EFFECT OF EXTERNAL PUBLIC DEBT ON ECONOMIC GROWTH: AN EMPIRICAL ANALYSIS OF EAST AFRICAN COUNTRIES

HALIMA IBRAHIM

X50/67234/2013

A Research paper submitted in partial fulfilment of the requirements for the award of a Degree of Master of Arts Economics, University of Nairobi.

November, 2015

DECLARATION

This research project is my original work and has not been presented to any other university for examination purpose.

Sign: ….................................. Date: ….........................

Halima Ibrahim

X50/67234/2013

This research Project has been submitted for examination with my approval as University Supervisor.

Sign: ....   Date: …................................

Dr. Japheth OsotsiAwiti

DEDICATION

To my late father KallaGudoye and my late brother AdanKalla.Special dedications to my loving mother HabibaBonaya, my sister Amina, my brothers Liban and Boru. Thank you for the love and support.

ACKNOWLEDGEMENT

I thank Allah the Almighty for the gift of life and for seeing me through this course

Special thanks go to my supervisor Dr. Japheth Awiti for his unlimited guidance and input in completing this project

My sincere appreciation to my mother and siblings for the support that they gave me during my studies

I sincerely thank my friends at the national treasury and colleagues for assisting me in getting the data that was instrumental in this paper.

I also wish to thank the government library and Economics Graduate Library staff who made it all possible for me to get all the research materials I needed.

ABSTRACT

The aim of this study was to estimate the effect of external public debt on economic growth in four East African countries. These included Kenya, Tanzania, Uganda, and Rwanda. The study also analyzed the risk and costs associated with public debt in the countries. The study used panel data for the period 1981 to 2014. The data was analyzed using the fixed effect and the random effects model estimation techniques. The study found that external debt had a negative effect on economic growth in East African Countries. Domestic debt, on the other hand, had no significant effect on economic growth. Additionally, capital stock had a positive relationship with economic growth. However, macroeconomic factors such as real interest rate, inflation rate, and exchange rate did not have a significant effect on economic growth. The risk-cost analysis showed that EAC countries face exchange rate risks when borrowing. Specifically, a depreciation of local currencies led to an increase in public debt. In light of these findings, EAC countries should adopt an optimal balance between external and domestic debt to ensure sustainable economic growth. They should also implement measures to stabilize their currencies to avoid an increase in debt burden due to exchange rate depreciation.

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ACRONYMS

CPI   **Consumer Price Index**

EAC   **East African Community**

EU   **The European Union**

FE   **Fixed Effects**

GDP   **Gross Domestic Product**

GNI   **Gross National Income**

HIPC   **Highly Indebted Poor Countries**

IMF   **International Monetary Fund**

LR   **Likelihood Ratio**

OECD   **Organization for Economic Cooperation and Development**

OLS   **Ordinary Least Squares**

RE   **Random Effects**

SDR   **Special Drawing Rights**

UK   **United Kingdom**

US   **United States**

VAR   **Vector Autoregressive Model**

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Most countries across the world borrow funds to meet their financing needs and close the budget deficit.[1]However, domestic resources have often proved inadequate and potentially devastating in its effects on the private sector investment. Fajana (2003) classifies debt as either internal or external debt. Another common division of public debt is the remaining time to maturity.

Government debt constitutes both domestic and external debt.[2] Domestic debt includes funds raised through financial assets such as Treasury bills and bonds and money borrowed from other locally owned financial institutions. Similarly, the external debt can be from bilateral, multilateral or commercial sources. Bilateral sources include government to government while multilateral sources include government to a conglomeration of countries or agencies that have created a pool of resources from which they lend.   The debt of a state or provincial government, or local government can also constitute public debt. Multilateral debt could be sourced from financial institutions such as the IMF, African Development Bank and the World Bank among other Institutions (Polly, 2009).

Governments tend to borrow externally because such sources are highly concessional compared to domestic sources. Ajisafe and Gidado (2006) admit that governments can monetize their debts by creating money, to evade payment of interest. This is away governments use to reduce interest costs which and if often used it can lead to hyperinflation. Mutasa (2003) points out that the conventional view that high levels of domestic debt may crowd out the private sector and constrain the scope of countercyclical fiscal policies may result in higher volatility and adverse effects on economic performance.

The notion of crowding out effect appears is deeply rooted among debt managers in developing countries than developed countries. Omassoma (2011) argues that countries should formulate

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[1]The difference between what a government receives and what it spends is what is referred to as Government debt (Smith, 2010).
[2]Domestic debt refers to liabilities owed to residents of the country that require payment of principal and interest while external debt refers to liabilities to non-resident that requires payments of principal and interest.

policies that provide autonomy of restructuring debt depending on the prevailing circumstances. With debt management increasingly becoming a major concern in both developed and developing countries, there is growing need to learn from experiences of others (IMF, 2014). There is the need for audit commissions to deal with the public debt problem.

Most analysts believe that net debt is the most appropriate means of analyzing a countries debt situation. This measure gives the total amount of money owed by the government in fines and interests while the gross debt is the money owed minus interest or any fines charged on delay payment or the fluctuation of the currency. However, Claessens and Kanbru (2007) states that definition of net debt varies among countries. Therefore, it is extremely difficult to derive a measure that is comparable across countries. The use of gross debt as a percentage of GDP is the most commonly used measure.

Savvies (1992)stated that governments, especially in the developing countries usually borrow by issuing securities such as Treasury bills and bonds. Depending on the sources of financing at the disposal of the government, a choice of the structure and composition of debt can be made. Less endowed governments conscious of cost and risk characteristics of debt are likely to source loans from concessional sources such as the multilateral. Most countries in Africa can access concessional loans, but non-concessional sources may still be available to them.

1.1.1 The Global Debt Crisis

The current global financial crisis is the third great financial upheaval to have hit the world economy since the 1970s start of financial liberalization. The 1980s crisis affected immensely South America and the then Eastern bloc. In the 1990s, the crisis affected the Asian "tigers", Russia, Argentina and Turkey. The most recent meltdown started in 2007 and shook the global economy mainly the EU, UK, and US (World Bank, 2013).

The source of the financial meltdowns is associated with financial capitalism. Countries affected by the global crisis experienced an increase in both their domestic debt and external debt. There were high investments in real estate rather than production. When the inevitable crisis burst out, borrowers were left with vast debts, domestic and foreign, private and public. There was an increase in austerity measures imposed by multilateral organizations the interests of lenders at

the expense of the society. These resulted in years of falling incomes and high unemployment (IMF, 2012).

Claessens and Kanbru (2007) notice that decade of bitter experience has produced several lessons, three of which is merit mentioning. First, engagement with multilateral organizations, principally the International Monetary Fund (IMF), is to be avoided. Stabilization policies lead to no economic growth; it is safer to distance oneself from the IMF. Second, the lenders such as bondholders and large banks are favored by the international machinery that deals with debt. Pattillo et al. (2002) advice that adequate debt relief requires intervention by borrowers to achieve substantial cancelation of debt. It even requires international co-operation among borrowing countries.

