"THE RELATIONSHIP BETWEEN DEBT SERVICING AND ECONOMIC GROWTH IN KENYA"

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Research Project submitted to the School of Economics in partial fulfillment of Master of Arts degree at the University of Nairobi.

DECLARATION

This research paper is my original work and to the best of my knowledge has not been presented for the award of a degree in any other University.

Rebecca Musyoka _____ **Date:** 31/10/2011

This research paper has been submitted for examination with our approval as University supervisors.

Dr. S. Nyandemo _____ **Date:** 31/10/2011

Prof. L. P. Mureithi _____ **Date:** 31/10/2011

DEDICATION

This study is dedicated to my loving parents, Mr. Peter and Mrs. Ruth Musyoka to whom I owe so much.

Further dedication is to my sisters and brothers: Zippy, Everlyne, Edner, Rosiana, David and Kanyi for their great inspiration and support.

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Special thanks to my parents; Mr. and Mrs. Musyoka and my siblings for their prayers, inspiration, moral and financial support throughout my academic life. May God always bless you.

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However, the views expressed in this paper are my own and do not represent the views of any of the named person(s) or institution(s). I bear the sole responsibility.

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AIC	Akaike Information Criterion
ADF	Augmented Dickey Fuller
d	Depreciation rate
DS	Debt Servicing
GDP	Gross Domestic Product
GNP	Gross National Product
E_t	Efficiency of labor
g	Growth rate of the efficiency of labor
HIC_S	Heavily Indebted Countries
HC	Human Capital
IMF	International Monetary Fund
K	Capital Stock
k	Capital Output ratio
k*	Steady – State value
K/L	Capital Stock per worker
LF	Labour Force
ML	Maximum Likelihood
n	Proportional growth rate of labor force
OLS	Ordinary Least Squares
s	Savings - Investment rate
TDS	Total Debt Service
TEDS	Total External Debt Service
VAR	Vector Auto Regression
Y/L	Output per worker

ABSTRACT

This paper analyses the relationship between debt servicing and economic growth in Kenya for the period 1970 - 2008, focusing on both Internal and External debt service. Results of the study show that economic growth is not very much affected by external debt servicing. Instead, it was found that labour force has a strong relationship with economic growth.

In debt overhang theory, it is anticipated that debt servicing will decrease economic growth because investors will be discouraged to invest. However, debt servicing did not show any effect on economic growth. This is because debt servicing in Kenya is not high enough for debt overhang to occur. Therefore, debt servicing is not yet a threat to economic growth in Kenya.

The higher the rate of interest on debt, the greater would be the rates of expansion of exports have to be to ensure the capability to service the debt. The decline in investment and growth performance of the highly indebted countries in the past three decades is frequently attributed, at least to some extent, to the burden of their foreign debt, a phenomenon which has been recognised as debt overhang.

CHAPTER 1: INTRODUCTION

1.1 Background Information

There was a dip in Kenya's economic growth from a growth rate of 7.1 % in 2007 to 1.7 and 2.6 per cent in 2008 and 2009 respectively. The anticipated economic recovery in 2009 as only experienced in the first quarter when the economy registered a growth rate of 5.7 %. Growth during this period was mainly supported by resurgence of activities in the tourism sector, resilience in the building and construction industry and the government's intervention through an economic stimulus package. On the other hand, a mixture of unfavourable weather and sluggish internal and external demands restrained growth during the period under review. Slowdown in household borrowing during the period accounted for the lethargic domestic demand while global economic recession was felt mainly through depressed demand for horticultural produce abroad and inadequate recovery in tourism (Republic of Kenya, 2010). It is anticipated that the economy will register an economic growth rate of 5 % in 2010.

All countries in the world face financial resource constraints and many times results to deficit financing. A budget deficit can be financed mainly through internal or external borrowing, sale of government assets. Sale of government assets is constrained by the stock and attractiveness of the assets; governments therefore resort to domestic borrowing (from the Central Bank, banking system and the private sector), and or foreign borrowing (bilateral or multilateral). Regardless of the nature and source of borrowing, there are associated costs.

High debt ratio as a percentage of Gross Domestic Product (GDP) in many developing countries has raised the question of debt sustainability. There are at times when debt in some countries had reached unsustainable levels precipitating into a debt crisis. Examples include the following: 1930s, 1982 (Mexico, Latin America), 1994 (Mexico), 1997 (Asia, Russia), 2000 (Ecuador, Pakistan), 2001 (Turkey, Argentina). Since the year 2001, the world has not had major debt problem only recently Greece (2010).

Domestic and foreign borrowing to deficit finance can cause huge accumulation of debts. This situation can lead to debt overhang[1]. Debt overhang theory is based on the premise that if debt exceeds a country's repayment ability, the 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 new foreign investor is discouraged (Patenio and Tan-Cruz, 2007).

Debt servicing, including interest payments and repayments, may also be a real linkage from an indebted country. It takes large benefit from the domestic economy to transfer to the foreign economy. Therefore, the country foregoes some multiplier accelerator effects. According to Metwally and Tamaschke (1994) this decreases the domestic country's ability to grow its economy and raises its dependence on foreign debt. It is argued that a debt overhang creates adverse incentive effects on the economic growth in the long run.

Other channels through which the need to service a large amount of external obligations can affect economic performance include the crowding out effect. Due to high real interest rates, terms of trade of over borrowed country worsens and shut-off from foreign credit markets. It is expected that investments would have declined because of the decrease in available resources for financing investment and macroeconomic conditions. Moreover, because of the expected higher taxes and deteriorated domestic policies that will affect real returns on investment since the debtor country has to pay their debt obligations, this has led to a decreasing growth rates on investment (Patenio and Tan-Cruz, 2007). In addition, foreign borrowing affects future growth through the effect on interest payment obligations. This causes a higher stock of outstanding debt. This means that external borrowing increases future debt service obligations because the foreign exchange constraint tightened in the future (Kamin et al., 1989). In the crowding out effect, a reduction in the debt service should lead to an increase in investment for any

given level of future indebtedness. If a greater portion of foreign resources are used to service external debt, very little is available for investment and growth. Excessive domestic borrowing can lead to crowding out effect of the sector.

