



**EXTERNAL PUBLIC DEBT AND ECONOMIC GROWTH IN
KENYA**

BY

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X50/80341/2012

**Research paper submitted to the School of Economics in partial fulfillment
of the requirements for the award of the degree of Master of Arts in
Economics of the University of Nairobi**

November 2014

DECLARATION

This research paper is my original work and has not been presented for award of a degree in any other university.

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LIST OF ACRONYMS

ADF	:	AUGMENTED DICKY- FULLER
CBK:		CENTRAL BANK OF KENYA
GDP	:	GROSS DOMESTIC PRODUCT
GOK:		GOVERNMENT OF KENYA
IMF	:	INTERNATIONAL MONETARY FUND
KNBS:		KENYA NATIONAL BUREAU OF STATISTICS
OLS	:	ORDINARY LEAST SQUARES
SSA	:	SUB-SAHARAN AFRICA
USD	:	US DOLLAR
WB	:	WORLD BANK

ACKNOWLEDGEMENTS

First, I thank God for His mercy and grace which has been sufficient in seeing me through the academic journey. My sincere gratitude goes to my supervisors Dr. Kamau Gathiaka and Dr. Mary Lucia Mbithi for dedicating time to guide me in writing this research paper. Through their guidance, support and consistent encouragement this study has eventually come to be what it is.

Many thanks also go to my other lecturers and to my classmates in the School of Economics for their support and study materials during the course.

My acknowledgement goes to all my friends for their moral support and contribution towards accomplishment of this paper.

To my dad Mr. Jackson Muinga, sister Grace Muinga and other family members, I am highly indebted to you and I appreciate you so much for the prayers and constant encouragement that has seen me complete this masters degree course.

Lastly, I would like to appreciate my employer, Family Bank, especially the human resource manager, Faith Kosilbet for the all the support and understanding and for giving me time to study the course.

ABSTRACT

This study examines the relationship between external public indebtedness and economic growth in Kenya. It uses data from 1970 to 2010 from World Development Indicators and Kenya National Bureau of Statistics. The GDP is the proxy for economic growth. The explanatory variables are capital, labour, interest payments on external debt, external public debt, debt service payments, and inflation. Since the data is in time series the augmented Dickey Fuller Unit Root test is used to ascertain stationarity. The econometric technique of Ordinary Least Square (OLS) is employed in the data analysis.

The results indicate that external debt and interest payments on external debt payments contribute negatively to economic growth in Kenya. Capital formation and labour force have a significant positive contribution to economic growth. The simulation results show that any percentage increase of external debt holding other factors constant, will reduce the GDP hence slow economic growth. The study recommends that the policies of debt management in Kenya be reviewed and improved. The government should pay more attention to the debt management profile particularly on the expenditure items and diversify the economy to generate more revenue and avoid external borrowing to the extent possible.

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CHAPTER ONE

INTRODUCTION

1.1 Background

Sustainable economic growth is of major concern for all economies, especially in developing economies. These economies commonly face burgeoning fiscal deficits mainly driven by external debt servicing and widening current account deficits (Reinhart et al., 2012). Since developing countries are striving for sustainable economic growth, they need to control their escalating fiscal deficit. In order to bring it down, these countries are confronted with the challenges of increasing revenues, curtailing non-essential public expenditures and expanding avenues for new investment that can drive these economies to higher growth while limiting the current account deficit to sustainable levels (Baum et al., 2013).

According to Arai et al. (2012), over the past three decades developing countries have borrowed large amounts of money often at high interest rates. They hoped that these loans would put them on a faster development path through higher investments. But as debt ratios reached very high levels in the 1980s, it became clear that for many of these countries, repayment would not just constrain economic performance but was virtually impossible. Thus, in the 1980s, several middle-income countries particularly in Latin America faced severe debt crises that saw Mexico declare that it could not pay and would not repay its debt and announced unilaterally a moratorium of 90 days and also requested a renegotiation of payment of periods and new loans in order to fulfill its prior obligations. This was due to economic recession in 1970s and 1980s leading to high oil prices. Garcia, Cristina, (1991).

According to Patenio and Tan-Cruz (2007), a public debt is a debt owed to both external and internal parties by a government of an independent country. External Public Debt is debt

owed to external creditors which are multilateral creditors such as African Development Bank, World Bank, International Monetary Fund and bilateral creditors who are essentially governments of other countries and commercial creditors.

According to Rusike (2007) the effects of external debt accumulation on investment and economic growth of a country are always questioned by policymakers and academicians. There is no consensus on the role of external debt on growth. It has both positive and negative effect effects. Different experts are in view that external debt will have favourable effect on economic growth because it increases capital inflow. When used for growth related expenditures external debt can accelerate the pace of economic growth. It not only provides foreign capital for industrial development but also managerial know-how, technology, technical expertise as well as access to foreign markets for the mobilization of a nation's human and material resources (Reinhart et al., 2012).

On the other hand when external debt accumulates beyond a certain limit, it contracts economic growth by hampering investment. A leading explanation for this negative relationship is the so-called debt overhang. Debt overhang hypothesis states that high levels of indebtedness discourage investment and negatively affect growth as future tax revenues go to repay debt (Baum et al., 2013).

Kenya has been experiencing rapid growth of gross external debt over the years. Some of this debt is over 50 years old with remote prospects of repayment and over the years the country has resorted to occasional debt rescheduling and expensive short term borrowing to finance government expenditure.

The Table below shows trends in Kenya's external debt stocks, debt service and GDP.