Third, protecting the borrowers works best when layers of countries are involved on a democratic basis. With the formation of debt commissions, there has been open access to information. An audit commission could examine public debt for its legality, legitimacy, odiousness and social sustainability, providing grounds for its cancelation (Claessens and Kanbru

, 2007). This argument tends to offer a balance between leaning to the creditor and debtor, although, in practice, debtors are price takers and not setters.

1.1.2 Public Debt in developed Countries

Debt ratios are commonly used in the analysis of debt sustainability because they provide a relative measure that is standard and comparable. For instance external debt as a percentage of Gross Domestic Product (GDP) shows how much of the wealth created by the nationals of a country compare with the foreign indebtedness. Developed economies have incurred debt in recent years. In 2007, debt ratio for OECD countries was 74.2%, and the estimation as of 2014 was 112.5%. In the OECD Countries, the lowest debt to GDP was Estonia at 14.5%, and highest was Japan at 224.3% (IMF, 2012).

The financial crisis in late 2007 and its mix of liquidity crunch, reduced tax revenues, increased economic stimulus programs, and recapitalizations of banks resulted in a massive rise in the public debt for most developing countries. Debt ratio in OECD countries as a whole went from

hovering about 70% throughout the 1990s to almost 110% in 2012. It was projected to increase to 112.5% of GDP by 2014, rising even higher in the years to follow. The trend is seen not only in countries with a past of debt problems –such as Italy, Japan, Belgium, and Greece - but also in countries where the debt ratio was low including the US, UK, France, Portugal and Ireland (World Bank, 2013).

Many economists see this increased level of debt as being unsustainable in many countries, with the Eurozone in the current shakeup. Increased debt among the EU countries has shaken EU and subjected it to increased credit ratings by ranking agencies. Hence Eurozone countries resulted in adopting austerity measures that have resulted in political tensions, economic instability, and increased protests. With these measures for countries like Greece Public debt has almost immensely increased, from a debt ratio of 115.2% in 2007 to a projection of 200% in 2014 according to a 2014 report by Global Fund. Portugal's debt ratio was 75% in 2007 to an estimation of 134.6% in 2014 while Spain's debt ratio has been increasing over six years from 42% to 105% in 2015. Italy's debt ratio rose from 112.4% in 2007 to 131.4% in 2014.

Public Debt is not limited to certain countries alone, Adepoju, et. al. (2014) points out that other than the countries in EuropeJapan has a huge debt to Gdp ratio. In 1997 the debt ratio was over 100% and by 2011 it was over 200% and it was expected to be 230% in 2014. The good thing about Japans debt is that it is domestically owed, unlike the debt in the United States. Foreign debt is more threatening to an economy.

1.1.3 Public Debt in Developing Countries

Servicing of Debt both domestic and foreign present a significant challenge for developing countries that have weaker institutional and regulatory framework for debt management. Gross debt in these countries consists of all liabilities that require payments of interest and principal such as loans, insurance, etc. Smith (2010). The localcurrency is an issue for developing countries. Omotoye and Eseonu (2006) observed that Two-thirds of the public debt is dubbed in foreign currency. In some cases, lenders have increased interest rates from 12% to 22%. But it is mismanagement of the government's finances that has pushed these countries over the edge. For example, Gambia's debt ratio increased 18% from 2009 to 2014. With 80% in some countries, it

is one of the highest in the region (Adepoju et. al. 2014). It is likely to increase based on the boosts in spending by 11%.

Slow economic growth in Sub-Saharan Africa has been influenced by the excessive stock of debt that has weakened growth and hampered the socio–economic development Omassoma (2011). Slow growth makes debt servicing difficulty and it leads to more borrowing that weakens the economy more.

1.1.4 Public External Debt in Africa

With the increasing threat of insecurity arising from terrorism attacks and the attendant ailing tourism sector, the economies in Africa are reeling under the weight of the weakening macroeconomic fundamentals. Falling commodity prices are also taking a tolling on these countries. Investors are pulling out of riskier spots, prompted by the prospect of rising interest rates in America (Lora and Olivera, 2006). The IMF is cutting its growth forecasts further reducing earnings for the countries forcing them to borrow more and service their loans less often. The unfolding public-debt crisis in African countries, which has suffered from all these trends are a harbinger of things to come.

Although the IMF and other development partners have a moral obligation to bail-out these countries, some countries like Gambia are likely not to benefit fully. In part, the problems of the tiny West African country of 2 million stem from a decrease in tourism, the source of 30% of its export earnings. Although it has not suffered a single case of Ebola, it is close to Guinea, one of the most affected countries that may further affect its economic performance. Falling commodity prices mean that exports of wood and nuts will also bring in less. These prompted the local currency to fall by 12% against the dollar last year (IMF, 2014).

As much as debt continue to rise for most African countries; there is slight hope given that most sub-Saharan countries have a debt service to exports of 20% although these numbers are worsening due to falling commodity prices (Rockerbie, 2014). Though the continent is facing tough times, only a few countries are struggling.

1.1.5 East African Community Debt Situation

Countries in the region are facing rising levels of un-serviced debt with Tanzania's national debt forecast to reach alarmingly high levels by 2015. According to various sources, Tanzania's debt was steadily growing and was close to Tshs 28 trillion by January 2015 a trend that is expected to continue against the dwindling revenue income. A recent economic forecast by the UK-based Oxford Economics, Tanzania's Gross Domestic Product (GDP) stood at Tshs 52 trillion at current prices as of November 2013 (Asogwa, 2014). Debt-to-GDP ratio has exceeded 50 percent surpassing the debt to GDP ratio threshold set by the IMF.

For Rwanda, the Government recorded a debt to GDP ratio of 29.42 percent of the country's Gross Domestic Product in 2013. Government debt to GDP in Rwanda averaged 65.78 percent from 1995 to 2013, reaching an all-time high of 119.50% in 1995 and a record low of 21.27% in 2008. Rwanda's recent increased borrowing saw lawmakers raising concerns over the country's ability to service the debt(Ogwuma, 2013).

Table 1: Public Debts as a % of GDP in East African Countries, 2007-2014

Country	2007	2008	2009	2010	2011	2012	2013	2014
Kenya	46.0	45.6	47.5	49.9	48.5	47.2	45.3	45.3
Rwanda	26.9	21.4	23.0	23.2	24.0	25.8	24.3	22.2
Uganda	72.5	23.6	22.1	22.2	27	29.3	31.07	33.26
Tanzania	36.3	36.0	39.0	42.7	45.4	46.8	48.8	50.3

1.2 Statement of the Problem

Countries with less developed domestic debt markets often rely on external borrowing to meet their financing needs. This is because the domestic debt market is shallow and cannot match the government financing requirements. As a result, their debt portfolio is mainly composed of external debt. Although most countries in East Africa have over time deepened their domestic markets, a large proportion of their foreign borrowing is denominated in foreign currency. While the external financing is mainly from concessional sources, the challenge of managing external debt remain prevalent. For instance, the exchange rate fluctuations drive the debt service higher than projected leaving fewer resources to finance development projects. Chawdhury (2001) admits that external debt may have huge effects on the overall performance of these countries. Mukui (2013) observes that high levels of external debt in Kenya poses a great challenge to the economy given that a large proportion of the export income goes to servicing debts instead of being put into domestic investment.