In summary, in the debt overhang hypothesis, external debt causes a negative effect on investment. The debtor country cannot benefit fully from an increase in production. A part of the production goes to creditor countries to pay the debt service and this point is a consideration for investment and production decisions.

1.2.1 Stock of Public Debt

The overall objective of the Government debt management policy is to meet the central Government's financing needs at the lowest possible long term borrowing cost with a prudent degree of risk. Additionally, it aims at facilitating Government's access to financial markets as well as supporting development of a well functioning vibrant domestic market (Republic of Kenya, 2010). The main creditors to Kenya are the World Bank (44.3 percent of total external debt), followed by Japan (16.9 percent) and African Development Bank Group (6.1 percent). Other notable creditors to Kenya are France, Germany, European Union/European Investment Bank and Italy (Republic of Kenya, 2010). Table 1.1 gives a summary of total public debt (June 2006-09).

Table 1.1: Kenya's Public Debt Stock (Kshs. Millions)

	Jun-06	Jun-07	Jun-08	Jun-09	Change 2008/09
EXTERNAL					
Bilateral	154,877	141,706	153,201	185,933	32,732
Multilateral	255,550	240,259	268,223	327,633	59,410
Commercial Banks	1,274	574	0	0	0
Commercial Creditors	19,536	18,427	18,543	23,837	5,294
Sub-Total	**431,237**	**400,966**	**439,967**	**537,403**	**97,436**
As a % of GDP	27.9	21.7	21.1	23.3	2.2
(As a % of total debt)	54.7	49.8	50.5	50.9	0.4
DOMESTIC (Gross)					
Banks	**195,809**	**224,076**	**228,482**	**290,778**	**62,296**
Central bank	41,289	36,182	35,548	40,061	4,513
Commercial Banks	154,520	187,894	192,934	250,717	57,783
Non-banks	**162,029**	**180,614**	**202,130**	**227,729**	**25,599**
Non-bank Financial Institutions	1,400	1,084	11,177	3,651	(7,526)
Other Non-bank Sources	160,629	179,530	190,953	224,078	33,125
Sub-Total	**357,838**	**404,690**	**430,612**	**518,507**	**87,895**
As a % of GDP	23.2	21.9	20.7	22.5	1.8
As a % of total debt	45.3	50.2	49.5	49.1	(0.4)
GRAND TOTAL	**789,076**	**805,686**	**870,579**	**1,055,910**	**185,331**
As a % of GDP	51.1	43.6	41.8	45.8	4.0
Memorandum items					
GDP	**1,545,652**	**1,847,700**	**2,085,152**	**2,307,700**	

Source: Annual Public Debt Management Report, 2010

Kenya's public and publicly guaranteed debt increased from Kshs. 870,579 million or 41.8 percent of GDP in June 2007/08 to Kshs. 1,055,910 million or 45.8 percent of GDP in June 2008/09 as indicated in Table 1.1. Domestic debt rose from Kshs. 430,612 million or 20.7 percent of GDP to Kshs. 518,507 million or 22.5 percent of GDP over the period under review. Similarly, external debt rose from 439,967 million in 2007/08 to Kshs. 537,403 million in 2008/09. As a percentage of GDP, external debt increased marginally from 21.1 percent to 23.3 percent over the period. This rise in nominal external debt stock

is attributed largely to the depreciation of the Kenya Shilling coupled with increased disbursements to finance Government projects and programmes including a disbursement of Kshs. 16,253 million from the International Monetary Fund (IMF) under the Exogenous Shock Facility for Balance of Payments support.

The composition of public and publicly guaranteed debt remained relatively unchanged with the share of external debt increasing marginally from 50.5 percent to 50.9 percent while domestic debt declined from 49.5 percent to 49.1 percent of total debt. On domestic debt, the ratio of Treasury Bonds to Treasury Bills was 75:25. Kenya's external debt portfolio shows that the debt is mainly owed to multilateral and bilateral creditors at 61.0 percent and 34.6 percent respectively.

1.2.2 Debt Servicing

Kenya's overall debt service increased by Kshs. 3,637 million (5.7 percent) from Kshs. 63,957 million in 2007/08 to Kshs. 67,594 million in 2008/2009 as shown in Table 1.2. During the period, interest payments on domestic debt increased from Kshs. 42,181 Million to Kshs. 45,949 million while external debt service decreased marginally from Kshs. 21,776 million to Kshs. 21,645 million. The increase in domestic debt service was attributed to a higher domestic debt stock.

Table 1.2: Kenya's Public Debt Service (Kshs. Millions)

	Jun-04	Jun-05	Jun-06	Jun-07	Jun-08	Jun-09	Change 08-09
External principal	20,448	10,544	9,230	13,884	15,815	16,013	198
External interest	5,830	4,427	3,645	4,433	5,961	5,632	(329)
TEDS	**26,278**	**14,971**	**12,875**	**18,317**	**21,776**	**21,645**	**(131)**
TEDS as a % of TDS	53.0	39.0	29.1	33.2	34.0	32.0	(2.0)
Domestic interest	**23,281**	**23,375**	**31,445**	**36,860**	**42,181**	**45,949**	**3,768**
Dom interest as a % of TDS	47.0	61.0	70.9	66.8	66.0	68.0	2.0
TDS	**49,559**	**38,346**	**44,320**	**55,177**	**63,957**	**67,594**	**3,637**
Ordinary revenue	226,478	265,912	291,064	338,509	396,489	456,000	59,511
Export earnings	159,048	209,918	228,181	261,626	298,239	322,660	24,421
TDS as a % of Revenue	21.9	14.4	15.2	16.3	16.1	14.8	(1.3)
TEDS as a % of Exports	16.5	7.1	5.6	7.0	7.3	6.7	(0.6)

Source: Annual Public Debt Management Report, 2010

The structure of debt service remained relatively unchanged with a large share being domestic debt as illustrated in Table 1.2. External debt service decreased slightly from 34.0 percent in 2007/08 to 32.0 percent in 2008/09 while domestic interest payments increased marginally from 66.0 percent to 68.0 percent of total debt service. Total debt service as a percentage of revenue declined from 16.1 percent in June 2008 to 14.8 percent in June 2009 largely due to improved revenue collection. External debt service as a percentage of export earnings also declined from 7.3 percent to 6.7 percent over the

same period which is attributed to both higher export earnings and improved concessionality of external debt.