Table 1: Trend in Kenya's External debt stocks and debt service as %GDP and GDP Annual Growth (%)

Year	Ext. Debt (% GDP)	Debt service (% GDP)	GDP growth (%)
1980	48.1	6.1	5.6
1981	48.6	7.3	3.8
1982	54.5	8.0	1.5
1983	62.7	8.9	1.3
1984	58.6	9.6	1.8
1985	70.6	10.5	4.3
1986	65.8	9.7	7.2
1987	75.2	8.9	5.9
1988	72.3	9.2	6.2
1989	73.4	8.8	4.7
1990	85.8	9.6	4.2
1991	95.8	9.2	1.4
1992	87.7	8.5	-0.8
1993	131.9	11.7	0.6
1994	105.0	12.9	2.6
1995	83.8	10.4	4.4
1996	57.6	7.1	4.1
1997	49.9	5.1	0.5
1998	48.9	4.7	3.3
1999	51.3	5.5	2.3
2000	49.3	4.7	0.6
2001	43.4	3.8	3.8
2002	47.4	4.1	0.5
2003	47.0	3.9	2.9
2004	47.3	2.2	5.1
2005	34.6	2.9	5.9
2006	29.8	1.9	6.3
2007	27.8	1.7	7.0
2008	25.0	1.4	1.5
2009	28.1	1.3	2.7
2010	27.5	1.3	5.6

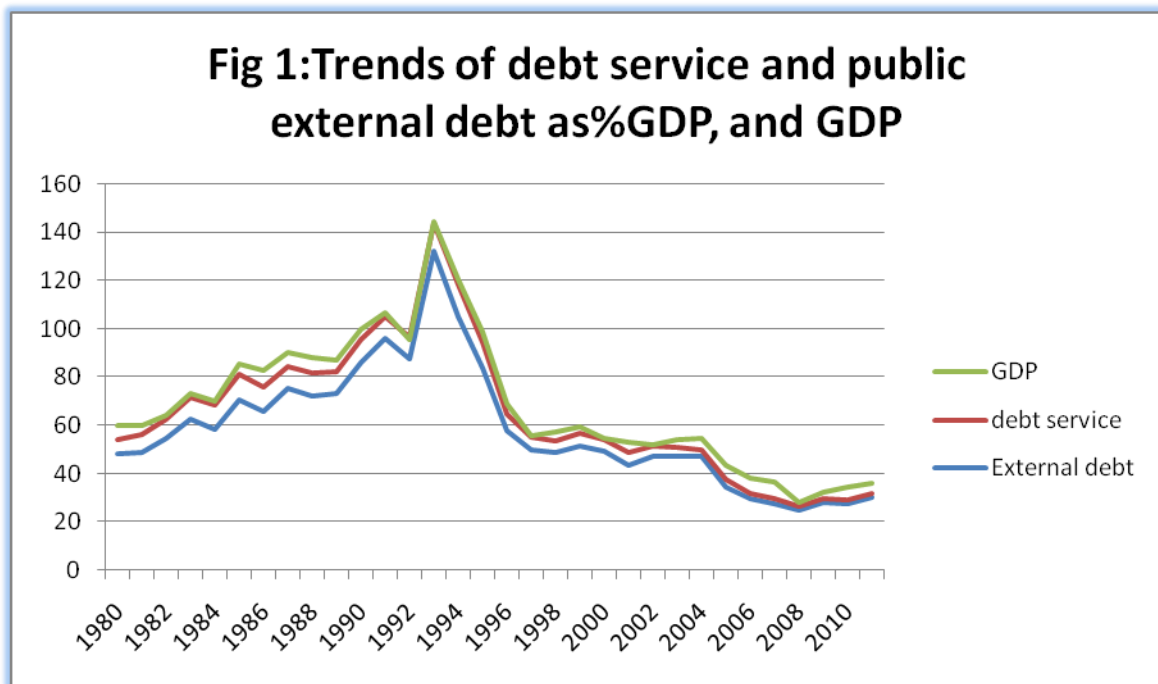
Source: World Bank, 2012

From Table 1 the external debt problem in Kenya has been historical and has been increasing. External debt as percentage of GDP between years 1980 to 2000 ranged from 48% to 131.9%. , Over the same period GDP growth ranged from as low as -0.8% to 7.2%. From 2000 external debt began to decline until in 2011. Debt service remained above 5% between

1980 and 1997 and declined to 4.7% in 1998 then went back to over 5% in 1999. However, beginning 2000 debt service began to decline while GDP growth rate rose from as low as 0.6% in 2000 to reach 7% in 2007.

The highest debt ratio was experienced in 1993 while the lowest ratio was in 2008. 1993 recorded 131.9% while 2008 recorded 25%. The corresponding GDP growth rates were 0.6% and 1.5% in 1993 and 2008 respectively.

The figure below shows the relationship between GDP, public external debt and debt service as discussed above.



Source: Owner's computation

1.2 Statement of the Problem

Kenya experienced rapid economic growth after independence, through public investments, increased smallholder agricultural production and private foreign industrial investments. Gross domestic product (GDP) grew at an annual average of 6.6% from 1963 to 1973.

Between 1974 and 1990, however, Kenya's economic performance declined (IMF/World Bank, 2009) due to economic shocks (mainly oil shocks), poor governance and the resultant political instability

Kenya had its worst economic performance since independence from 1991 to 1993. Growth in GDP stagnated, and agricultural production shrank at an annual rate of 3.9%. Inflation reached a record 100% in August 1993 and government budget deficit was over 10% of GDP. The country's real GDP growth picked up at 2.3% in early 2004 and to nearly 6% in 2005 and 2006. External debt declined from 47.3% to 29.8% from 2004 to 2006. As at June 2013, the total public debt stock amounted to Sh1.9 trillion, or 51.7 per cent of GDP. Total gross domestic debt stock increased by 22.4 per cent from Sh858.8 billion as at end-June 2012 to Sh1 trillion.