Several studies have analyzed the effect of public debt on economic growth, but, the author is not aware of studies that have analyzed the effects of external debt on economic growth in the context of the EAC region. This increase in public debt for these countries in the region contravenes the theory on debt growth dynamics that stresses that due to deficits of capital in developing countries certain level of external leverage should enhance economic growth through capital accumulation and productivity growth. This study, therefore, sought to investigate the effects of external public debt on economic growth in the EAC region.

1.3 Research Focus and Questions

The ways through which external debt affects economic growth are vast and varied. However, the most critical aspect of external debt that requires greater emphasis is the risk exposure of the economy to unsystematic risk. Some of the risks involved include refinancing risk, exchange rate risk (currency risk) among others. The study addressed the following research questions:

i)   What is the relationship between external public debt and economic growth?

ii)   What is the optimal cost/risk trade-off for EAC member countries' overall debt?

iii)   What is the optimal policy prescription for prudent debt management in the EAC member countries?

1.4 Objective of the Study

The main study's main was to determine the effects of external public debt on economic growth in EAC member countries.

1.4.1   Specific Objectives

i.   To establish the relationship between external public debt and economic growth in EAC region.

ii.   To determine the optimal cost-risk trade-off for the EAC member countries?

iii.   To recommend an optimal policy prescription for prudent management of public external debt component.

1.5 Significance of the Study

The EAC member countries have increasingly accumulated both external and domestic debt over the years. The volume of outstanding external obligations is raising concern about the future sustainability. Given the weak institutional and regulatory framework governing debt management, it is important to establish a stable causal relationship between external public debt and economic growth. This will not only provide a more prudent approach to debt management but also help improve the rating of creditworthiness of the country. This study is therefore crucial for the countries in the region given that it promotes policies that will ensure countries are leveraged towards enhancing economic growth through capital accumulation, domestic investment and productivity growth. The study utilized data from various secondary sources including all Reserve Banks, National Statistics offices, and World Bank. The data used was for the period 1981 to 2014.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is aimed at identifying and evaluating opinions, contributions, and findings of various studies that have been done before by different scholars and institutions. This chapter looks at the relevant literature done by past researchers to shed more light on the effects of external public debt on economic growth.

2.2 Theoretical Literature Review

The neoclassical growth theory which has its origin from the Harrod- Domar model explains the relationship between investment, growth rate and employment in an economy. According to this theory, production capacity is proportional to capital stock.

Solow (1956) in his contribution to economic growth focused on the process of capital formation and assumed that production was a function of capital, labor and technology. He argued that if there were capital constraints growth, then capital can be substituted for labor. In this case, long run growth is determined by technological change and not by savings or investment. Savings only affects temporal growth or when the economy is moving to the long term path. This is because the economy will experience diminishing returns as the ratio of capital per worker increases. In his analysis the long term economic growth is possible through labor augmenting technological change and increase of capital per worker.

According to endogenous growth theory, the long run growth emanates from economic activities that create new technological knowledge. The economic growth rate is determined by the forces

that are internal to the economic system especially those forces that govern the opportunities and incentives for creating technological know-how.

In the classical theory Adam Smith identified three sources of growth namely; growth in the labour force and stock of capital; improvement in the efficiency with which capital is used in labour through greater division of labour and technological progress; and promotion of foreign trade which is expected to widen the market and reinforce labour and capital.

Barro and Salai-martin (1997) developed a hybrid model which establishes an intuitively appealing framework where long run growth is driven endogenously by the discovery of new ideas in the 'leading edge' economies but also retains the empirically supported convergence properties of the neoclassical growth model through the impact of the imitation behaviour of follower countries

If all economies were intrinsically the same in terms of factors such as savings rates, preferences, access to technology, and population growth, then according to the neoclassical growth model, poor countries should grow faster than rich countries because of diminishing returns to capital accumulation (Barro, 1997; Sala-i-Martin, 2002d). This would result in Absolute convergence of living standards. However, in a heterogeneous world, the growth rates of poor countries may be high or low depending on their initial per capita GDP relative to their long-run steady state positions, which are determined by savings rates and the other key variables. That is, we should expect to see in the data evidence of conditional convergence

2.2.1 The Growth-Cum-Debt Models

The basic argument to the growth-cum-debt model is that a country will be able to service its debt provided the debt leads to more growth. This means that a country will only borrow if the borrowed funds help it to improve its economy. External borrowing will be determined on whether such borrowing affects economic growth. The amount of money does not quantify the value of debt but on the effects the debt will have on the economy of the country

The growth-cum-debt models consider debt capacity in terms of the benefits and costs of borrowing in the process of economic growth.

2.2.2 Debt and Economic Growth

The existing literature on the analysis of public debt and economic growth tends to indicate a negative relationship. According to Modigliani (1961), Buchanan (1958), and Meade (1958), public debt is a burden to future generations because it reduces the stock of private capital, which in turn reduces the flow of income. Specifically, public debt can negatively impact economic growth by crowding out private investments. If the proportion of government operations funded through debt is significantly high, interest rates may substantially increase in the long-run. An increase in debt will not be costless to future generations despite benefiting the current generation.

Modigliani (1961) argues that the gross burden of public debt can only be offset in part or in total if borrowed funds are used to finance productive public capital formation, which in turn improves the real income of future generations. The interest accruing from both domestic and external debt is often paid through taxes. This reduces the available lifetime consumption of taxpayers and their savings. As a result, capital stock and economic growth reduce.

Krugman (1988) coined the term 'debt overhang' to describe the negative relationship between public debt and economic growth. Debt overhang refers to when the ability of a country to repay its external debt reduces below the contractual value of the debt. Cohen (1993), on the other hand, argues that the relationship between public debt and economic growth is non-linear. This means that an increase in external public debt promotes investment up to a certain level or

threshold. Beyond the threshold, debt overhang will discourage investors from providing capital to the government. Eventually, economic growth begins to decline as interest rates increase.

High public debt can affect economic growth negatively through different channels. One of the most important channels is long-term interest rates. High long-term interest rates can crowd out private investment, thereby reducing potential output growth. Increased public financing needs are likely to increase sovereign debt yields. Therefore, we expect a net flow of capital or funds from the private to the public sector. This increases interest rates and decreases private spending by households and firms.

According to Krugman (1988), external debt affects economic growth through its adverse effects on investments. As domestic and foreign investors reduce their supply of capital, the level of investment reduces. This leads to a reduction in economic growth. Public debt can also negatively affect economic growth through higher future distortionary taxation, inflation, and greater uncertainty about prospects and policies. Extreme cases of debt crisis can also trigger a banking or currency crisis; thus, causing a reduction in economic growth.