1.3 Statement of the Problem

Kenya has set herself an ambitious plan of attaining a middle income status by 2030 in its current long-term development blue print. Realisation of this plan hinges to a greater extent on heavy investments in hard infrastructure such as roads, railways, energy among others. Kenya, like many other developing countries lack adequate domestic financial resources to undertake these projects because of low levels of savings due to low incomes. In addition, countries at early stages of development have small stocks of capital and are likely to have investment opportunities with rates of return higher than those in advanced economies (Patenio and Tan-Cruz, 2007).

Both foreign and domestic debt for Kenya have been on an upward trend and by the end of financial year 2008/2009 total debt was approximately 1.1 trillion Kshs or 45.8 % of Gross Domestic Product (GDP) (see Table 1.1). Economic theory suggests that reasonable levels of borrowing by a developing country are likely to enhance its economic growth. This is as long as they use the borrowed funds for productive investments and do not suffer from macroeconomic instability, policies that distort economic incentives, or sizeable adverse shocks; growth should increase and allow for timely debt repayments (Patenio and Tan-Cruz, 2007). Whereas this is the case, increase borrowing both internally and externally as is happening to Kenya at the moment can lead to debt overhang which is likely to stifle economic growth for which it is meant to stimulate, further plunging the country into poverty traps. There is therefore need to examine whether there are threats of debt overhang in Kenya.

1.4 Research Questions

The study seeks to answer the following questions

- Does debt servicing have negative effects on economic growth?
- Do capital stock, labour force, and human capital have any significant effects on economic growth?

1.5 Objectives of the study

The main objective of the study is to examine the relationship between debt servicing and economic growth in Kenya. Specifically:

- To find out whether debt servicing has had negative effects on economic growth;
- To find out whether other variables such as capital stock, labour force, and human capital have any significant effects on economic growth;
- Make policy recommendations aimed at containing national debt in sustainable levels.

1.6 Rationale of the Study

Increased government borrowing and resultant obligations have several implication to the domestic economy through for example the possibilities of debt overhang and crowding out of the private sector consequently constraining economic growth for which is the main objective of incurring debt. There is therefore need to find out whether increased borrowing which makes countries have huge debt servicing bills constrains economic growth.

There is a growing concern that public debt in emerging markets as a group maybe too high. The high public debt level of emerging markets has once again triggered concerns about fiscal sustainability. International Monetary Fund (IMF, 2003), explained that public debt in emerging markets as a group is too high because countries over borrow substantially in relation to public debt threshold warranted by their fiscal track record. Furthermore, the same study found out that fiscal policy response was found to weaken

as public debt ratio rose and for public debt ratios above 50 percent, fiscal policy does not respond to public debt.

Further, Reinhart et al 2003 argued that emerging market countries with a history of default, high inflation and weak institutions should target low external debt ratios (15-20 percent of GDP). Gill and Pinto (2005) expressed a pessimistic view about the role of public debt in emerging market countries – they found that public debt was likely to enhance macroeconomic vulnerability rather than growth. Thus, in view of the above concerns, there is need to carry out empirical work for Kenya as far as debt servicing and economic growth of the economy is concerned.

This study aims to fill the intellectual gap on the analysis of examining the relationship between debt servicing and economic growth in Kenya and will go a long way in adding value in the existing empirical literature within the developing economies.

1.7 Organisation of the Study

The structure of the paper is as follows. Chapter two is about literature review and chapter three methodology that will be used in the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Theoretical Literature

2.1.1 Theory of Economic Growth

Every country aspires to realise long-run economic growth. Good and bad policies can accelerate or cripple economic growth. Almost all the differences of the world economies (rich and poor) are due to differences in growth policies working through two channels. The first is the impact of policies on the economy's *technology* that multiplies the efficiency of labor. The second is their impact on the economy's *capital intensity*—the stock of machines, equipment, and buildings.

Better technology leads to a higher *efficiency of labor*--the skills and education of the labor force, the ability of the labor force to handle modern machine technologies, and the efficiency with which the economy's businesses and markets function.

A large part is also played by the second factor: *capital intensity*. The more capital the average worker has at his or her disposal to amplify productivity, the more prosperous the economy will be. In turn, there are two principal determinants of capital intensity. The first is the *investment effort* made by the economy: the share of total production-real GDP-saved and invested to boost the capital stock. The second are the economy's *investment requirements*: how much new investment is needed to equip new workers with the standard level of capital, to keep up with new technology, and to replace worn-machines and buildings.

The ratio between the investment effort and the investment requirements of the economy determines the economy's capital intensity. Capital intensity (k) is measured by the economy's capital-output ratio K/Y—the economy's capital stock K divided by its annual real GDP Y.

$$\kappa = \frac{K}{Y}$$

2.1.2 The balanced Growth Path

In the balanced-growth equilibrium the capital intensity of the economy-its capital stock divided by its total output-is constant. However, other variables like the capital stock, real GDP, and output per worker are growing. Economists use the standard model to calculate the balanced-growth path. They then forecast that if the economy is on this path, it will grow along this path. And they forecast that if the economy is not on its balanced growth path, it will head toward that path.

What is the economy's balanced-growth path? On the balanced-growth path, the economy's capital-output ratio (k) is equal to its particular steady-state value k*. We calculate this value by taking the share of production that is saved and invested for the future-the economy's saving-investment rate (s) and then dividing it by the sum of the depreciation rate at which capital wears out (d), the proportional growth rate (n) of the labor force, and the proportional growth rate (g) of the efficiency of labor. This can be algebraically written as follows:

$$\kappa^* = \frac{s}{n+g+\delta} \qquad 2$$

Along the balanced-growth path, the level of output per worker Y/L is found by raising the steady-state capital-output ratio k* to the power of the growth multiplier (λ), and then multiplying the result by the current efficiency of labor (written E_t). In algebra:

$$\frac{Y_t}{L_t} = \kappa^{*\lambda} \times E_t \qquad 3$$

The steady-state capital-output ratio k* is constant (as long as the economy's savings investment share s, its labor force growth rate n, and its efficiency of labor growth rate g do not change). However, the balanced-growth path level of output per worker is not constant. As time passes, the balanced-growth path level of output per worker rises

because output per worker Y/L is equal to the *current* efficiency of labor E_t times the steady-state capital-output ratio k* raised to the power l; and technological progress means that the efficiency of labor E_t grows at a proportional growth rate g.

