THE THRESHOLD EFFECTS IN THE RELATIONSHIP BETWEEN EXTERNAL DEBT AND HUMAN DEVELOPMENT: THE CASE OF KENYA

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DECLARATION

I, the undersigned, declare that this thesis 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 or institution.

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This thesis has been submitted for examination with my approval as the university supervisor.

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DEDICATION

I dedicate this project to my Dad, Mum, Sisters, brothers, my friends, and my mentors for their support and guidance during the entire course.

ACKNOWLEDGMENT

I acknowledge the Almighty God for financial provision, strength, and grace to accomplish this thesis. I am forever grateful to my supervisor Prof. Seth Gor for his invaluable guidance throughout the thesis work. I acknowledge the lecturers School of Economics for laying the academic foundation for my thesis. Finally, I thank my friends for their encouragement and collaboration, which made the course a success.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

HDI-Human Development Index

UNDP- United Nations Development Program

AfDB-African Development Bank

IDA-International Debt Association

IMF- International Monetary Fund

GNI-Gross National Income

SSA-Sub Saharan Countries

EXTD-External Public Debt

FDI- Foreign Direct Investment

ABSTRACT

This study aimed at establishing the relationship between external debt and human development in Kenya by identifying the optimum threshold of external debt. This was done by carrying out a regression of the human development index and external debt using the quadratic method. Annual time series data for the period 1970 to 2018 was used. The macroeconomic variables selected included external debt, gross capital formation, foreign direct investment, and population growth rate. The governance indicators used included control of corruption and the absence of violence. The results show that the threshold level of external debt that optimizes human development is 45%. External debt beyond this level crowds-out social sector spending. The study recommends that the treasury should cap external debt at 45% of GNI. The borrowed funds should be invested in the most productive sectors. Other recommended measures include population control and measures to foster peace and social stability.

CHAPTER ONE
INTRODUCTION

1.1. Background

Kenya has had the challenge of creating sufficient domestic resources to bridge her budget deficits and consequently relied on external financing. External debt brings challenges of stringent lending conditions and unfavorable foreign exchange variation, which cause debt overhang. Prudent borrowing requires that the government puts the borrowed money into productive projects that create multiplier effects of improving standards of living, education, and health. It is through public sector spending in terms of provision of public services that the government stimulates human development. However, an unsustainable level of external debt can crowd out social sector spending, especially when the debt repayment involves a large proportion of government revenue. The government diverts money from essential services and uses it to service debt.

The choice of lenders contributes to the ineffectiveness of foreign debt on human development in Kenya. China is Kenya's biggest bilateral creditor accounting for 22% of foreign debt (the Republic of Kenya, 2019). Other creditors include the World Bank (IDA), Japan, USA, France, Denmark, and the UK (the Republic of Kenya, 2019). "The Chinese debt trap" explains a condition where the Chinese government issues large sums of loans under stringent conditions and seizes strategic assets when a borrowing country reneges on its ability to repay the loans. China seized Sri Lanka's Hambantota port for 99 years in December 2017 for loans owed to Chinese firms amounting to $8 billion, and Djibouti is on the verge of losing its port to clear the Chinese loan (Benabdallah, 2018). Kenya is not an exception since it is the third top Chinese debtor in Africa after Ethiopia and Angola. The repayment of these loans will reduce the amount of money available for social programs.

The UNDP uses the Human Development Index (HDI) to measure progress in human development. The UNDP provides various measures of the three HDI indicators. Long and healthy life is measured by life expectancy at birth. The knowledge level is measured by the literacy rate, access to learning, and mean years of schooling (UNDP, 2019). The standard of living is measured by Gross National Income (GNI)

per capita. The index ranges between 0 and 1. A low HDI indicates low levels of welfare.

Kenya's HDI has increased gradually over the past two decades, rising to the medium human development category. Over the same period, Kenya's HDI value has increased by 26.1% (UNDP, 2019). Each of the three HDI indicators has experienced progress. The comparison of HDI and external debt shows a different pattern in the last five decades. A unique case is the tremendous HDI growth between 2002 and 2007, with a correspondingly sharp drop in external debt (UNDP, 2019). A different scenario was observed between 2013 and 2017, when external debt growth increased tremendously with a corresponding drop in HDI growth.