Kenya's public debt rose to Sh1.6 trillion as at end May 2012, or 48.9 per cent of the country's Gross Domestic Product. This is just a few points to the 50 per cent mark of GDP that the Treasury has warned is not manageable. IMF/WB public and publicly guaranteed debt rose by 0.81 per cent at the end of April 2012, a position attributed to depreciation of the Kenya shilling and increased disbursements to external creditors. According to Treasury's latest debt figures, external debt rose by Sh20.14 billion from May 2011 to stand at Sh721.04 billion in May 2012.

According to treasury bulletin (GoK, 2013) as at end of June 2013 external debt was at 45% of GDP and this increase was due to rise in disbursements and depreciation of Kenya shilling against the major currencies. The currency composition of external debt is that euro forms the largest share of the external debt portfolio at 34% followed by dollar at 32%.

Also according to statistics compiled by IMF (2013), Kenya is the second most indebted country in the sub-Saharan Africa at 53% of GDP. This shows if the situation persists this trend may plunge the country into a debt crisis. However, the very opposite may occur. It is

not immediately clear how rise in external debt affects the country's economic growth. This study seeks to establish how the growth in public external debt affects the country's economic growth.

1.3 Research questions

The following are the specific research questions:

- i. What is the relationship between external public debt and economic growth in Kenya?
- ii. What is the threshold at which external debt changes the trend of economic growth in Kenya?
- iii. What is the most pragmatic approach to external public debt in Kenya?

1.4 General and specific objectives of the study

The main objective of this study is to examine the relationship between external public indebtedness and economic growth in Kenya.

The following are the study specific objectives:

- i. To establish the relationship between external public debt and economic growth in Kenya.
- ii. To establish the threshold at which external debt changes the trend of economic growth in Kenya.
- iii. To explore the most pragmatic approach to external public debt in Kenya.

1.5 Significance of the study

The results obtained from the study will be useful to the government policy makers and various stakeholders in the ministry of Finance in highlighting the various implications of external public debt in economic growth in the country.

The study will also add to the existing literature on the impact of the external public on the economic growth of the country and also provide some recommendation on the various ways of mitigating the impact. It will also contribute to literature for those who would like to carry out further research on similar field. This study constructs a framework for rationalization of the impact of public external debt on economic growth and it is useful for further research.

The main objective of this study is to examine the relationship between external public indebtedness and economic growth in Kenya. Particularly, the question of interest is whether there is any significance effect of external debt on economic growth. The study using time series will analyse external debt trends in Kenya compared to GDP from 1980 to 2010.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents literature review. Both theoretical and empirical literature is discussed. The chapter concludes by giving an overview of the literature reviewed.

2.1 Theoretical literature

Classical growth theory which uses theory of production and theory of growth is based on the theory of variable proportions whereby increasing either of factors of production that is, capital and labour while holding other factors constant and assuming no technological change will increase output but at diminishing rate. Classical economists employ use of capital and labour as factors contributing to economic growth.

Neoclassical economists Solow (1956) and Swan (1956) show a relationship between labour, capital, output, and investment. They assume that countries use their resources efficiently and there are diminishing returns to capital and labour increases. According to these economists growth is determined by capital, labour, and technology. Solow argues that capital increases relative to labour, and this increase growth since people can be more productive given capital. It follows that if the gains accrued from increased productivity goes to foreign creditors and not domestic agents, then the motivation to increase the productivity of capital or labour is very minimal. The implication is that an increase in debt repayments beyond a certain level will decrease economic growth.

According to Keynesian growth theory (1936) the rate of economic growth is determined by the rate of investment and savings in an economy. He argues that if a country's rate of saving

is low, then this automatically affects the country rate of investments which subsequently affects the rate of economic growth. Countries with low savings borrow externally to finance investments. This theory is applicable to the study since the country with external debts will concentrate on paying the debts which normally have high interest rates and not concentrate on investment which affects the economic growth.

Romer and Solow in the late 1980s and early 1990s developed endogenous model of growth which holds that economic growth is as result of endogenous forces and not external forces (growth theories, Wikipedia) According to this growth theory factors that contribute to economic growth are investment in human capital, innovation, and knowledge. The concept of human capital skills and knowledge make workers more productive hence increased output in the economy. This theory holds that with constant returns to capital and labour the economy never reaches steady state. Also growth doesn't slow as capital accumulates but rate of growth depends on the types of capital a country invests in.

The theoretical literature on the relationship between external debt and economic growth has focused largely on the harmful effects of a country's "debt overhang", i.e., the accumulation of a stock of debt so large as to threaten the country's ability to repay its past loans. Debt overhang scares off potential lenders and investors. That is, if a country's debt level is expected to exceed the country's repayment ability with some probability in the future, expected debt service is likely to be an increasing function of the country's output level. Thus, some of the returns from investing in the domestic economy are effectively "taxed away" by existing foreign creditors, and investment by domestic and foreign investors is discouraged (Patenio and Tan-Cruz, 2007).

Debt overhang also depresses growth by increasing investors' uncertainty about actions the government might take to meet its onerous debt-servicing obligations. As the stock of public

sector debt rises, investors may worry that the government will finance its debt-service obligations through distortionary measures (Acemoglu et al., 2009), such as rapidly increasing the money supply (which causes inflation). Amid such uncertainty, wary would-be private investors tend to remain on the sidelines. When they do invest, they are more likely to opt for projects with quick returns rather than for projects that enhance growth on a sustainable basis (Acemoglu et al., 2009).