2.3 Empirical Review

Georgiev (2012) studied the relationship between public debt and economic growth, investments, and economic development in 17 European countries. His study used data for the period 1980 to 2012, which was analyzed using descriptive statistics and panel data regressions. The research found that as public debt increase, the cost of servicing it rises substantially. This leads to a decrease in investments, which in turn affects economic growth negatively. The researcher concluded that public debt affects economic growth indirectly by reducing investments through high-interest rates, increased uncertainty, and high debt repayment costs. The limitation of this study is that it focused on gross debt rather than net public debt. Conceptually, the net debt-to-GDP ratio may be a better measure of public debt sustainability because it indicates the extent to which the government must rely on savings by the public to finance its future borrowing needs.

In Pakistan, Akram (2010) found that external public debt had debt overhang effect on economic growth. Specifically, the researcher found that external debt had a negative and statistically significant relationship between per capita GDP and investment in the short and long run. The domestic debt had a negative and significant relationship with investments. This suggests that

domestic debt crowded out private investment. However, domestic debt did not have a statistically significant relationship with per capita GDP. Debt servicing had a negative and statistically significant relationship with per capita GDP only in the short run. These results were based on data for the period 1972 to 2009, which was analyzed using the ARDL approach to cointegration test. The conclusions of this study were based on data for only one country. Thus, they might not be applicable in other countries such as Kenya due to differences in levels of economic development and macroeconomic environment.

Using OLS regressions, Boboye and Ojo (2012) studied the effects of external debt on economic growth in Nigeria. They found that external debt had a negative effect on national income and per capita income of Nigeria. The increase in debt level led to the devaluation of the country's currency, retrenchment of workers, regular industrial strikes, and poor education. As a result, the level of economic growth and development declined. This study sheds light on the effect of public debt on economic growth in the context of a developing African country. However, it ignores the effect of domestic debt on economic growth.

Panizza and Presbitero (2014) used the variable instrument approach to investigate the causal effect of public debt on economic growth in OECD countries. Their analysis revealed a negative relationship between debt and economic growth. However, they did not find any causal effect of public debt on economic growth after correcting for endogeneity. Although this study sheds light on the causal relationship between public debt and economic growth, its findings are inconclusive. Thus, they might not be applicable in other countries.

According to Mukui (2013), external public debt and debt servicing had a negative effect on economic growth in Kenya. The researcher also noted that inflation rate and domestic savings had negative effects on economic growth. By contrast, capital formation and foreign direct investment had a positive effect on economic growth. These findings were based on Kenyan data for the period 1980 to 2011, which was analyzed using a linear model. Although the study used Kenyan data, it did not estimate the effect of domestic debt on economic growth.

Using data from a panel of 38 developed and emerging economies, Kumar and Woo (2010) studied the correlation between public debt and economic growth. Their study revealed a negative relationship between initial debt and subsequent economic growth. Specifically, a 10% increase in initial debt-to-GDP ratio led to a 0.2% reduction in real per capita GDP per year. The impact of public debt on economic growth was, however, smaller in developed economies.

Despite its contribution to the public debt and economic growth nexus, it ignored the effect of debt on growth in developing countries such as Kenya.

Checcherita and Rother (2010) found a non-linear relationship between public debt and per capita GDP growth rate in 12 Euro Area countries. Their analysis, which was based on dynamic panel model and data for 40 years starting 1970 revealed a u-shaped relationship between public debt and economic growth rate with the debt turning point at approximately 90% to 100% of GDP. This means that a high public debt-to-GDP ratio led to low long-term growth rates at debt levels above 90% to 100% of GDP. The study concluded that a one percent increase in debt-to-GDP ratio led to a -0.10% reduction in GDP growth rate.

Zouhaier and Fatma (2014) in their study of economic growth in 19 developing countries found that external public debt as a percentage of GDP and GNI had a negative and statistically significant effect on economic growth. Similarly, the external public debt had a negative effect on investment in the 19 countries. Although this study focused on developing countries such as Kenya, its findings are inconclusive. Additionally, it did not identify the channels through which external debt affect economic growth.

Dinca and Dinca (2010) studied the impact of public debt on economic growth in Bulgaria, Czech Republic, Romania, Hungary, and Slovakia. They used data for the period 1996 to 2010 and quadratic regression model. The researchers found that public debt had a negative effect on economic growth if it exceeds 44.42% of GDP. This study did not indicate the channels through which public debt affected economic growth in the five countries.

Chawdhury (2001) investigated the relationship between indebtedness and economic growth using Vector Autoregressivemodel (VAR); the finding shows that debt servicing as a percentage of either export earnings or GDP affects the growth rate of GDP per capita adversely. This effect is equally important and statistically significant for heavily indebted poor countries (HIPCs) and other developing countries facing heavy debt burden.

Geiger (1990) adopted the lag distributional model to analyze the relationship between GNP growth rate and debt burden for nine South American countries over a period of 12 years (1974-1986) and found an inverse statistically significant relationship between the debt burden and economic growth. On the contrary, Warner (1992) used 13 developing countries for the period 1960-1981 and 1982-1989 but could not find any conclusive evidence on whether debt had any

negative effect on economic growth or investment in those developing countries. He further argued that a clear way to approach this issue is to examine out-of-sample forecasts of investment over debt crisis period (1982-1989).

Kamau (2001) analyzed debt servicing and economic growth in Kenya using a time series data for the period 1970 to 2000. The study employed a single equation model with real GDP growth rate as a function of debt servicing among other factors. The findings of the analysis showed that there is indeed a negative relationship between debt servicing and economic growth rate.

Deshpande (1997) attempted to explore the debt overhang hypothesis by an empirical examination of the investment experience of 13 severely indebted countries, during two periods, the first period is between 1975 - 1983 and the second period is between 1984 to 1991 with OLS estimation for panel data. In the first period, public debt had a positive influence on investment, while in the second half of the period it had a negative effect. This means that the investment ratio for the sample countries rose in the first half of the period and then declined in the second half.

Polly (2009) using time series data for the period 1970 to 2007 investigated the impact of public debt on investment and economic growth in Kenya. The empirical results showed that debt servicing was significant at explaining GDP growth in Kenya. Public investment had a negative relationship with the stock of external debt and debt servicing.

2.4 Overview of Literature

The literature reviewed above shows that several studies have been done on the relationship between public debt and economic growth. Most studies tend to find a negative relationship between public debt and economic growth. However, a few studies have found a nonlinear relationship between public debt and economic growth. This means that public debt improves economic growth up to a certain threshold beyond which it negatively affects GDP growth. The debate on the effect of public debt on economic growth, however, remains unresolved because of the mixed findings of previous studies. Even recent studies such as Panizza and Presbitero (2014) still consider their findings to be inconclusive. The existing literature also tends to focus more on external public debt rather than domestic debt. This study has contributed to the existing literature by using panel data for four East African countries to explore the relationship between public debt and economic growth.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the theoretical and methodological framework that will be used to estimate the effect of external public debt on economic growth. It sets out the empirical models used and various tests that were conducted to ascertain the validity of the data and effectiveness of the model.