The changes also express the welfare trends in real income. According to the Republic of Kenya (2018), the real wages for Kenyan workers has dropped by 8.8% in the past ten years. The inflation-adjusted monthly earnings dropped by 1.6% between 2008 and 2017. The rate of fall in real wages is increasing as Kenya experienced a 2.9% drop in real wages between 2017 and 2018(Republic of Kenya, 2019b). The real income growth rate for the sub-Saharan African region averages 2.7%, and Kenya falls below this mark. The implication is that the expansion of the economy is not translating to an increase in real income. This study sought to establish the level of external debt stock that improves health care delivery, quality, and accessibility of education and living standards in Kenya.

1.1.1 Kenya's External Debt Situation and Trend

External debt has been growing in the past decade. By June 2018, the external debt was 2.4 trillion, as shown in Table 1. This represents a 12.6% rise from the previous year (Republic of Kenya, 2019a). The increase was caused by higher international sovereign bonds, bilateral credit, and commercial syndicated loans. In the period between 2013 and 2018, bilateral loans tripled, and commercial loans grew by more than ten times. Multilateral loans grew by 1.6 times. The loans from external commercial banks increased progressively to surpass bilateral and multilateral loans by June 2018, as shown in Table 1.

Table 1: Kenya's External Debt Structure (Billions Kshs)

Creditor type	Jun-13	Jun-14	Jun-15	Jun-16	Jun-17	Jun-18*
External Debt						
Bilateral	217,970	248,636	405,562	491,864	669,840	759,017
Multilateral	507,920	593,397	680,192	794,797	839,721	825,299
Commercial Banks	58,928	234,799	276,937	432,377	634,109	830,652
Suppliers Credits	15,207	16,452	16,628	16,628	15,303	16,725
Sub-Total	800,025	1,093,284	1,379,319	1,735,667	2,158,973	2,431,693

Source: Republic of Kenya, 2018.

Figure1: **National Government External Debt Trend by Creditor Category**
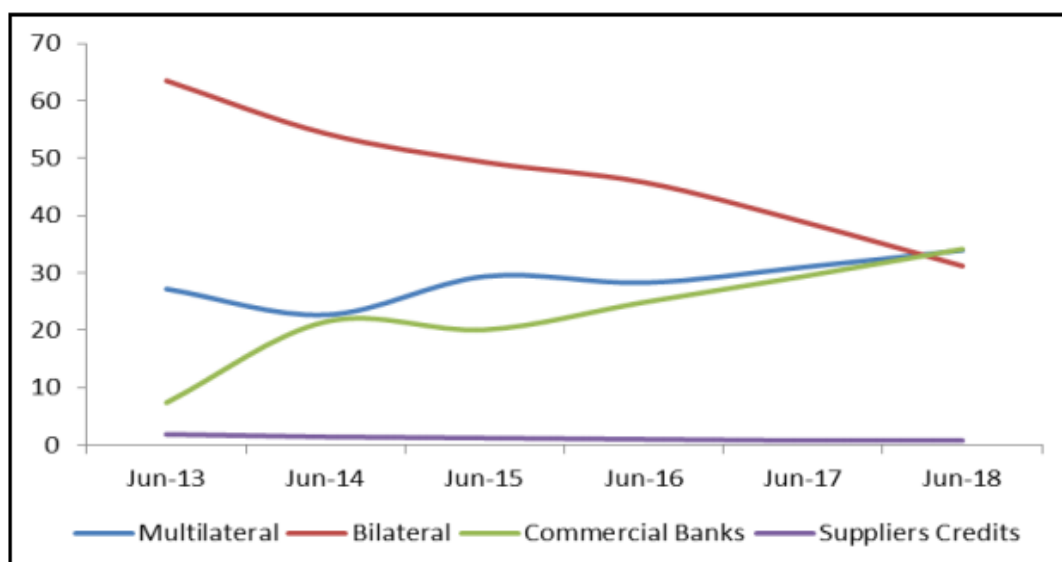
Source: Republic of Kenya, 2018

External debt affects the economy depending on the category of loan a country takes. The first category is the concessional loans, which are given by non-profit organizations such as the African Development Bank (ADB), International Debt Association (IDA), and IMF (Republic of Kenya, 2019). Their rates are more favorable than market rates. Non-concessional loans such as the Eurobond are given at commercial terms, factoring country, and market risk premiums. African countries also pay a premium of 2.9% on their loans (Olabisi & Stein, 2015). An ideal mix is to have more concessional loans because non-concessional loans are given by commercial banks, which are relatively expensive.