Is the economy always on its balanced-growth path? No. But if the economy is not on it, it is heading towards it. If the capital-output ratio k is below k*, the share of output invested each year (equal to s) is greater than needed to keep the capital stock growing as fast as output (equal to k(n+ g + d)). The capital-output ratio rises. If the capital-output ratio is above k*, the share invested each year (equal to s) is less than needed to keep the capital stock growing as fast as output (equal to k(n + g + d)). The capital-output ratio falls. The economy closes some of the gap between its current position and its steady-state growth path.

The steady-state balanced growth path depends on five factors:

1. the economy's savings-investment rate, the share of output used to buy investment goods to boost the capital stock (s);
2. the growth rate of the efficiency of labor (g);
3. the depreciation rate-the proportion of the existing capital stock K that wears out or becomes obsolete every year (d);
4. the economy's labor force growth rate (n);
5. the economy's growth multiplier (written λ, equal to $\alpha/(1-\alpha)$, where a comes from the production function)
6. the current efficiency of labor-a measure of the economy's ability to use technology, where "technology" is defined in the broadest possible sense to include work organization, incentives, and all other factors that affect the ability of the economy to use resources to produce goods and services (E_t).

Factors (1) through (4) determine the steady-state capital-output ratio k* which is then raised to the λ power (factor (5)), and the result is then multiplied by the current efficiency of labor E_t (factor (6)).

Economists analyze long-run growth by building a standard model of economic growth-a growth model. The standard growth model is called Solow growth model of 1956. The first component of the model is a *behavioral relationship* called the *production function.* This behavioral relationship tells us how the productive resources of the economy—the labor force, the capital stock, and the level of technology that determines the efficiency of labor-can be used to produce and determine the level of output in the economy. The total volume of production of the goods and services that consumers, investing businesses, and the government wish for is limited by the available resources.

The production function tells us how available resources limit production. The study will use a Cobb-Douglas production function, a functional form that economists use because it makes many kinds of calculations relatively simple. The Cobb-Douglas production function states:

$$(Y / L) = (K / L)^{\alpha} \times (E)^{1-\alpha} \qquad 4$$

The economy's level of output per worker (Y/L) is equal to the capital stock per worker K/L raised to the exponential power of some number α, and then multiplied by the current efficiency of labor E raised to the exponential power (1- α).

The efficiency of labor E and the number α are *parameters* of the model. The parameter α is always a number between zero and one. It is the parameter that governs how fast diminishing returns to investment set in. A level of α near zero means that the extra amount of output made possible by each additional unit of capital declines very quickly as the capital stock increases.

Mankiw, Romer and Weil, 1992 made an improvement to the Solow model by incorporating human capital. That is, recognising that labour in different economies may possess different levels of education and different skills. Physical capital is accumulated by investing some output instead of consuming it.

The Cobb-Douglas production function is "flexible" in the sense that it can be tuned to fit any of a wide variety of different economic situations. Thus, in the case of this study, total debt servicing was added as one of the inputs in the traditional Cobb-Douglas production function.

2.2 Empirical Literature

The causality between external debt and economic growth is examined in many studies. Amoateng and Amoako-Adu (1996) investigated the relationship between external debt servicing, economic growth and exports for a total sample of 35 African countries. These countries were grouped into sub-samples of 31 South of the Sahara countries, 24 low income African countries and 11 middle income countries. In this study Granger's causality test was employed to analyze the interrelationship between exports, Gross National Product (GNP) growth and foreign debt servicing during 1971-1990 for the 35 countries, using longitudinal data. The empirical results declared that there was a unidirectional and positive causal relationship between foreign debt service and GDP growth after excluding exports revenue growth for Africa and South of Saharan countries during 1983-1990 periods.

Karagöl (2002) investigated the long-run and short-run relationship between economic growth and external debt service for Turkey during the 1956-1996. This study used multivariate co-integration techniques and employed a standard production function model. The Vector Auto- Regression (VAR) estimates of the system showed that there was a one co-integrating relationship in the long-run. Debt service was negatively related to economic growth in the long-run. Granger causality test results showed a uni-direction causality running from debt service to economic growth.

Fosu (1996) tested the relationship between economic growth and external debt with an empirical study for the sample of sub-Saharan African countries over the 1970-1986 periods by employing the Ordinary Least Squares (OLS) method. This study examined to

which degree debt had a negative impact on economic growth of sub-Saharan African (SSA) countries. This study estimated the direct effect of debt hypothesis and indirect debt hypothesis. The direct effect of debt hypothesis proposed that if debt service payments do not decrease investment and saving levels considerably, the debt negatively affects growth directly by reducing productivity. It is also argued that the direct effect of debt hypothesis suggests that both debt service payments and debt outstanding may affect GDP growth rate negatively even if debt outstanding and debt service payments do not affect investment levels. The results showed that by using a debt-burden measure, direct effect of debt hypothesis revealed that GDP growth was negatively influenced via a diminishing marginal productivity of capital. The findings of this study also showed that on average a high debt country faces about one percentage reductions in GDP growth rate annually. This explains one-third of all reduction of growth rate in sample countries. On the other hand, the results do not support the adverse indirect effect of debt indirect effect of debt hypothesis states that the relationship between debt and economic growth is indirect.

Sawada (1994) investigated whether the heavily indebted countries (HICs), concerned with their external debt repayments, stay solvent. A direct test of the solvency condition derived from the usual in temporal budget constraints shed light on the sustainability of their current policies. This study employed annual time series data for sample period from 1955-1990 and estimated the cointegration regression using the OLS method. The findings of this study showed that HICs have debt overhang problems. Since their current external debts are above the expected present value of the future gains.