Some analysts like Checherita and Rother (2010) have argued that only above a certain threshold will additional foreign loans have a negative impact on growth, owing to the debt-overhang considerations.

Up to a certain threshold, increased borrowing makes repayment of debt more likely to be paid, but, beyond that threshold, further increases in foreign debt reduce the prospects of creditors being repaid. As a country's access to loans drops, its ability to accumulate capital suffers, and growth may slow. In short, the negative effects of debt overhang are likely to take effect only after a certain threshold level has been reached.

2.2 Empirical literature

Hameed et al. (2008) explore the dynamic effects of external debt servicing, capital stock and labour force on the economic growth in Pakistan over the over the period 1970-2003. They find an adverse effect of external debt servicing on labour and capital productivity. Butts (2009) investigate the causal relationship between short term external debt and GDP growth rate for 27 Latin American and Caribbean countries over the period 1970-2003 and found evidence of granger causality meaning in 13 countries.

Uma, Eboh and Obidike (2013) study of an empirical investigation of the influence of total domestic debt, total external debt cum servicing of external debt from 1970-2010 on the economic development of Nigeria show that total domestic and total external debts are

inversely related to real gross domestic product, a proxy for economic development, but at an insignificant level, while Interest on total external debt relates positively.

Muhtar, (2004) states debt servicing has direct negative impact on economic development. He argues that debt services encroach on resources needed for socioeconomic development and poverty reduction. It also contributes to negative net resources flow.

Safia and Shabbir, (2009) analyzes relatively small sample of 24 developing countries in Africa over a period of 1976-2003 using panel data and applied random effect and fixed effect estimation, employing all the leading variables of external debt indicators and macroeconomic indicators, the results of the study established a relatively casual negative relationship between the external public debts and economic growth to a certain threshold of borrowing. Also Faraji Kasidi¹ and A. Makame Said, (2013) using co- integration test find that there is no long run relationship of the external debt and GDP.

Acemoglu et al, (2009) suggests that foreign borrowing has a positive impact on investment and growth of a country up to a threshold level. But external debt service can potentially affect the growth of a country adversely as most of the funds go in the repayment of the debt rather than to investments. Furthermore, Fosu (2009) finds that debt servicing shifts spending away from the social sector, health, and education. This shows that the aim of taking debt for development is depressed by debt service payments that cut resources available. This creates a hindrance to economic growth of a country due to high interest payments on the external debt, and foreign exchange repayments (Ibadan, 2002).

External debt problem is one of the main challenges faced by the developing countries like Tanzania. Gohar et al. (2012) mentions that the repayment or “debt service” has created problems for these countries because the debts being serviced are more than the initial amount it was procured. Therefore, large debt service payments impose constraints on a

country's growth path. Either it drains limited resources or restricts financial resources for domestic development.

Ajayi and Oke (2012) investigates the effect of the external debt burden on economic growth and development of Nigeria and their findings indicates that external debt burden had an adverse effect on the nation income and per capital income of the nation. High level of external debt led to devaluation of the nation currency, increase in retrenchment of workers, continuous industrial strike and poor educational system. This led to the economy of Nigeria getting depressed.

Reinhart and Rogoff, (2010) examined the effect of public debt on economic growth for forty four developed and developing countries over the last hundred years. They concluded that high levels of public debt in relation to GDP of over 90% is accompanied by a lower levels of economic growth in both developed and developing countries. Consequently, in the case of developing countries external debt levels of over 60% of GDP negatively affects economic growth.

Several empirical studies find that public debt/GDP ratios above a certain threshold lower economic growth. In addition to Reinhart and Rogoff, (2012) and Reinhart and Rogoff (2010), Checherita-Westphal and Rother, (2012) and Baum, Checherita-Westphal and Rother, (2013) identify the same phenomenon in data from 12 euro area countries. These findings are new in that previous literature does not show that public debt has a significant effect on economic growth, while it does show the negative Reinhart and Rogoff, (2010) examined the effect of public debt on economic growth for forty four developed and developing countries over the last hundred years. They concluded that high levels of public debt in relation to GDP of over 90% is accompanied by a lower levels of economic growth in both developed and developing countries. Consequently, in the case of developing countries external debt levels of over 60% of GDP negatively affects economic growth.

Reinhart and Rogoff's, (2012) findings that public debt overhang tends to lower both economic growth and the interest rate is puzzling because the textbook argument of crowding-out Gal'ı,L'opez-SalidoandVall'es,(2007) and Romer,(2011) implies that expansionary and inefficient fiscal policy is associated with high interest rates. Interest rates are low in 11 episodes of public debt overhang including Japan's lost decades. Non-Keynesian effects are also related to this finding on public debt overhang: the non-Keynesian effects of expansionary fiscal policy lead to low consumption due to expectations of a one-time tax distortion in the future. As the non-Keynesian effects explain the short-term phenomenon, the finding that public debts overhang continues for a decade is still puzzling.

Results of Presbitero, (2010), from a panel of low- and middle-income countries over the period 1990-2007 show that public debt has a negative impact on output growth up to a threshold of 90 percent of GDP, beyond which its effect becomes irrelevant. This non-linear effect can be explained by country-specific factors since debt overhang is a growth constraint only in countries with sound macroeconomic policies and stable institutions.

Egbetunde, (2012) uses Granger causality to know the direction of causality between public borrowing and economic growth in the economy. He finds public debt and economic growth rate have long run relationship and are positively related if the government is sincere with the loan obtained and use it for the development of an economy rather than channel the funds to their personal benefits.