3.2 Theoretical Framework

According to Sala-i-martin (1997), economic theories do not identify the exact factors or variables that determine economic growth. In response to this challenge, he proposes a cross-sectional model of the form:

$$\gamma = \alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n + \varepsilon \qquad (1)$$

Where γ is a vector of economic growth rate and $x_1 \cdots, x_n$ are vectors of potential explanatory variables that vary from study to study. In this regard, researchers often use a variety of variables, which they believe best explain economic growth based on theoretical literature and the unique economic situation of each country. For instance, Hassan and Mamman (2013) modeled real gross domestic product (GDP) as a function of external debt, debts service payment, export, inflation, and exchange rate. Uma, Eboh and Obidike (2013) noted that real gross domestic product is determined by total domestic product, total external debt, and interest rate on total external debt. In addition to these variables, Ajayi and Oke (2012) added exchange rate as a factor that determine GDP growth in an open economy.

Theoretical literature indicates that capital and labor affect productivity, which in turn determines GDP. This can be expressed as: $Y = f(K, L)$ \qquad (2)

Where Y is GDP; K and L are capital stock and labor force respectively.

Following Sala-i-martin et al. (1997), this paper used panel regression techniques to determine the effect of public debt on economic growth in four East African countries, namely Kenya, Tanzania, Uganda, and Rwanda. The estimation was based on the growth model 2, which was augmented to include public debt indicators and control variables.

3.3 Empirical Model

Based on economic theory, this study modeled GDP growth as a function of external debt, domestic debt, debt payment, inflation rate, exchange rate, capital stock and labor force. This relationship is expressed as:

$$GDP = \alpha_o + \alpha_1 lnED_{it} + \alpha_2 lnDD_{it} + \alpha_3 lnIf_{it} + \alpha_4 lnEXR_{it} + \alpha_5 lnCS_{it} + \alpha_6 lnLF_{it} + \varepsilon \quad (3)$$

Where:

GDP is real GDP for country i and time t

ln is natural logarithm

ED is external debt

DD is domestic debt

If is inflation rate

EXR is exchange rate

CS is capital stock

LF is labor force

ε is a stochastic error term

α_o is the constant

$\alpha_1, \dots, \alpha_6$ are parameters to be estimated

Table 2: Summary of the variables

Variable	Measurement	Expected sign
GDP	Annual percentage change	
External debt	Total external debt of each country in US Dollars)	Negative/ positive
Domestic Debt	Total domestic debt of each country (in US Dollars)	Negative/ positive
Inflation rate	Annual Percentage change in Consumer Price Index (CPI)	Negative
Capital stock	Gross fixed capital formation (in US dollar)	Positive
Labour force	Total labour force of each country	Positive
Exchange rate	Exchange rate for each country to the US dollar	Positive/ negative

3.4 Data Sources

The study used data for the period 1981 to 2014. Data for GDP growth, capital stock, external and domestic debt was obtained from World Bank's website. Data on inflation rate and exchange rate were obtained from each countries' central bank. Labor force data was obtained from World Bank and each country's bureau of statistics.

3.5 Estimation Procedure

3.5.1 Descriptive Statistics

Data analysis began with description of the stochastic properties of the panel data used in the study. Descriptive statistics analysis involved calculating the mean, standard deviation, variance and the minimum and maximum values for the variables.

3.5.2 The Fixed Effects (FE) and the Random Effects (RE) Regression

Panel data can be analyzed using two models, namely the fixed effects and the random effects models. In the proposed study, the FE was used to determine the relationship between public debt and economic growth within each country. The justification for using this model is that each country has a unique macroeconomic environment with variables that may or may not affect GDP growth. The FE model is defined as:

$$GDP_{it} = \alpha_i + \beta_1 X_{it} + u_{it}$$

Where:

$\alpha_i (i = 1 \cdots n)$ is the intercept for each country

GDP_{it} is Gross domestic product $i = country$ and $t = time$

X_{it} is a vector of independent variables (external debt, domestic debt, inflation rate, capital stock, labor force, and exchange rate)

βs are the coefficients of the independent variables

u_{it} is a stochastic error term

The main assumption of the model is that fixed parameters represent the non-observed individual effects. Moreover, the independent variables are not correlated with the idiosyncratic error term. RE model assumes that differences across entities (countries in this case) are random and uncorrelated with the independent variables. It is also based on the assumption that the error terms of individual entities are not correlated with the independent variables. The RE model is defined as:

$$GDP_{it} = \alpha_1 + \beta_1 X_{it} + u_{it} + \varepsilon_{it}$$

Where

u_{it} is the between country error term

ε_{it} is the within country error term

The generalized least squares method was used to estimate the RE model

3.5.3 Hausman Test

Hausman test was conducted to select either the FE or the RE model. The test is based on the null hypothesis that RE is the preferred model against the alternative hypothesis that the FE is the preferred model.

3.5.4 Diagnostic Tests

3.5.4.1 Testing for Heteroskedasticity

Estimated parameters are likely to be inconsistent if the data has a serious heteroskedasticity problem. The likelihood-ratio (LR) test was used to test for the presence of heteroskedasticity in the panels.

CHAPTER FOUR

RESULTS

4.1 Descriptive Statistics

The descriptive statistics for the variables used in the study are presented in Table 4.1. The table shows that each of the eight variables had 136 observations. The mean of external debt, labour force, capital stock, and domestic debt were relatively higher than those of GDP and interest rate. The variables seemed not to be normally distributed since their skewness were either more or less than zero. All the variables except GDP and interest rate were positively skewed. Additionally, the variables seemed to have a relatively peaked distribution since their kurtosis were positive.

Table 4.1: Descriptive statistics

Variable	Obs.	Mean	Std. dev.	Variance	Skewness	Kurtosis
GDP	136	4.8078	6.3675	40.5447	-4.0463	45.9413
External debt	136	4.55e+09	3.25e+09	1.05e+19	0.6214	2.9611
Labour force	136	1.03e+07	5334870	2.85e+13	0.587972	2.901662
Inflation	136	11.54094	8.90547	79.3074	1.3877	4.6995
Exchange rate	136	574.4387	680.6396	463270.3	1.2593	3.6303
Capital stock	136	2.71e+09	3.28e+09	1.08e+19	1.8693	6.0795
Domestic debt	136	1204541	1726260	2.98e+12	1.6031	4.3791
Interest rate	136	5.4670	12.8223	164.4123	-2.4763	11.1128

4.2 Correlation

The correlations between the variables are presented in Table 4.2. All the variables had a perfect correlation with themselves as was expected. Labour force and inflation had a statistically significant correlation with external debt. Exchange rate had a significant correlation with GDP, inflation, and labour force. Capital had a significant correlation with external debt, labour force, and exchange rate. Interest had a significant correlation with only exchange rate. By contrast, domestic debt had a significant correlation with all variables except external debt. Since most of the correlations were statistically significant, multicollinearity was likely to be a problem in the data.