Chowdhury (1994) tried to resolve the controversy about the cause and effect relationship between external debt and economic slowdown. The author also tried to resolve the Bullow and Rogof's (1990) proposition. They argued that the external debts of developing countries are a symptom rather than a cause of economic slowdown. External debt leads to bad management in highly indebted countries, such as, exchange rate mismanagement. The expectation of currency devaluation leads to speculative capital

flight. Devaluation also causes the currency costs of debt service obligations, deteriorates budget deficit, and affects money supply and inflation. The estimation of the growth rate and debt accumulation rate and the regression analyses in the various stages of the causality tests employed the logarithmic transformations of the time series data on GNP. For this estimation Bangladesh, Indonesia, Malaysia, Philippines, South Korea, Sri Lanka, and Thailand were examined during the period 1970-1988.

Afxentiou (1993) examined the negative impact of foreign indebtedness on the growth of GNP for twenty middle-income developing countries between 1971 and 1988. The Granger causality test was employed to investigate the relationship between economic growth and foreign indebtedness Statistical evidence showed that in seven out of twenty countries, the debt service ratio (Total debt service/Exports of goods and services) seemed to be as a growth suppressing factor. In six out of twenty, the interest service ratio (Total interest payments/Exports of goods and services) was a significant growth-inhibiting factor. It was concluded that there was a strong debt overhang effect which took place in the sampled countries in the sample period of 1971-1988. The author claimed that the large debt accumulation of sampled countries was the result of bad domestic management. Causality test results supported inferentially source mismanagement caused negative effect on GNP. If foreign resources were not productively used, GNP growth rate would be negatively affected by indebtedness.

2.3 An Overview of Literature

Theory suggests that the differences of the world economies (rich and poor) are due to differences in growth policies working through two channels. The first is the impact of policies on the economy's *technology* that multiplies the efficiency of labor. The second is their impact on the economy's *capital intensity*-the stock of machines, equipment, and buildings. Economists have sought to explain growth using growth models, the most famous being Solow growth model. Empirical literature has established that incurring

debt will only positively impact on economic growth if the debt incurred is used only for productive purposes.

However, no study has been carried out for Kenya to establish the relationship between debt servicing and economic growth. Most of the studies have concentrated on the impact of external debt servicing on economic growth and not total debt servicing (both domestic and external).

CHAPTER 3: METHODOLOGY

3.1 Theoretical Framework

The relationship between external debt and economic growth as discussed by Karagol (2002) is not very simple. This subject usually attracts the interest of highly developing countries due to the reduction in economic growth via investment, namely debt overhang. Debt overhang theory is based on the premise that if debt will 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 new foreign investor is discouraged.

Debt servicing, including interest payments and repayments, may also be a real linkage from an indebted country. It takes large benefit from the domestic economy to transfer to the foreign economy. Therefore, the country foregoes some spectacular multiplier accelerator effects. According to Metwally and Tamaschke (1994), this decreases the domestic country's ability to grow its economy and raises its dependence on foreign debt. It is argued that a debt overhang creates adverse incentive effects on the economic growth in the long run.

Other channels through which the need to service a large amount of external obligations can affect economic performance include the crowding out effect. Due to high real interest rates, terms of trade of over borrowed country worsens and shut-off from foreign credit markets. It is expected that investments would have declined because of the decrease in available resources for financing investment and macroeconomic conditions. Moreover, because of the expected higher taxes and deteriorated domestic policies that will affect real returns on investment since the debtor country has to pay their debt obligations, this has led to a decreasing growth rates on investment. In addition, foreign borrowing affects future growth through the effect on interest payment obligations. This causes a higher stock of outstanding debt. This means that external borrowing increases

future debt service obligations because the foreign exchange constraint tightened in the future (Kamin et al., 1989). In the crowding out effect, a reduction in the debt service should lead to an increase in investment for any given level of future indebtedness. If a greater portion of foreign resources are used to service external debt, very little is available for investment and growth.

In summary, in the debt overhang hypothesis, external debt causes a negative effect on investment. The debtor country cannot benefit fully from an increase in production. A part of the production goes to creditor countries to pay the debt service and this point is a consideration for investment and production decisions.

3.2 Empirical Model Specification

This study takes off from the framework employed by Wijeweera, *et al.* (2005) and by Cunningham (1993) wherein debt servicing was classified as a primary factor of production. It used the following standard production function model to investigate the relationship between economic growth and debt servicing,

$$Y = f(K, LF, DS) \tag{5}$$

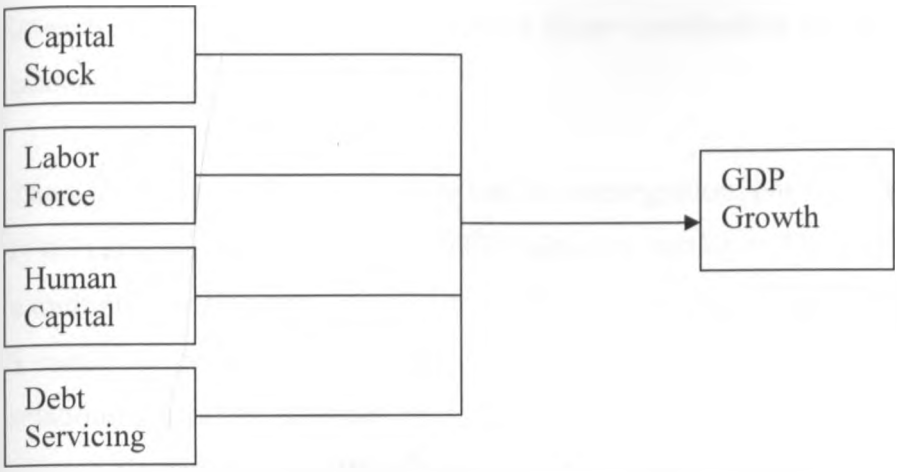
where Y, K, LF and DS represent GDP, capital stock, the labor force and debt servicing respectively.

Karagol (2002) extended the Cunningham model to incorporate Romer's (1996) conceptualization of human capital. It consists of the abilities, skills, and knowledge of particular workers. Therefore, like traditional economic goods, human capital is rival and excludable, and adding human capital to the model raises the output effects of changes in the resources devoted to capital accumulation. With an additional human capital (H) variable, the new production function takes the following form:

$Y = f(K, LF, DS, H)$ (6)

This study makes use of this extended model.