Patenio and Tan-Curz (2007), studied the relationship between external debt servicing payments and economic growth in Philippine for period 1981 to 2005. Results showed that economic growth was not very much affected by external debt servicing. This was probably because external debt servicing in Philippines was not yet a threat in economic growth and thus, Philippines should not fear of experiencing debt overhang in the near future.

Most policymakers do seem to agree that debt reduces growth. This view is in line with the results of a growing empirical literature which shows that there is a negative correlation between public debt and economic growth, and finds that this correlation becomes particularly strong when public debt approaches 100% of GDP (Reinhart and Rogoff 2010a, 2010b; Kumar and Woo 2010; Cecchetti et al. 2011).

2.3 Overview

Relatively few empirical studies have assessed the effects of debt service payments on private investment or on the composition of public spending, and the available empirical evidence is mixed. The review of existing empirical and theoretical studies of external debt and economic growth relationship indicate that it is inadequate to make any generalization of the relationship between economic growth and external debt. Various researchers such as (Reinhart and Rogoff, (2012; Gal'ı et al., 2007; Utagami et al., 2010; Checherita-Westphal, Cristina, and Rother, 2012; Baum et al., 2013; Arai et al., 2012; Acemoglu et al., (2009), indicates that external public debt will affect a country's economic growth if it reaches a certain threshold, they also argue that external debts can accelerate economic growth of a country up to a certain limit. Therefore, it is necessary to consider the case of each country separately in order to understand the various dynamics involved in economic boosting of a nation and the specific country's threshold debt size that is favourable to economic growth. From the literature review many researchers have focused on impact of external debt on an economy leaving out the threshold to which external debt will affect economic growth in a country. This study will focus on the effect of public external debt on the economic growth in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Theoretical framework

To analyze the relationship between external debt and economic growth, Hassan and Mamman (2013) use multiple regressions to estimate the relationship between Real Gross Domestic Product and its covariates.

The functional relationship is expressed as:

$$RGDP = f(ED, DSP, EXPT, INF, EXCR) \dots\dots\dots (1)$$

Where,

RGDP= Real Gross Domestic Product

ED= External Debt

DSP= Debt Service Payment

EXPT= Export

INFL= Inflation

EXCR= Exchange Rate

Uma, Eboh and Obidike (2013) state that total domestic debt (tdd), total external debts (ted) and interest rate on total external debt (ited) are functionally related with the real gross domestic product (rgdp).

Mathematically, the functional form of the relationship is stated as:

$$Rgdp = f(Tdd, Ted, Ited) \dots\dots\dots (2)$$

More explicitly, the function is expressed as

$$Rgdp = b_0 + b_1 tdd + b_2 ted + b_3 ited + e_t \dots\dots\dots (3)$$

Where,

Rgpd = Real gross domestic product;

Tdd = Total domestic debt;

Ted = Total external debt; and

Ited = Interest on total external debt.

Ajayi and Oke (2012) use simple open macroeconomic debt growth model to gauge the relationship between the external debt and growth of the Nigeria economy. The functional relationship between the national income and the covariates is expressed as:

$$NI = f(DSP, EXTR, INTR) \dots \dots \dots (4)$$

The model is explicitly written as follows.

$$NI = \beta_0 + \beta_1 TDS + \beta_2 EXTR + \beta_3 INTR + U \dots \dots \dots (5)$$

Where,

NI= National Income

DSP= Debt Service Payments

EXTR=External Debt

INTR= Interest rate

From theoretical literature capital and labour affect production positively, and by extension GDP. Using a simple production function this relationship can be expressed as:

$$Y = f(K, L) \dots \dots \dots (6)$$

Where,

Y= GDP

K= Capital stock

L=Labour force

3.2 Empirical Model

In this study we use capital stock (K), labour force (L), external public debt (ED), debt payment services (DSP) and interest rate on external debt (IR) as independent or explanatory variables. The dependent variable will be gross domestic product (GDP).

The functional relationship can be expressed as below:

$$\text{GDP} = f(\text{K}, \text{L}, \text{ED}, \text{DSP}, \text{IR}) \dots \dots \dots (7)$$

Following Hassan and Mamman (2013) a linear relationship between the external debt and economic growth is assumed. The model can be specified as follows:

$$Y = \beta_0 + \beta_1 K + \beta_2 L + \beta_3 IR + \beta_4 ED + \beta_5 DSP + \beta_6 IF + U \dots \dots \dots (8)$$

Where,

Y = Gross Domestic Product

K= Capital stock

L= Labour force

IR = Interest Rate

ED= External debt measured as total external debt stocks in USD

DSP = Debt Services Payment

IF= Inflation as GDP deflator

U = Stochastic error term

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ = parameters to be estimated.

By extracting the residuals from equation (2), the model becomes:

$$Y = \beta_0 + \beta_1 \ln K_{t-1} + \beta_2 \ln L_{t-1} + \beta_3 \ln IR_{t-1} + \beta_4 \ln ED_{t-1} + \beta_5 \ln DSP_{t-1} + \beta_6 IF_{t-1} + U_t \dots \dots (9)$$

Where,

t-1 = Variable lagged by one period

U_t = Error term

Table 3.1 Summary of the variables, their measurement, and expected signs

Variable	Variable Measurement (millions)	Expected sign
Gross Domestic Product	US \$	
Capital stock	Physical capital measured as natural log of gross capital formation in USD lagged by one period.	+ve
Labour force	Labour force measured as natural log of total labour force lagged by one period.	+ve
Debt service payment	Debt service payment measured as natural log of total debt service on external debt in USD lagged by one period.	-ve
External debt	External debt measured as natural log of total external debt stocks in USD lagged by one period.	-ve/+ve
Interest rate	Interest on external debt measured as natural log total interest on external debt lagged by one period.	-ve
Inflation	Inflation measured as consumer prices (annual %)	-ve

3.3 Estimation procedures

The study applied ordinary least square method (OLS) technique to estimate the model in equation 3 above. The study also used Dickey Fuller (DF) and Augmented Dickey-Fuller (ADF) to test stationarity of the time series data. ADF was used as an alternative to DF in cases where there was autocorrelation in the error terms. Autocorrelation gives biased estimates and data with such a problem cannot be DF test which assumes that the data generated is an AR (1) under the null hypothesis. To test for the threshold at which external debt changes the trend of economic growth we applied simulation test.