Table 4.2: Correlation matrix

	GDP	External debt	Labour force	Inflation	Exchange rate	Capital stock	Domestic debt	Interest rate
GDP	1.0000							
External debt	0.0100 (0.9079)	1.0000						
Labour force	0.0817 (0.3444)	0.8349* (0.0000)	1.0000					
Inflation	-0.1618 (0.0598)	0.2836* (0.0008)	0.1233 (0.1526)	1.0000				
Exchange rate	0.2109* (0.0137)	0.0509 (0.5565)	0.4215* (0.0000)	-0.2639* (0.0019)	1.0000			
Capital stock	0.0805 (0.3515)	0.7302* (0.0000)	0.7456* (0.0000)	0.0846 (0.3273)	0.2897* (0.0006)	1.0000		
Domestic debt	0.1728* (0.0443)	0.1231 (0.1532)	0.4358* (0.0000)	-0.2327* (0.0064)	0.8902* (0.0000)	0.4080* (0.0000)	1.0000	
Interest rate	0.1097 (0.2034)	0.1636 (0.0570)	0.0830 (0.3369)	-0.1416 (0.1002)	0.2526* (0.0030)	0.0952 (0.2702)	0.0819 (0.3432)	1.0000

*Where * means statistically significant at 5% and the figures in parentheses are p-values*

4.3 Multicollinearity

Multicollinearity test was conducted by calculating the VIF for each variable, and the results are presented in Table 4.3. Clearly, multicollinearity was a major problem since the VIFs for labour force, external debt, and exchange rate were more than 10.

Table 4.3: Multicollinearity test

Variable	VIF	1/VIF
Labour force	27.11	0.0369
External debt	21.68	0.0461
Exchange rate	14.81	0.0675
Domestic debt	9.89	0.1011
Capital stock	4.58	0.2184
Inflation	2.61	0.3834
Interest rate	1.77	0.5665
Mean VIF	11.78	

Labour force was eliminated from the model to address multicollinearity since it had the highest VIF. As a result, the VIF for all variables reduced to less than ten as shown in Table 4.4. Thus, multicollinearity was no longer a major problem in the data.

Table 4.4: Multicollinearity test

Variable	VIF	1/VIF
Exchange rate	9.61	0.1041
Domestic debt	9.40	0.1064
External debt	6.51	0.1536
Capital stock	4.57	0.2189
Inflation	2.49	0.4017
Interest rate	1.53	0.6524
Mean VIF	5.69	

4.4 Heteroskedasticity Test

The presence of heteroskedasticity was tested using the Modified Wald test for GroupWise heteroskedasticity. The results are presented in Table 4.5. Clearly the results show that heteroskedasticity was a problem in the data. Thus, robust standard errors were used to address the problem of heteroskedasticity.

Table 4.5: Heteroskedasticity test

Ho: $sigma(i)\char`^2 = sigma\char`^2\ fo\ all\ i$	
Chi2 (32)	5945.11
Prob> chi2	0.0000

4.5 Fixed Effects Model (FEM)

The results obtained from the FEM are presented in Table 4.6. The table shows that both external and domestic debt had a negative relationship with GDP growth. However, the relationships were not statistically significant. Similarly, the control variables did not have a statistically significant relationship with GDP.

Table 4.6: Fixed effects model results

GDP	Coefficients	Robust Std. errors	t	$P > |t|$
Lnexternal debt	-0.1414	0.2801489	-0.50	0.648
Inflation	-.01328	0.0596777	-2.23	0.112
Interest rate	0.0044	0.0095437	0.46	0.679
Lnexchange rate	0.5055	0.4652196	1.09	0.357
Lncapital stock	1.2928	0.6514598	1.98	0.141
Lndomesticdebt	-0.4106	0.4661343	-0.88	0.443
Constant	-15.3318	14.75209	-1.04	0.375
Sigma_u	1.3070416			
Sigma_e	6.2692613			
Rho	0.04165508			

4.6 Random Effects Model (REM)

The random effects model results are presented in tablem4.7. The results show that external debt had a negative relationship with GDP growth. The relationship was statistically significant at 5% level. Domestic debt, on the other hand, had a negative but insignificant relationship with GDP. Capital stock had a positive and significant relationship with GDP. However, other control variables did not have a statistically significant relationship with GDP.

Table 4.7: Random effects model results

GDP	Coefficients	Robust Std. errors	Z	$P > \lvert t \rvert$
Lnexternal debt	-0.6839	0.1843535	-3.71	0.000
Inflation	-0.1036	0.0653517	-1.59	0.113
Interest rate	-0.0047	0.0134728	-0.35	0.729
Lnexchange rate	0.6403	0.4325253	1.48	0.139
Lncapital stock	1.1400	0.5616848	2.05	0.041
Lndomestic debt	-0.1394	0.4289831	-0.33	0.745
Constant	-4.8408	9.011409	-0.54	0.591
Sigma_u	0			
Sigma_e	6.2693			
Rho	0			

4.7 Hausman Test

Hausman test was conducted to choose between the fixed and the random effects model. The test selected the random effects as the preferred model as indicated in Table 4.8.

Table 4.8: Hausman test results

	Coefficients			
	(b) fe	(B) re	(b-B) difference	Sqrt (diag(V_b-V_B)) S.E
Lnexternal debt	-0.1414329	-0.6838574	0.5424245	1.334695
Inflation	-0.1328004	-0.1035951	-0.0292053	0.0327579
Interest rate	0.0043556	-0.0046721	0.0090276	0.0164649
Lnexchange rate	0.5055203	0.6403187	-0.1347983	0.4120081
Lncapital stock	1.292782	1.149916	0.1428662	0.1779844
Lndomestic debt	-0.4106035	-0.1394458	-0.2711577	0.2839462
b = consistent under Ho and Ha; obtained from xtreg				
B = inconsistent under Ha, efficient under Ho; obtained from xtreg				
Test: Ho: difference in coefficients not systematic				
$chi2(6) = (b - B)'[(V_b - v\_B)^{\wedge}(-1)](b - B) = 1.55$				
Prob> chi2 = 0.9561				

4.8 Least squares dummy variable model (LDVM)

The Least squares dummy variable model (LDVM) results are presented in tablem4.8. The results of the model with dummy variables for each country (labeled 1country1_2, icountry1_3 etc on the first column are provided below. Only lncapital stock with a p-value of 0.078 is statistically significant at 10% level.

GDP	Coef.	Std. Err.	t	$p|t|$
inflation	-0.1328004	0.0890978	-1.49	0.139
interest rate	0.0043556	0.0566995	0.08	0.0939
lnexternal debt	-0.1414329	1.606798	-0.09	0.93
lnexchange rate	0.5055203	0.608059	0.83	0.407
lncapitalstock	1.292782	0.727991	1.78	0.078
lndomesticdebt	-0.4106035	0.4913317	-0.84	0.405
Icountry1_2	1.796352	4.4149824	0.43	0.666
Icountry1_3	0.8701697	1.924286	0.45	0.652
Icountry1_4	3.052513	2.857782	1.07	0.287
Constant	-16.76154	34.8254	-0.48	0.631

4.9 Costs vs. Risk Analysis

Cost and risk analysis was done by estimating the effect of interest rate and exchange rate on overall debt. The results of the fixed effect model are presented in Table 4.9. The table shows that exchange rate had a positive and statistically significant relationship with overall debt in the four EAC countries. By contrast, interest rate had a positive but statistically insignificant relationship with overall debt.