Figure 1: Relationship between Economic Growth and Production Variables



Sources: Modified figure adopted from Patenio and Tan-Cruz 2005

3.3 Time Series Property Investigation

3.3.1 Unit Roots Test

The standard practice in the time series literature obliges a check for unit roots in each series before estimating any equation. If there is a unit root then that particular series is considered to be non-stationary. Moreover, estimation based on non-stationary variables may lead to spurious results, which will produce high R^2 and t-statistics, but without any coherent economic meaning or has insignificant results. In accordance with standard practice, this study will check whether or not the variables are stationary. The Augmented Dickey-Fuller (ADF) test for checking unit roots was employed in this study.

3.3 .2 Cointegration Tests

The basic idea behind cointegration is that if all the components of a vector time series process *zt* have a unit root, or in other words, if *zt* is a multivariate *I* (1) process, there may exist linear combinations βTzt without a unit root. These linear combinations may

then be interpreted as long term relations between the components of *zt*, or in economic terms as static equilibrium relations.

Two variables, x and y are said to be cointegrated of order one (CI (1.1) if both are integrated of order 1 and there exists a linear combination of the two variables that is stationary, $I(0)$.

There are two tests that are used to test for cointegration, one by Engle and Granger (EG) (1987) and the other Johansen (1988). Johansen maximum likelihood (ML) procedure is a multiple equation method that permits the identification of the cointegration space using a canonical correlation method which enables the testing of how many cointegration relationships exists. Johansen ML procedure is superior to EG test since it corrects some shortcomings that EG suffers from, mainly being a two-step test in which errors in the first step are carried over to the second step. Thus the study will prefer Johansen ML procedure. The presence of one cointegrating relationship permits the use of Engle and Granger (1987) error correction model to test for Granger causality.

3.3.3 Granger Causality Test

Granger causality test is meant to indicate the direction of causality, that is, whether it is uni-directional or bi-directional. The use of error-correction modeling provides an additional channel through which causality in the Granger sense can be assessed. The standard Granger test may provide invalid causal information due to the omission of error-correction terms from the tests. If the error-correction term is excluded from causality tests when the series are cointegrated, no causation may be detected when it exists, i.e., when the coefficient of the error-correction term is statistically significant.

Toda and Phillips (1993) provide some guidelines for testing for causality. The first step would be to test for unit roots in all the variables involved. In the case of stationary variables, the model would be estimated in levels and a standard Granger causality can be

applied. If all the variables are non-stationary, $I(1)$, in levels and are stationary in first differences, $I(0)$, then a cointegration test is carried out to determine if a long-term relationship exists. Once cointegration is detected, causality tests have to be performed using an error correction model. If no cointegration is detected, then the model has to be estimated in first differences and the Granger causality should be applied.

3.4 Measurement of Variables

Economic growth is generally a factor in an increase in the income of a country. In this study, it was measured through the rate of increase in real GDP. GDP is determined by four factors of production; labor, human capital, capital and total debt servicing. Fixed capital formation will be used to control for the capital stock, and employed labor force data to control for labor force. Annual education expenditure by the government of Kenya will be used as a proxy for human capital, while total debt service payments will also include interest payments and repayments to foreign and domestic creditors.

3.5 Data Source

The study requires a time series data. This study will use data for the period 1985 to 2008. Data on GDP, fixed capital formation, labor force, education expenditure and external debt service will be taken from statistical abstracts and economic surveys. The study will also rely on annual public debt management reports by the Ministry of Finance regarding debt servicing.

CHAPTER 4: DATA ANALYSIS AND INTEPRETATION OF RESULTS

4.0 Introduction

The focus of this chapter is data analysis and interpretation of results.

4.1 Descriptive Statistics

Before carrying out empirical analysis, there is need to examine whether the data is normally distributed. An analysis of the descriptive statistics can enable us determine the variables that are close to normal distribution. The most common measures include the mean, median, skewedness and kurtosis. In normally distributed data, the mean and the median should be equal, for the variables in this study, only labor force (LF) has mean and the median being almost equal, indicating that most of the variables are not normally distributed. The mean is typically higher than the median in the positively skewed distributions and lower than the median in negatively skewed distributions. This is the case with capital, labour force and human capital where the mean is higher than the median and hence positively skewed. For the GDP and debt servicing, the mean is lower than the median hence negatively skewed.

Most economic data is skewed (non-normal), possibly due to the fact that economic data has a clear floor but no definite ceiling. Skewedness for a normal distribution is zero. Skewedness is the tilt in the distribution and should be within the -2 and +2 range for normally distributed series. None of the variables has skewedness with a value of zero thereby confirming that they are not normally distributed. Skewedness is a measure of symmetry or the lack of it. The Jarque–Bera statistic test on the other hand is used to test for normality of the series. It utilizes the mean based coefficient of skewedness and Kurtosis to check normality of variable used.

Kurtosis is the peakedness of a distribution and should be within -3 and +3 range when data is normally distributed. Kurtosis is a measure of whether the distribution is peaked or flat relative to a normal distribution. Data sets with high Kurtosis tend to have a

distinct peak near the mean, decline rather rapidly and have heavy tails. Data sets with low Kurtosis tend to have a flat top near the mean rather than a sharp peak. A uniform distribution would be the extreme case. Kurtosis is also a measure of how outlier- prone a distribution is. The kurtosis for a normal distribution is 3. Distributions that are more outlier- prone have kurtosis less than 3. None of the variables has a Kurtosis of 3 meaning that the data is not normally distributed.