Since the data used is time series, the following tests were performed to establish its suitability for use in OLS regression.

3.3.1 Stationary test

For a series to be stationary, its moments, that is, mean and variance should be independent of time. If covariance between two time periods depends only on the distance or gap and not the actual time then the series is said to be stationary. The moments of the series (mean, mode, and kurtosis) are independent of time. Working with non-stationary variables leads to spurious regression results from which subsequent influence will be meaningless and to solve these non-stationary problems we use co integration. Stationarity will be tested by using Augmented Dickey-Fuller (ADF) unit root tests.

3.3.2 Heteroskedasticity test

OLS assumes that variance is constant across all observations and failure of which is heteroskedasticity. Estimating heterogeneous time series data would lead to biased standard errors and therefore inference will be adversely affected. To test for heteroskedasticity we will use Breusch-Pagan / Cook-Weisberg test.

3.3.3 Correlation test

There should not be any relationship or correlation between the independent variables. To test for this relationship we use Breusch-Godfrey LM test to test for serial correlation. The null hypothesis of the Breusch-Godfrey LM test is that there is no serial correlation. If the null hypothesis is rejected this would mean that the variable is stationary while accepting the null hypothesis would mean that the variable has unit root hence non-stationary.

3.3.4 Multicollinearity test

This test is done to determine whether there exists any relationship between the explanatory variables. This study will use the correlation matrix to test for the implied relationship between the independent variables.

3.4 Data collection

The study used secondary data from the Ministry of Finance, KNBS, the Central Bank of Kenya (CBK), internet, world development indicators and World Bank data. Since the data might not be harmonious, the study will reconcile and try to use most correct and consistent data for the analysis.

CHAPTER FOUR

ESTIMATION RESULTS AND INTERPRETATIONS

4.0 Introduction

This chapter presents the descriptive statistics and Ordinary Least Squares (OLS) regression results. The quality of the data is ascertained by use of various diagnostic tests discussed in the previous chapter. The chapter concludes by giving a detailed discussion of the results in relation to the reviewed literature.

4.1 Descriptive statistics

Table 4.1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	41	10610.46	8008.554	1603.447	32198.15
K	41	1918.998	1345.201	282.5199	6095.2
L	41	6.250579	5.612978	0.627214	15.00589
IR	41	168.0454	100.4367	0.283	333.362
ED	41	4748.824	2550.84	282	8589.492
DSP	41	478.4265	252.343	11.00446	904.429
IF	41	9.893516	8.001668	-9.219158	41.98877

Source: Own computation

From the Table 4.1, the GDP current in USD for Kenya has a mean of 10610.46 million with a standard deviation of 8008.554 and a maximum value of 32198.15 million and a lowest value of 1603.447 million over a period of 41 years. Gross capital formation had a mean of 1918.99 million with a standard deviation of 1345.20 and had a minimum value of 282.52 million with maximum value of 6095.2 million. Total labour force over the same period had a mean of 6.25 with a standard deviation of 5.61. This variable had a minimum of 0.63 million and a maximum of 15.01 million. Interest payments on external debt had a mean of 168.04 with a standard deviation of 100.44 and had a maximum value of 333.36 million and a

minimum value of 0.28 million over the same period. Total external debt stocks had a mean of 4748.83 with a standard deviation of 2550.84, while its minimum and maximum values in millions were 282 and 8589.49 respectively. External debt service had a mean of 478.43 with a standard deviation of 252.34 and had the minimum value of external debt service was 11 and a maximum value of 904.43. Inflation had a mean of 9.89 with a standard deviation of 8.00 and had minimum and maximum values -9.22 and 41.99 respectively.

These results show that for the period between 1970 and 2010, Kenya's average uptake of debt had been very high while at the same time the average economic growth was very minimal. Average percentage of external debt to GDP was as high compared to average percentage of capital to GDP implying that much of the resources accrued from the slow growing economy were used to service the debts. Inflation as GDP deflator was also very high during this period as evidenced by high mean value giving an indication that the economic growth is critical.

4.2 Diagnostic test results

4.2.1 Correlation Analysis

Table 4.2: Correlation Matrix before first differencing

Variables	GDP	K	L	IR	ED	DSP	IF
GDP	1.0000						
K	0.9651	1.0000					
L	0.8110	0.7160	1.0000				
IR	-0.0596	0.0241	0.0132	1.0000			
ED	0.7176	0.7018	0.8404	0.5077	1.0000		
DSP	0.2589	0.2679	0.4471	0.8203	0.7970	1.0000	
IF	-0.0447	-0.0666	0.0825	0.3070	0.1861	0.3054	1.0000