Figure 1 shows that concessional bilateral loans were the highest component of external debt between 2013 and 2017, albeit with a reducing trend. The loans from commercial banks and multilateral non-concessional sources increased progressively from 2013, and they surpassed concessional loans in 2018 (Republic of Kenya, 2019). Therefore, the largest component of external debt has more stringent terms with shorter repayment periods and higher premiums.

1.1.2 Audit Findings on External Debt

The Auditor-General presents annual audit reports on the projects financed by external debt. The findings for the period between 2013 and 2018 showed a gross violation of procurement laws in the contracting process. The projects were found to be overpriced, and sometimes the credits only existed on paper. The audits conducted by PwC also show a violation of Kenya's public expenditure law, upfront payments, and under-delivery of supplies (Republic of Kenya, 2019).

1.1.3 Kenya's Human Development

Human Development explains how and why the conditions of people change or remain static over time. According to the United Nations (2019a), human development is the provision of conditions that enable people to lead a healthy and long life, enjoy decent living standards, and be educated. Human development is achieved by distributing goods and services the underprivileged people need.

Kenya is a medium human development country. Between 1990 and 2017, the HDI value increased from 0.468 to 0.590, as shown in Table 2. Each of the HDI indicators experienced progress. Life expectancy at birth grew by 9.8 years, indicating an improvement in the health level of citizens. The mean years of schooling improved by 2.8 years and GNI per capita improved by about 28.9% in the same period (UNDP, 2019). Human development has improved at different rates in the past three political regimes. A unique case is where HDI growth increased tremendously between 2003 and 2013, as shown in Figure 2. A different scenario is observed between 1990 and 2002 and 2013 to 2017 when HDI growth was slower.

Table 2: **Kenya's HDI Trends**

	Life expectancy at birth	Expected years of schooling	Mean years of schooling	GNI per capita (2011 PPP$)	HDI value
1990	57.5	9.1	3.7	2,297	0.468
1995	53.9	8.7	4.5	2,130	0.456
2000	51.8	8.4	5.3	2,112	0.451
2005	55.8	9.4	5.8	2,223	0.490
2010	62.9	10.7	6.1	2,467	0.543
2015	66.7	11.7	6.3	2,806	0.578
2016	67.0	11.9	6.4	2,898	0.585
2017	67.3	12.1	6.5	2,961	0.590

Source: UNDP, 2018.

Figure **2**: **Trends in HDI Components 1990-2017**
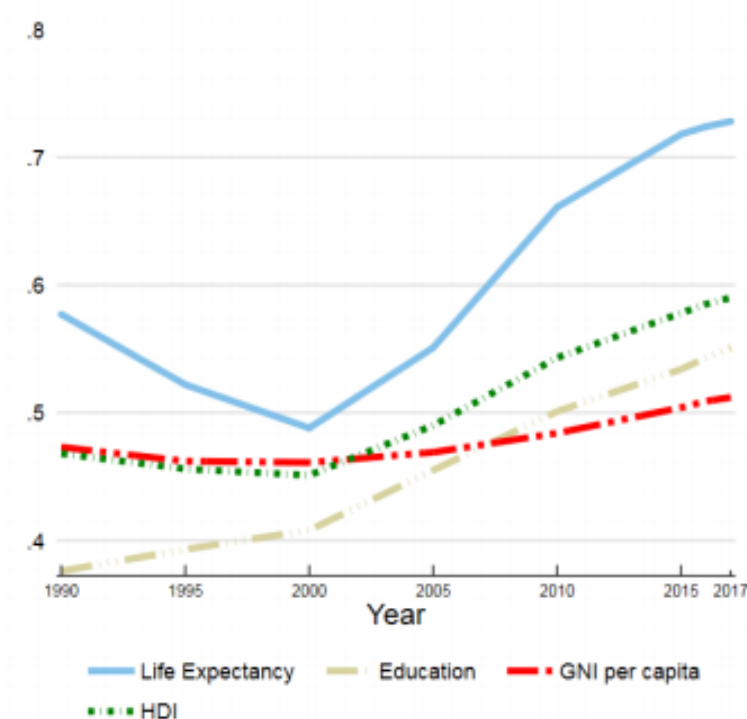
Source: UNDP, 2018.