Table 1.3: Descriptive Statistics

Mean	3.54	118431.30	18.96	65836.81	40857.28
Median	4.30	104469.50	18.40	69280.00	31132.40
Maximum	7.10	355090.00	29.20	115258.20	122044.30
Minimum	0.20	17607.60	10.30	7482.10	4815.00
Std. Dev.	2.08	95408.36	3.58	39893.57	34870.50
Skewness	-0.17	1.02	0.44	-0.26	0.95
Kurtosis	1.82	3.17	5.16	1.54	2.80
Jarque-Bera	1.45	4.05	5.19	2.31	3.46
Probability	0.48	0.13	0.07	0.31	0.18
Observations	23.00	23.00	23.00	23.00	23.00

Source: Author's Computation

4.2 Unit Roots Tests Results

In order to investigate the stationary properties of the time series, the presence of unit root is to be tested. That is, it has to be tested whether that the variables are integrated of order 1, that is, *I(1),* implying that they are stationary. This is accomplished by applying

augmented Dickey-Fuller (ADF) test. This test is based on the following regression equation with a constant and a trend of the form:

$$\Delta Q_t = a_1 + a_2 t + bQ_{t-1} + \sum_{i=1}^{n} \rho_i \Delta Q_{t-i} + \varepsilon_t \qquad 7$$

Where, n is the number of lags in the dependent variable chosen by Schwarz criterion, and εt is the stochastic error term. The null hypothesis of a unit root implies that the coefficient of Qt-1 is zero. If the null hypothesis is rejected, then the series is stationary and no differencing in the series is necessary to induce stationary. The ADF is widely used due to the stability of its critical values as well as its power over different sampling experiments. Unit roots tests results are reported in table 1.4 below.

Table 1.4: Unit Roots Tests; Level

Variable Name	**T-Statistic**	
GDP	ADF Tests Statistic	-2.53
	Test Critical Values:	1% = -3.79 5% = -3.01 10% = -2.65
Capital Stock (K)	ADF Tests Statistic	2.87
	Test Critical Values:	1% = -3.77 5% = -3.00 10% = -2.64
Labor Force (LF)	ADF Tests Statistic	-2.25
	Test Critical Values:	1% = -3.77 5% = -3.00 10% = -2.64
Debt Servicing (DS)	ADF Tests Statistic	-1.44
	Test Critical Values:	1% = -3.77 5% = -3.00 10% = -2.64
Human Capital (HC)	ADF Tests Statistic	4.43
	Test Critical Values:	1% = -3.77 5% = -3.00 10% = -2.64

Source: Author's Computation

Results in table 1.4 indicate that the variables are not stationary at levels meaning that they have at least one unit root and they have to be differenced to make them stationary. Table 1.5 gives unit root test results after first difference.

Table 1.5: Unit Roots Test: 1st Difference

Variable Name	**T-Statistic**	
GDP	ADF Tests Statistic	-2.68
	Test Critical Values:	1% = -3.79 5% = -3.01 10% = -2.65
Capital Stock (K)	ADF Tests Statistic	-3.06
	Test Critical Values:	1% = -3.83 5% = -3.00 10% = -2.64
Labor Force (LF)	ADF Tests Statistic	-4.93
	Test Critical Values:	1% = -3.81 5% = -3.02 10% = -2.65
Debt Servicing (DS)	ADF Tests Statistic	-4.77
	Test Critical Values:	1% = -3.83 5% = -3.03 10% = -2.66
Human Capital (HC)	ADF Tests Statistic	-2.36
	Test Critical Values:	1% = -3.79 5% = -3.01 10% = -2.65

Source: Author's Computation

Results in table 1.5 results show that labour force and debt servicing variables become stationary after differencing ones, thus, these variables are integrated of order one, that is I (1). However, GDP, capital and human capital are not stationary after differencing ones indicating they have at least another unit root and further differencing is therefore required.

Table 1.6: Second Differencing

Variable Name	**T-Statistic**	
GDP	ADF Tests Statistic	-4.60
	Test Critical Values:	1% = -3.81 5% = -3.02 10% = -2.65
Capital Stock (K)	ADF Tests Statistic	-4.68
	Test Critical Values:	1% = -3.86 5% = -3.04 10% = -2.66
Human Capital (HC)	ADF Tests Statistic	-6.07
	Test Critical Values:	1% = -3.83 5% = -3.03 10% = -2.66

From table 1.6 GDP, capital stock and human capital are integrated of order 2 since they have become stationary after differencing them the second time.

4.3 Cointegration Test Results

After establishing the order of integration of time series, cointegration test has to be done. Cointegration techniques are used to establish valid long-run relationships between variables. There are two cointegration methodologies suggested by Engel and Granger (1987) and Johansen and Juselius (1990). This study will apply Johansen's approach

which provides likelihood ratio tests for the presence of number of cointegrating vectors among the series and produces long-run elasticities.

Here, we investigate for the existence of any unique equilibrium relationship(s) among the stationary variables of the same order of integration. The Johansen methodology is a Vector Auto regression (VAR) based approach. The results based on VAR are generally found to be sensitive to the lag length; therefore optimal lag structure has to be found. Variables lag lengths were chosen by minimizing the Akaike information criterion (AIC). The selected lag length(s) are thus those that reduce autocorrelation in the model.
Cointegration test results are presented in table 1.7 and Table 1.8 below.

Table 1.7: Johansen Cointegration Test 1

Series: Labour Force, Debt Servicing (LF DS)				
Hypothesized No. of CE(s)	**Eigen value**	**Likelihood Ratio**	**0.05 Critical Value**	**0.01 Critical Value**
None	0.28	6.93	15.41	20.04
At most 1	0.00	0.02	3.76	6.65

Source: Author's Computation

From Table 1.7, the variables in question, that is labour force and debt servicing are not cointegrated implying that they do not have long-run relationship.

Table 1.8: Johansen Cointegration Test 2

Series: Gross Domestic Product, Capital Stock, Human Capital (GDP K HC)				
Hypothesized No. of CE(s)	**Eigen value**	**Likelihood Ratio**	**0.05 Critical Value**	**0.01 Critical Value**
None *	0.80	60.01	29.68	35.65
At most 1 *	0.59	26.40	15.49	20.04
At most 2 *	0.31	7.85	3.76	6.65

Source: Author's Computation

From Tables 1.8, Eigen value and Likelihood test statistics shows that there are at least three cointegrating equations. Cointegration test includes assumptions that allowed for linear deterministic trend in data, no intercept or trend in cointegrating equation, and test VAR. both the trace and maximum Eigen-value test results reveal the existence of three unique cointegrating vectors between test variables.

4.4 Granger Causality Results

In this section, the study intends to test for causality in the relationships between debt servicing and economic growth. Testing for causality between variables in the Granger sense of the world implies the specification of the dynamic relationship which links them. To test for causality between two variables, X_t and Y_t, the study follows the classical procedures of Granger (1969, 1986) and Engle and Granger (1987). The methodology differs whether the variables are cointegrated or not. If $t\ X$ and $t\ Y$ are not cointegrated, then the standard Granger-causality test is used to examine the causal relationships

between them. This test is based on the estimation of the following dynamic relationships between the variables (if individually I (1) processes).