Source: Own computation

Table 4.3: Correlation Matrix after first differencing

Variables	GDP	K	L	ED	IR	DSP	IF
GDP	1.0000						
K	0.9640	1.0000					
L	0.0491	0.1071	1.0000				
ED	0.0923	0.1816	0.3384	1.0000			
IR	-0.1552	-0.1418	-0.1193	0.2296	1.0000		
DSP	-0.2319	-0.2070	0.0937	0.2143	0.0842	1.0000	
IF	-0.0841	-0.1102	0.0247	-0.2356	-0.1574	-0.0269	1.0000

Source: Own computation

Table 4.2 and 4.3 presents correlation matrix results of multicollinearity test which shows the relationships between explanatory variables. In our case, we tested for the implied relationship between capital formation, labour force, interest rate on external debt, external debt, debt service payment, and inflation. Multicollinearity will be severe if the correlation coefficient is greater than 0.8. From the results of multicollinearity some of the explanatory variables are highly correlated, that is external debt is highly correlated with labour force and debt service payment is highly correlated with interest rate. Therefore there would be a severe problem of multicollinearity if these variables were together included in a regression. To avoid the problem we conduct the first differences of the collinear variables which is the recommended as one of the remedy.

4.2.2 Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity results had a P value of 0.0300 and a chi2 (1) of 4.71 implying that we reject the null hypothesis of constant variance. This indicated that the variance of the error term is varies across observations. To avoid this problem we conduct Newey West regression which also serves as a remedy.

4.2.3 Unit root test

We carried out non stationarity test to avoid spurious regressions and inconsistent regression results. Table 4.4 below shows the results of Augmented Dickey Fuller (ADF) in establishing the order of integration of individual series.

Table 4.4: Test for Unit Root

Variables	Test Statistic at lags (0)	Test statistic at lags (0) after first differencing
GDP	2.925	-3.192
K	1.961	-4.810
L	-0.109	-6.176
IR	-1.674	-5.136
ED	-0.934	-5.273
DSP	-1.918	-7.480
IF	-4.776	-

**Critical values at 1%, 5% and 10% is 3.648, 2.958 and 2.612 before first differencing and after first differencing are 3.655, 2.961 and 2.613.

Source: own computation

Upon conducting the stationarity test, Gross Domestic Product, capital, labour, interest rate, external debt, and debt service payment were found to be non stationary at lags zero but on first differencing, they turn out to be stationary. Inflation rate was the only variable which was stationary without first differencing.

4.2.4 Test for Autocorrelation

Breusch-Godfrey LM test for autocorrelation with one lag show a chi2 of 12.915 and a P value of 0.0003 implying we acceptance of the alternative hypothesis of the presence of first order serial autocorrelation. This implies that one of the OLS assumptions of no autocorrelation is violated and therefore this will be accounted for in the regression results.

4.2.5 Co-integration Test

We conducted the co integration test to identify the existence of long run relationship between the Gross domestic product and the independent variables. We tested the null hypothesis of no Co integration and the results are as shown in the table below;

Table 4.5: Engel Granger test for Cointegration

D.uhat	Coefficients	Std. Err.	T	P>t
L1.	-0.5697908	0.1914055	-2.98	0.005
LD.	-0.0988652	0.1725294	-0.57	0.570
_cons	449.9221	181.9036	2.47	0.018
Number of observation = 38 F(2, 35) = 8.44 Prob > F = 0.0010 R-squared = 0.3252 Adj R-squared = 0.2867 Root MSE = 696.34				

Source: Own computation

The p value of 0.001 is less than 0.05 significant level where 32.5% of variations of independent variables explain the dependent variable. This implies that there is long run relationship between gross domestic product and determining variables.

4.3 Regression Results

Having conducted the diagnostic tests to verify whether OLS assumptions are met, we regressed the empirical model. Since one of the OLS assumptions of multicollinearity is violated, that is, external debt is highly correlated with labour force and debt service payment is highly correlated with interest rate the model in equation 9 was estimated using Newey West regression method to minimize the effects of multicollinearity and avoid biased results.

Table 4.6 Newey West regression results
The dependent variable is GDP

Variables	Coef	t-statistic	p>[t]
K	1137.987	3.22	0.002
L	345.813	1.24	0.225
IR	-87.928	-0.52	0.605
ED	-500.6715	-3.18	0.003
DSP	56.386	0.08	0.935
INF	3.028	0.18	0.860
CONSTANT	-1585.199	-0.47	0.644

Significance level at 5%; F STATISTIC = 10.12; Prob>Chi2=0.0021; R² =0.216; ADJ R²=0.0777

Source: Own computation

Table 4.6 presents the OLS regression results, where the F statistic is 10.12 with a p value of 0.0021. This implies independent variables that is, capital formation, labour force, interest on debt payment, external debt stocks, debt service payment, and inflation determine GDP growth.

The measure of goodness of fit, the R squared is 0.216 and the Adjusted R squared is 0.078 implying that 21 percent of the variations in GDP growth rate are explained by the independent variables in the model.

Capital formation and external debt are statistically significant in determining economic growth in Kenya. This is shown by their coefficients of 1137.98 and -500.67 at significance level of 5% and the t statistic. Holding other factors constant, an increase in capital stock by one million USD would increase GDP by USD 1137.98 million. An increase in external debt stock by one million USD reduces GDP by USD 500.67 million.

Debt service payment and inflation are statistically insignificant in determining economic growth in Kenya. An increase in debt service payment by one million would increase GDP by USD 56.386 million. An increase in inflation by one percent would increase GDP by 3.08 percent.

According to our results labour force has a positive effect on GDP, while interest on debt payment has a negative effect on GDP. This implies that a unit change in labour force would increase economic growth in 345.81 million dollars and a unit change in interest on debt payment will decrease economic growth by 87.92 million dollars.

