)
Date: 05/14/21 Time: 22:22
Sample (adjusted): 1999 2019
Periods included: 21
Cross-sections included: 6
Total panel (balanced) observations: 126
Panel method: Grouped estimation
Cointegrating equation deterministics: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXD	0.140818	0.035376	3.980624	0.0001
EXDSQ	-0.002693	0.000501	-5.379241	0.0000
GCF	0.220846	0.026447	8.350571	0.0000
IQI	0.280421	0.179877	1.558961	0.1218
PG	-3.583529	0.624993	-5.733708	0.0000
TO	0.056764	0.010121	5.608336	0.0000

Dependent Variable: D(RGDPG)
Method: ARDL
Date: 05/05/21 Time: 20:33
Sample: 1999 2013
Included observations: 120
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic): EXD GCF PG TO IEXD
Fixed regressors:
Number of models evalulated: 1
Selected Model: ARDL(1, 1, 1, 1, 1, 1)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
	Long Run Equation			
EXD	-0.040119	0.013111	-3.059866	0.0030
GCF	0.195405	0.016174	12.08123	0.0000
PG	0.401584	0.188755	2.127539	0.0363
TO	-0.007438	0.010487	-0.709229	0.4801
IEXD	0.009263	0.002716	3.410701	0.0010
	Short Run Equation			
COINTEQ01	-0.871642	0.183081	-4.760958	0.0000
D(EXD)	-0.081227	0.060681	-1.338582	0.1843
D(GCF)	0.169757	0.118286	1.435137	0.1549
D(PG)	-1.871480	2.492049	-0.750981	0.4547
D(TO)	0.098817	0.047755	2.069266	0.0416
D(IEXD)	0.003862	0.017267	0.223690	0.8235

Mean dependent var	0.183333	S.D. dependent var	3.121822
S.E. of regression	2.366685	Akaike info criterion	4.037347
Sum squared resid	476.1017	Schwarz criterion	4.960264
Log likelihood	-213.3528	Hannan-Quinn criter.	4.412299

*Note: p-values and any subsequent tests do not account for model selection.