Table 1.9: Granger Causality Test Results

Null Hypothesis:	Obs.	F-Statistic	Probability
DS does not Granger Cause GDP	30	0.621	0.550
GDP does not Granger Cause DS		1.950	0.175
HC does not Granger Cause GDP	30	0.666	0.527
GDP does not Granger Cause HC		1.240	0.316
K does not Granger Cause GDP	30	0.002	0.540
GDP does not Granger Cause K		0.640	0.998
LF does not Granger Cause GDP	30	1.240	0.316
GDP does not Granger Cause LF		4.029	0.038
HC does not Granger Cause DS	30	0.243	0.787
DS does not Granger Cause HC		2.569	0.108
K does not Granger Cause DS	30	0.685	0.518
DS does not Granger Cause K		0.165	0.849
LF does not Granger Cause DS	30	4.662	0.025
DS does not Granger Cause LF		0.615	0.553
K does not Granger Cause HC	30	7.946	0.004
HC does not Granger Cause K		6.605	0.008
LF does not Granger Cause HC	30	0.294	0.749
HC does not Granger Cause LF		1.164	0.337
LF does not Granger Cause K	30	1.232	0.318
K does not Granger Cause LF		1.417	0.271

Source: Author's Computation

Except GDP and labour force, labour force and debt servicing, capital stock and human capital and human capital and capital stock, the other variables do not have causal link between them. There is bidirectional causality between capital stock and human capital and between human capital and capital stock. This is as shown in Table 1.9.

CHAPTER FIVE: SUMMARY, CONCLUSIONS, POLICY RECOMMENDATIONS, LIMITATIONS OF THE STUDY AND AREAS FOR FURTHER RESEARCH.

5.0 Introduction

This chapter will give the summary, conclusions, policy recommendations, limitations of the study and areas for further research.

5.1 Summary

The present study sought to examine the relationship between debt servicing and economic growth. The study covered period 1985-2008; the choice of the period being based on availability of data. The study first examined the order of integration of each of the time series included in the model. As a necessary but not sufficient condition for cointegration, each of the variables must be integrated of the same order, where the order of integration must be greater than zero. To achieve this, the study applied ADF unit root tests. After determining the order of integration, the study proceeded to test for cointegration using Johansen Maximum Likelihood procedure. Finally, the study conducted a Granger causality test to determine whether there is causal link between debt servicing and economic growth.

Unit roots test results revealed that labour force and debt servicing variables are integrated of order 1 since they become stationary after differencing ones. On the other hand, GDP, capital stock and human capital are not stationary after differencing ones but become stationary after differencing them the second time meaning that they are integrated of order 2.

Cointegration test carried out to determine whether the variables in question have a long-run relationship is carried out on variables that are of the same order of integration. Labour force and debt servicing are not cointegrated implying that they do not have long-run relationship. Both the trace and maximum Eigen value test results revealed the

existence of three unique cointegrating vectors between GDP, capital stock and human capital variables.

5.2 Conclusions

Results of the study (from Granger Causality test) show that economic growth is not very much affected by external debt servicing. Instead, it was found that labour force has a strong relationship with economic growth. In debt overhang theory, it is anticipated that debt servicing will decrease economic growth because investors will be discouraged to invest. However, debt servicing did not show any effect on economic growth. This is probably because debt servicing in Kenya is not high enough for debt overhang to occur. Therefore, debt servicing is not yet a threat in economic growth and thus, the Kenyan government should not fear of experiencing debt overhang in the near future.

5.3 Policy Recommendations

The government should continue borrowing for investments especially in both social and hard infrastructure as planned in Vision 2030 to attain middle income status. This is because there was no evidence of debt overhang from the analysis. Investments in hard infrastructure are especially important to overcome supply side constraints and fill the current infrastructural deficit to ensure long term and sustainable growth.

5.4 Limitations of the Study and Areas for Further Research

This study however has a very limited scope. Further studies, either support studies or comparative, are suggested.

Suggested areas for further research are the following:

- The use of longer time series and therefore more observations for the study to explain further the effects of the variables considered on economic growth.
- Other models to explain economic growth can also be explored such as the Dynamic Simultaneous Equation Model.

- A shock variable can be introduced in the model to represent unanticipated disturbances. This might give a more realistic model.

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Appendix 1: Data Used in the Analysis

ır	Gross Domestic Product (GDP)	Capital Stock (K)	Labour Force (LF)	Debt Servicing (DS)	Human Capital (HC)
1985	5.1	17607.6	15.7	7482.10	4815.00
1986	5.5	23064.2	15.6	8580.00	6373.60
1987	4.9	25734.6	17.8	9710.90	7930.00
1988	5.1	30444	18.4	10778.00	9132.60
1989	5	33156.4	20.1	18684.00	10475.40
1990	4.3	40560.4	21.1	18930.00	13223.80
1991	2.3	41462.4	19.2	29372.00	12907.00
1992	0.5	43776.8	19.2	38400.00	13624.00
1993	0.2	56505.8	17.6	61220.00	14868.80
1994	3	75616.4	17.4	103810.00	21254.00
1995	4.8	99496.6	18.2	66960.00	28603.40
1996	4.6	104469.5	20.3	69280.00	31132.40
1997	2.36	109873.2	18.4	58960.00	37128.30
1998	1.77	113878.7	10.3	108800.00	41324.15
1999	1.42	112962	14.9	98170.20	46500.81
2000	0.2	116368.5	18.8	78849.63	48259.80
2001	1.2	185186.5	16.9	80503.31	49861.79
2002	1.6	178480	18.1	115258.19	56335.71
2003	3.6	179262	21.6	91596.94	76724.79
2004	4.5	206634	21.8	114379.12	85010.30
2005	5.9	264728	22.3	108306.93	92360.40
2006	6.5	309562	29.2	106999.97	109827.20
2007	7.1	355090	23.1	109215.33	122044.30

Source: KNBS: Statistical Abstracts and Economic Surveys (Various)