Table 4.9: Fixed effects model

Lnoverall debt	Coefficients	Robust Std. errors	t	$P > |t|$
Lncapital stock	0.1127824	0.0664476	1.70	0.188
Lnexchange rate	0.1468896	0.0350399	4.19	0.025
Inflation	0.0066067	0.004777	1.38	0.261
Interest rate	0.0022229	0.0022663	0.98	0.399
Lnlabour force	0.0179511	0.3244225	0.06	0.959
GDP	-0.0003164	0.0011745	-0.27	0.805
Constant	18.34812	4.979961	3.68	0.035
Sigma_u	0.94066441			
Sigma_e	0.34747391			
Rho	0.87993278			

4.10 Random Effects Model

The results of the random effects model are presented in Table 4.10. The exchange rate had a negative but insignificant relationship with overall debt. The interest rate, on the other hand, had a positive and significant relationship with the total debt. The Inflation and labour force had a positive and statistically significant relationship with overall debt. The Hausman test had a p-value of 0.000 as shown in Table 4.11. This means that the FEM was the preferred model.

Table 4.10: Random effects model

Lnoverall debt	Coefficients	Robust Std. errors	z	$P > \lvert t \rvert$
Lncapital stock	0.0414011	0.0696097	0.59	0.552
Lnexchange rate	-0.0675524	0.069675	-0.97	0.332
Inflation	0.014861	0.0054795	2.71	0.007
Interest rate	0.0128392	0.0037202	3.45	0.001
Lnlabour force	1.409978	0.175621	8.03	0.000
GDP	-0.0021893	0.0037907	-0.58	0.564
Constant	-1.430391	1.65521	-0.86	0.387
Sigma_u	0			
Sigma_e	0.34747391			
Rho	0			

Table 4.11: Hausman test

	Coefficients			
	(b) fe	(B) re	(b-B) difference	Sqrt(diag(V_b-V_B)) S.E
Lncapital stock	0.1127824	0.0414011	0.0713812	
Lnexchange rate	0.1468896	-0.0675524	0.2144421	0.0222163
Inflation	0.0066067	0.014861	-0.0082543	
Interest rate	0.0022229	0.0128392	-0.0106162	
Lnlabour force	0.0179511	1.409978	-1.392027	0.2379858
GDP	-0.0003164	-0.0021893	0.0018728	
b = consistent under Ho and Ha; obtained from xtreg				
B = inconsistent under Ha, efficient under Ho; obtained from xtreg				
Test: Ho: difference in coefficients not systematic				
$chi2(6) = (b - B)'[(V_b - v\_B)^{\wedge}(-1)] = 140.66$ Prob> chi2 = 0.0000				

Table **4.12 Least squares dummy variable model (LDVM)**

lnoverall debt	Coef.	Std. Err.	t	$p|t|$
lncapital stock	0.1127824	0.054849	2.06	0.042
lnexchange rate	0.1468896	0.0324294	4.53	0.000
Inflation rate	0.0066067	0.0045198	1.46	0.146
Interest rate	0.0022229	0.0029525	0.75	0.453
lnlabour force	0.0179511	0.2666607	0.07	0.946
GDP	-0.0003164	0.0049332	-0.06	0.949
Icountry1_2	-2.086845	0.2974783	-7.02	0.000
Icountry1_3	-0.2729821	0.1109747	-2.46	0.015
Icountry1_4	-1.115991	0.138522	-8.06	0.000
Constant	19.21708	3.546689	5.42	0.000

CHAPTER FIVE

DISCUSSION

5.1 The Effect of External Debt on Economic Growth

The negative relationship and statistically significant relationship between external debt and GDP growth are consistent with a prior expectation and economic theory. It also agrees with the findings of Akram (2010), Boboye and Ojo (2012), and Mukui (2013) who found a negative relationship between external debt and GDP growth in Pakistan, OECD, and Kenya respectively. External debt can discourage economic growth through several channels. To begin with, as external debt increases a large proportion of tax revenue has to be used to repay foreign loans. These constraints the amount of funds that are available for investment in development projects that developing countries need to improve economic growth. Repayment of external debt can also lead to the depreciation of local currencies, thereby increasing inflation in EAC countries that are net importers. As a result, GDP growth declines. This decline is likely to be high if the proceeds of external debt are mismanaged or invested in unproductive ventures, which in turn constrains access to funds for servicing debts. A significant increase in external debt also discourages investments by increasing uncertainty concerning government policies. An increasing external debt stock often creates expectations that the government is likely to resort to distortionary measures to meet its debt obligations. As a result, the private sector investors are likely to postpone their investments, which in turn reduce economic growth.

The negative but statistically insignificant relationship between domestic debt and GDP growth was expected a priori. The finding also supports that of Mbate (2013) who showed that domestic debt had a negative relationship with economic growth in 21 Sub-Sahara African countries. The finding, however, is inconsistent with that of Putunoi and Mutuku (2012) and Sheikh, Faradi, and Tariq (2010) who found positive relationships between domestic debt and economic growth in Kenya and Pakistan respectively. According to Cohen (1993) domestic debt can have a positive effect on GDP growth up to a certain threshold beyond which the effect is negative. Thus, domestic debt can reduce economic growth by crowding out investments in the private sector. The insignificance of the relationship between domestic debt and GDP growth could be

explained in part by the fact that most of the EAC countries have underdeveloped capital markets. Thus, they tend to rely more on external rather than domestic debt. This minimizes the crowding-out effect of domestic debt on investments.

The capital stock had a positive and significant relationship with GDP growth as was expected a priori. This finding supports that of Drezgic (2008) and Limam and Miller (2003) who found that capital accumulation had a positive effect on economic growth. Capital accumulation involves increased spending of a country's savings on capital goods that are necessary for production. An increase in capital investment is likely to increase labour productivity if it promotes technological progress. The resulting increase in aggregate output leads to improvement in GDP growth and standards of living.

Although inflation rate, interest rate, and exchange rate did not have a statistically significant relationship with GDP, the signs of their coefficients were consistent with a priori expectation and economic theory. The negative coefficient of inflation rate is based on the fact that an increase in price levels reduces GDP growth through its negative effect on aggregate demand. An increase in inflation also increases the cost of production, thereby reducing economic growth. The negative sign of the coefficient of real lending interest rate reflects the adverse effect of the cost of financial capital on economic growth. As interest rates increase, investors find it difficult to access adequate funds to invest or expand their businesses. This results in a decline in the rate of economic growth. The positive relationship between exchange rate and GDP growth is explained in part by the role of currency depreciation in promoting exports. A depreciation of domestic currency makes local products more competitive in foreign markets by making them cheaper. This means that exporters can sell and earn more in foreign markets. The resulting increase in foreign exchange and job creation leads to economic growth; hence, the positive relationship between exchange rate and GDP.