1.2. Statement of the Problem

After independence, the Kenyan government engaged in external borrowing to help fight ignorance, disease, and poverty. To date, the government continues to borrow for the same reason: building hospitals, offering free maternity programs, financing free primary education, the cash transfer program, and the economic stimulus package. After decades of borrowing, the number of schools, referral hospitals in all 47 counties, teacher to student ratio, patient to doctor ratio, and general living standards has not increased proportionately to the loans borrowed for this purpose.

Kenya has not raised sufficient resources to finance its budget, and yet further external borrowing portends a possible debt crisis. On the other hand, investment in human development involves massive resources. Kenya will enter a risky debt standing if it exceeds the 45% debt to GDP threshold for developing countries (Benabdallah, 2018). However, the government cannot completely abandon external debt, even if research studies find negative impacts. There is a need to estimate the threshold effects of external debt on human development to help set a target for external debt management. The estimated threshold point will separate the leverage level and crowding out the level of external debt. The threshold level will help establish an external debt level that can allow borrowing while maintaining macroeconomic stability.

1.3. Objectives of the Study

The general objective of the study is to find the external debt level that can allow borrowing while maintaining macroeconomic stability of Kenya.

The specific objectives are;

i. To determine the relationship between external debt and human development in Kenya.

ii. To determine the optimal external debt threshold that separates the leverage effect and crowding out effect of external debt in Kenya.

iii. To provide policy recommendations to Kenya's debt management from the study findings.

1.4. Research Questions

i. What is the relationship between Kenya's external debt and human development?

ii. What is the leverage level and crowding out level of Kenya's external debt?

iii. What strategies can Kenya adopt to optimize the leverage effect of external debt?

1.5. Justification for the Study

There is an on-going debate on whether Kenya should continue taking external loans or adjust its budget to fit within the domestic revenue. The people in support of greater external debt argue that the country needs more resources to provide social amenities such as hospitals, schools, and other infrastructure. The opponents of external debt argue that the large sums of money for repayment of the debts crowds out investment in welfare projects. This work estimates a threshold of external debt that will help in developing a debt management policy that will enable the treasury to balance financing needs with social transformation. The debt threshold is an important figure in setting caps on external debt to stay within acceptable limits.

Most of the previous studies on the topic focused on external debt and economic growth relationships. This study contributes to the existing literature by looking at the threshold level of external debt. It also empirically assesses the factors that have the greatest positive and negative effects on human development. The government can then prioritize the factor with the greatest positive effect on human development.

Kenya is in the process of implementing vision 2030 to attain middle-income status. This can only be achieved if the country maintains macroeconomic stability through sustainable fiscal deficits, increasing real wages, a stable exchange rate, and reducing unemployment. A detailed study on external debt and human development is, therefore, essential in coming up with fiscal policies critical in maintaining macroeconomic stability.

1.6. Organization of the Study

The study is organized into five chapters. The preceding section introduced the study and outlined the objectives to be met. The second chapter reviews related literature and highlights the gap that the study addresses. The third chapter describes the data used in the study and data analysis methods. The fourth chapter presents the study findings, and the fifth chapter presents the summary and policy implications.

CHAPTER TWO
LITERATURE REVIEW

2.0. Introduction

This section presents the theoretical and empirical review of the link between external public debt and human development and a summary review of the same. Theoretical literature shows the interaction of external debt with other macroeconomic variables. The empirical review is based on the methodological approaches used.

2.1 Theoretical Review

2.1.1. Debt Overhang Theory

Debt overhang is the situation where a country's debt stock exceeds its future repayment capacity. The scenario of a debtor firm can be used to understand a debtor country. Creditors view the firm as having a probability distribution function over a stream of earnings from which the firm will service the debt. If the creditor expects that the stream of earnings will be less than the firm's debt, they do not expect full repayment of the loan (Krugman, 1988). A country also has an expected stream of earnings. However, not all of these resources are used for debt repayment. The country has a fraction of national income that can be transferred to pay the loans.