Capital formation and labour force have a positive effect on economic growth in Kenya. Moreover interests on debt payment and external debt have a negative effect on economic growth in Kenya.

4.4 Simulation results

We conducted simulations on the regression model to determine the effect of increasing external debt on GDP. In order to illustrate this, we systematically increased the values of external debt by various percentages and then noted their GDP values. The simulation exercise suggested that an increase in external debt by one percent holding other factors constant will reduce GDP by 40.966 millions. This continues up to a point where GDP values are negative, that is, between 73% and 74%. Therefore any increase in external public debt in Kenya reduces GDP and hence slows economic growth.

4.5 Discussion of the results

The results in Table 4.6 indicate a positive relationship between capital formation and GDP in Kenya. This confirms economic growth theories which argue that capital is a key factor of production which leads to increased output hence it is positively related to economic growth. Labor force showed a positive effect on economic growth. This confirms theoretical arguments that labour as a factor of production is a key determinant of economic growth. Labour force in Kenya has been increasing as the population grows and as people attain more skills and technology. This increased skilled labour leads to economic growth in Kenya.

Interest on external debt payment showed a negative relationship with GDP. This is because with high burden of external debt as a country increases its capital formation and output most of it goes to pay interest on external debt thus lowers rate of economic growth. These results are contrary to findings of Uma, Eboh and Obidike who find a positive relationship between interest on external debt and economic growth.

The impact of external debt on economic growth in Kenya is negative, high external debt in Kenya relative to GDP leads to a reduction in economic growth rate. This confirms Solow's argument that when capital increases relative to labour, this increases growth since people become more productive when working with more of capital. This also confirms Keynesian growth theory that economic growth is determined by investment and savings. A country with high external debts may experience a leakage in the circular flow of income through paying of the debts and interest rates. This may lower investments and affect the economic growth negatively.

The study results support empirical findings by Ajayi and Oke (2012) that external debt burden has an adverse effect on economic growth and development. Nigeria external debt burden has had an adverse effect on the national and per capital incomes giving a negative relationship between debt and growth. The results also support the empirical findings of Uma, Eboh and Obidike (2013) on debt and debt service implications on economic development. Nigeria's total domestic and external debts are inversely related to real gross domestic product, a proxy for economic development.

Uma, Eboh and Obidike (2013) find a positive relationship between interest and total external debt. This study has found the opposite.

The results of this study contradict the findings of Hassan and Mamman (2013 and Egbetunde, (2012) whose empirical results indicate that external debt has a positive effect on

economic growth. Their findings suggest that increase in external debt leads to increase in GDP but our study has found a decrease in GDP.

Similarly, debt service payment has positive effect on GDP contrary to expectation. The results show that debt services increase GDP. The results support the findings of Patenio and Tan-Curz (2007) whose empirical findings indicate positive effect of external debt servicing on economic growth in Philippine. Thus debt servicing may not be really a threat to economic growth in Kenya, but we should be carefully about it since the positive relationship is not significant.

Inflation showed positive effect on economic growth contrary to our expectation, but the effect is insignificant.

The simulation results suggest that any increase in external public debt will reduce GDP hence slow economic growth. The results show that the GDP reduces as external public debt increases to an extent that, between 73% and 74% the GDP values become negative and therefore worse economic growth. These findings are similar to Reinhart and Rogoff, (2010), they concluded that high levels of public debt in relation to GDP of over 90% is accompanied by a lower levels of economic growth in both developed and developing countries. This implies that external debt stock should be at very low levels for economic growth in Kenya.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

5.0 Introduction

This chapter presents summary of findings, conclusions and policy recommendations.

5.1 Summary of findings

This study examined the relationship between external public debt and economic growth in Kenya over the period 1970 to 2010. The empirical results showed that the relationship between public external debt and economic growth in Kenya is negative. As external public debt increase economic growth deteriorate. The simulation results further suggest that high levels of external debts would lead to negative economic growth.

Capital formation has significant positive impact on economic growth in Kenya. Capital investments in Kenya influences economic growth and therefore the country should embark on good policies to increase this economic growth determinant.

The impact of external debt is negatively felt in Kenya due to the fact that the funds are not always channelled to the real productive sectors. There is need for the government to manage external public debt properly and accelerate economic growth.

5.2 Conclusions

This study examines the relationship between external public debt and economic growth in Kenya over the period 1970 to 2010. The regression results indicated that external public debt has a negative effect on growth implying an increase in external debt worsens the economic growth in Kenya.

The capital formation coefficients have a significant positive contribution to GDP and this enhances economic growth. Policy makers should focus more on projects that flow in capital to boost economic growth in the country.

The coefficients of external public debt variables are negative and quite significant. This means any increase in external debt stocks would worsen economic growth in Kenya. Therefore, there is need for the government to pursue economic policies that are geared towards reducing the external debt stock in order to reduce this effect on growth.

5.3 Policy recommendations

In consideration of the outcome of our data analysis, we can make several policy recommendations. Policy makers in Kenya should be cautious regarding raising the public debt level, since this may drive the country towards high debt ratio regimes associated with lower economic growth. The government need to pursue policies geared towards reducing the debt stock in order to reduce the adverse effects of debt on growth.

The government should pay more attention to the debt management profile particularly in its expenditure. Borrowed funds should be put into productive projects and programmes to improve the economy. There is great need for laws to guide sourcing, management and limits on loan-taking by the government. External debt should be tied to productive ventures rather than to social consumption.

The government need to diversify the economy so as to generate more revenue and avoid loans build-up. Since capital is a key determinant of economic growth, it is important for the government to put measures to increase capital formation. This would lead to increased investments hence growth of the economy.

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