5.2 Costs-Risk Trade-off for Overall Debt

The positive and statistically significant relationship between exchange rate and overall debt is consistent with a priori expectation and economic theory. The finding supports that of Alam and Taib (2013), and Mahmood, Rauf and Rehman (2006). Depreciation in local currency against the foreign currency in which debt is denominated increases the value of outstanding external debt in equal proportion. This leads to capital loss since more of the domestic currency will be required to repay the external debt.

The interest rate, on the other hand, had a positive but insignificant effect on overall debt. This is inconsistent with the findings of Kinoshita (2006) who found that interest rate had a positive and statistically significant effect on public debt. An increase in domestic debt can encourage the government to borrow externally, thereby increasing the external component of public debt. A decrease in domestic interest rate, on the other hand, encourages borrowing in the local market, thereby increasing the domestic component of public debt. Also, a general increase in interest rate is expected to increase debt burden.

The findings discussed in the preceding paragraphs show that exchange rate poses the greatest risk to public debt management. It also reflects the fact that external debt plays a greater role in deficit financing in most EAC countries that have poorly developed capital markets. Interest rate risks, on the other hand, seem to be minimal since interest rate did not have a statistically significant relationship with overall debt.

5.3 Conclusion

The main objective of this study was to determine the effect of public debt on economic growth in four East African countries namely, Kenya, Tanzania, Uganda, and Rwanda. The study established that economic growth proxied by GDP responds differently to various components of public debt. Specifically, the external debt had a negative effect on economic growth in East African Countries. Domestic debt, on the other hand, had no significant effect on economic growth. However, this does not imply that domestic borrowing is harmless. This perspective is

attributed to the fact that domestic debt had a negative relationship with economic growth. Thus, an increase in domestic debt is likely to have a significant negative effect on economic growth in future.

Apart from external debt, economic growth was affected by capital stock. Specifically, an increase in the stock of capital led to an increase in GDP growth. This means that EAC countries focus on creating physical capital such as factories to increase their productivity, which in turn improves economic growth. The study also found that macroeconomic factors, specifically, real interest rate, inflation rate, and exchange rate did not have a reasonable effect on the economic growth. Additionally, the study found that EAC countries face exchange rate risks when borrowing. Specifically, a depreciation of local currencies led to an increase in public debt.

In future, this study can be extended by other researchers in the following ways. First, different indicators such as debt repayment and the debt-to-GDP ratio can be used to evaluate the effects of external public debt on economic growth in East African countries. Second, a different estimation technique can be used to explore the short term and long term effects of domestic and external debt on economic growth.

5.4 Policy Recommendations

In light of the results and conclusions discussed in the foregoing paragraphs, the government and policymakers in EAC countries should consider the following recommendations to improve public debt management. First, the governments should establish and adopt an optimal balance between external and domestic debt to maintain steady economic growth. Although domestic debt had no significant effect on GDP growth, it cannot be relied on entirely since a rapid increase in borrowing locally has the potential of crowding-out private investments.

Second, the negative effect of currency depreciation on public debt means that exchange rate stabilization is central to debt management. This means that measures such as improving exports should be implemented to ensure that local currencies are stable. As a result, the value of foreign currency denominated external debt will not increase significantly as local currencies depreciate over time.

Finally, Prudential fiscal management measures are required to avoid an unnecessary increase in overall public debt. A reduction in borrowing will enable EAC countries to use a greater proportion of their tax revenues for investments rather than repaying loans, thereby increasing economic growth.

Appendix A

LDVM

```
. xi: regress gdp inflation interestrate lnexternaldebt lnexchangerate lncapitalstock lndomesticdebt i.countr
> y1
i.country1        _Icountry1_1-4     (naturally coded; _Icountry1_1 omitted)

      Source |       SS       df       MS              Number of obs =     136
-------------+------------------------------           F(  9,   126) =    1.47
       Model |  521.277506     9  57.9197229           Prob > F      =  0.1646
    Residual |  4952.25829   126  39.3036373           R-squared     =  0.0952
-------------+------------------------------           Adj R-squared =  0.0306
       Total |   5473.5358   135  40.5447096           Root MSE      =  6.2693

---------------+----------------------------------------------------------------
           gdp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
     inflation | -.1328004   .0890978    -1.49   0.139    -.3091224    .0435216
  interestrate |  .0043556   .0566995     0.08   0.939     -.107851    .1165621
lnexternaldebt | -.1414329   1.606798    -0.09   0.930    -3.321239    3.038373
lnexchangerate |  .5055203    .608059     0.83   0.407    -.6978105    1.708851
lncapitalstock |  1.292782    .727991     1.78   0.078    -.1478904    2.733455
lndomesticdebt | -.4106035   .4913317    -0.84   0.405    -1.382935    .5617275
   _Icountry1_2 |  1.796352   4.149824     0.43   0.666    -6.416028    10.00873
   _Icountry1_3 |  .8701697   1.924286     0.45   0.652    -2.937935    4.678275
   _Icountry1_4 |  3.052513   2.857782     1.07   0.287    -2.602953    8.707979
         _cons | -16.76154    34.8254    -0.48   0.631    -85.67999    52.15691
---------------+----------------------------------------------------------------
```

Appendix B
LDVM
```
. xi: regress lnoveralldebt lncapitalstock lnexchangerate inflation interestrate ln
> labourforce gdp i.country1
i.country1        _Icountry1_1-4      (naturally coded; _Icountry1_1 omitted)
```

Source	SS	df	MS
Model	118.98414	9	13.22046
Residual	15.2130029	126	.120738118
Total	134.197143	135	.994052911

Number of obs = 136
F(9, 126) = 109.50
Prob > F = 0.0000
R-squared = 0.8866
Adj R-squared = 0.8785
Root MSE = .34747

lnoveralldebt	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
lncapitalstock	.1127824	.054849	2.06	0.042	.0042379	.2213269
lnexchangerate	.1468896	.0324294	4.53	0.000	.0827129	.2110664
inflation	.0066067	.0045198	1.46	0.146	-.0023379	.0155513
interestrate	.0022229	.0029525	0.75	0.453	-.0036199	.0080658
lnlabourforce	.0179511	.2666607	0.07	0.946	-.5097627	.5456648
gdp	-.0003164	.0049332	-0.06	0.949	-.0100791	.0094463
_Icountry1_2	-2.086845	.2974783	-7.02	0.000	-2.675545	-1.498144
_Icountry1_3	-.2729821	.1109747	-2.46	0.015	-.4925978	-.0533664
_Icountry1_4	-1.115991	.138522	-8.06	0.000	-1.390122	-.8418603
_cons	19.21708	3.546689	5.42	0.000	12.19828	26.23587

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