The potential resource transfer from a country is determined by the willingness of the debtor country to pay. The creditor can then rationally estimate the cost of default. The creditors intend to get the highest possible transfers from the debtor country, which also seeks to minimize resource transfer. Regarding resource transfer, debt overhang is defined as a condition where the expected present value of future resources of a country is less than its debt.

The government in this condition has such a great existing debt that it cannot easily borrow money even when new borrowing will be directed to viable investments that would repay the money. Governments take loans for various purposes such as financing infrastructure, social programs, and even to finance recurrent expenditure. The government owes the lender the loan and the interest the loan accumulates over the period before full repayment. The high debt levels indicate that significant government revenue and even part of government borrowing is used to repay the loans and interest. The high debt levels rob the government of its spending power.

The question is what happens when the country shows a lesser ability to pay the loan fully. The most immediate impact of this problem is a liquidity crisis. The high debt makes the government look risky in the eyes of lenders who shy away from giving loans to the government. The government is not able to attract new borrowing. In case they issue loans, the terms are likely to be stringent such as a smaller repayment period or a risk premium on the loans.

Debt overhang causes deterioration of standards of living. Countries facing high debt have a highly-leveraged budget and are required to explore more sources of revenue for debt repayment. The countries make tax increases and fiscal policy changes to meet the government's high financing needs. Debt overhang also stimulates measures such as currency devaluation, capital flow control measures, and expropriation of private enterprises. The measures create uncertainty and discourage investors, leading to low employment or even layoffs. A protracted reduction in purchasing power causes deterioration in the standards of living and a consequent fall in the human development level.

Debt overhang compromises limited resources of the state and limits public spending on social services. The government spends much of its resources in repaying the loans, and fewer resources are directed to social programs. Debt overhang also limits the financing sources available for the government to invest in social infrastructure. Most governments that seek external loans run deficit budgets. Debt overhang constrains the ability of the countries to borrow because lenders doubt the repayment ability of the governments. In a situation where the government is highly burdened with debt repayment, and it cannot acquire external loans, the government can hardly build schools and hospitals. The government also develops less ability to hire teachers and healthcare workers and also to procure efficient medical equipment. Thus, debt overhang paralyzes the social support of the government.

The significance of this theory is that it indicates that foreign debt is favorable up to a level where the repayment of debt and interest rates deplete the country's liquidity. The theory supports the argument that foreign debt has the leverage and crowding out effect. A country should closely monitor its borrowing and utilization of foreign debt to keep it within the leverage range.

2.1.2. Robert Solow's Growth Model

The Solow growth model tried to answer why rich countries continue to accumulate wealth, and developing countries remain poor. Solow argued that the main variable that determines growth is labor productivity (Prescott, 1988). The model suggests that the components that produce output (Y) are technology (A), capital (K), and labor (L) in the relationship shown in equation 1. Growth in output is caused by increases in these components that produce output.

$$Y = f(A,K,L) = K^a L^{1-a} \dots\dots\dots\dots\dots\dots\dots\dots\dots 1$$

Where:

Y= aggregate output,

A= A scalar stock

L= Labor units

a and 1-a are output elasticity of capital and labor, respectively.

The above production function can be expressed as output per worker (y=Y/L) and capital per worker (k= K/L).

Two equations can be derived from the Solow growth model:

$$Y = k^a \qquad\qquad \dots\dots\dots\dots\dots\dots\dots 2$$

$$K' = sY - dK$$

Where

K' = Change in capital stock

sY= gross investment

dK= depreciation for the state of technology

K= Capital

during the production process

Capital accumulation per worker can be derived as:

$$k' = sy - (n+d)k \qquad \dots\dots\dots\dots\dots 3$$

According to equation 1, capital and labor are the main components of economic growth. Equation 2 indicates that higher investment in capital per worker yields higher output per worker. However, the assumption holds until the steady-state level.

According to equation 3, investment per worker is the only variable that positively affects change in capital per worker. A country invests in human capital through improvement in education and health services. Therefore, the acquisition of capital by a country is justified so long as the country invests in human capital. External debt is considered as the acquisition of capital by a nation. The borrowed capital is expected to finance education, infrastructural development, and improvement of healthcare, which enhances labor, capital, and technology. The ultimate intention of foreign debt is human development.

2.1.3. Dual Gap Theory

The theory states that underdeveloped countries are affected by low and weak growth rates because of low savings, which are unable to support private and public investments. Economic development cannot be achieved if the total capital of a country does not reach a certain threshold point. In case the savings in the economy cannot provide sufficient capital for investment, foreign loans are required to stimulate growth in the economy.

Therefore, external borrowing is necessary to fill the deficits in the capital for investment for countries experiencing a deficit in international savings. According to this theory, a government should only borrow externally if it can invest the proceeds to generate returns above the cost of the loan. The external debt enhances the productivity and output of the borrowing country through facilitating investment (McKinnon, 1964). The role of foreign capital is to enable investment in developing countries even when their domestic savings cannot support the required level of investment.

In the application of the debt overhang theory to the Kenyan situation, the government has accumulated many loans that the lenders now issue loans at a lesser payment period because of the increased risk of repayment. For example, the first Eurobond will be paid in 30 years, whereas the second Eurobond will be repaid in 10 years (Republic of Kenya, 2019). The IMF has even cast aspersions on the ability of Kenya to repay its loans (Olabisi& Stein, 2015). The government is spending more than half of the country's GDP to repay loans, hence, left with little to invest in social goods and services. Debt overhang mirrors the situation in Kenya, where the government is facing a liquidity crisis, and it has resorted to imposing a tax on petroleum products.

The government has limited public spending, as seen by austerity measures and halting the launching of more projects. The theory forms the basis of further investigation on the level of debt that impacts the country's liquidity.

2.2. Empirical Literature

External debt and human development have been a subject of concern among scholars. Osuagwu & Orbunde (2015) reviewed secondary sources to assess the poverty situation of strong economies before and after venturing into foreign loans. Using a case study of Nigeria, the study found that the country achieved tremendous development in the 1960s, but it sunk further into severe poverty and development drawbacks after introducing foreign loans aimed at increasing development. The author observes that foreign loans stimulated corruption and money laundering. Poverty is an indicator of low living standards and a lack of access to education and healthcare. The findings of this study indicate that the more Nigeria accumulated foreign debt, the more indicators of human development deteriorated.

Egungwu (2018) examined the relationship between external debt and human development in Nigeria. OLS regression was applied to time series data for the period 1986-2015. The study found that external debt stock and external debt repayment negatively affected human capital development. The author concluded that governments should take foreign loans if they apply them on priority projects that have the potential to improve the welfare of citizens.

Adegbiteet al. (2008) examined the impact of external debt on economic development in Nigeria. The approach used in the study was the neoclassical growth model. This study tested the linear and nonlinear effects of external debt on economic development. The overall impact of debt on economic development in Nigeria was negative. However, external debt enhanced development to some level beyond which debt yielded a negative impact. The results of the study indicate a nonlinear relationship between external debt and economic development.

Mahdi (2004) examined the effect of external public debt on public sector spending across 47 developing countries. The study found that debt burden adversely affected capital expenditure due to alteration of the spending composition to debt repayment. A drop in spending on social services reduces human development.

Fosu(2010)examined external debt servicing and public sector expenditure in 35 SSA countries. The study used the public-expenditure choice framework. The study found that debt servicing shifts government spending away from health and education. The study found that the partial elasticity of social sector expenditure with respect to external debt is 1.5. The author suggested that South Saharan Africa countries should seek debt relief to protect the social sector.

2.3. Summary of Literature Review

The theoretical literature covers the debt overhang theory, Solow's growth model, and the Dual Gap theory. Whereas the Solow's model indicates that the aim of obtaining foreign debt is human development, debt overhang explains the condition where a higher level of external debt would cripple social spending that enhances human development. The dual gap theory focuses on the ventures in which foreign debt is invested and emphasizes the need to invest foreign loans on ventures that can generate high returns that can be sufficient to repay the loans. The effect on human development is that investing the foreign debt in unproductive ventures would require the government to repay loans with money that should be used for social spending.

The empirical studies of Egungwu (2018), Mahdi (2004), and Fosu 2010 use the linear regression model, which cannot detect the threshold effect. The conclusions of these studies based on linear regression assume that external debt and human development are linearly related. They also give a generalized observation that external debt has either a positive or negative impact on HDI, and such a conclusion cannot guide policymakers on the leverage level of external debt. External debt cannot be entirely condemned even when studies indicate negative relationships with HDI. External debt has a leverage effect, except that the government borrows beyond the leverage level, causing wastage. This study uses the quadratic function to establish regime changes and debt thresholds beyond which external debt exhausts its positive effect on human development in Kenya.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1. Theoretical Framework

The investigation into the effect of external debt on human development in Kenya begins by the general model describing the link between human development and its determinants. The study uses the general growth model expressed as a growth regression equation augmented with external debt.

$$\ln hdi_t = \beta_0 + \beta_1 exd + \beta_2 x_t + \varepsilon_t$$

………………………………………………………………. (4)

Where:

lnhdi=change in HDI computed as the log of the HDI.

β_0=is a constant.

β_2=matrix of parameters of the explanatory variables.

exd=External debt.

x_t=vector of explanatory variables.

ε_t=Error term.

The next task is to determine the set of determinants of human development. According to Solow's model, the determinants of human development include growth in capital stock, labor units, and technology (Prescott, 1988). The endogenous growth theory emphasizes on human capital and knowledge. This study draws upon Solow's model as the basis of explanatory variables. In the empirical model, the capital stock is split into Gross Capital Formation and Foreign Direct Investment, and Population Growth Rate substitutes labor Force.

Zaghdoudi (2018) identifies three regressors as the most important determinants of human development: foreign direct investment (FDI), Gross capital formation (GCF), and Population growth rate (PGR). The two governance variables used are control of corruption (COR) and political stability (PEACE). The empirical analysis uses the basic model shown in equation 2.

$$\ln hdi = \beta_0 + \beta_1 exd + \beta_2 fdi + \beta_3 gcf + \beta_4 pgr + \beta_5 cor + \beta_6 peace + \varepsilon_t \ldots\ldots\ldots\ldots (5)$$

3.2. Definition of Variables

External debt (EXD) is the total external debt stock to GNI. External debt is selected because Kenya has continued to rely heavily on foreign loans. This study argues that high debt servicing adversely affects human development through the reduction of the government's social sector spending.

FDI is a theoretically supported explanatory variable of human development. The neoclassical growth models identify investment as a basic factor of wealth creation in a country. The accelerator principle also states that a change in the investment-to-GDP ratio leads to an increase in a country's net output. Harrod-Domar model explains that growth in investment spending boosts the growth rate of output (Prescott, 1988).

Kenya has made comprehensive financial, tax, and economic reforms to attract FDI. Chief among these reforms is to reduce the cost of doing business, reduce the time taken to register a company and harmonize regulatory requirements for business licenses. FDI is a significant enabler of economic growth and, therefore, one of the factors that impact human development. If a country has significant growth in FDI, the government revenue, through corporate tax, increases, some big foreign investors in Kenya also build public amenities as Corporate Social Responsibility (CSR) initiatives. If Kenya meets conditions that attract FDI, it can reduce the external debt used to bridge tax revenue target shortfalls.

Gross capital formation (GCF) directly affects the standards of living because it affects the gross national income (GNI) per capita. GNI is a component of HDI. GCF is enhanced by mobilization of savings, pooling of risks, reduction in financial transaction costs, and efficient resource allocation. GCF is calculated using the Gross Fixed Capital Formation as a percentage of GDP. A higher GCF indicates a significant financial depth that shows vibrant financial development in the economy.

Population growth rate (PGR) is selected because Kenya's population has increased tremendously in the last two decades. PGR affects HDI because of its effect on access to health and education and living standards. Population growth can improve, worsen,

or have no impact on HDI. A larger population is a source of aggregate demand that is required to generate economies of scale and productive labor that produces higher output. The positive effects are realized when the population has a significant component of the highly productive labor force, capable of achieving effective aggregate demand. However, population growth that contributes to an increase in dependency ratio and lower productivity exerts strain on resources and leads to a worsening HDI.

The level of corruption can affect human development in Kenya. If borrowed loans are embezzled, they are not used to offer health facilities, educational facilities, or other public amenities that improve the standard of living. Other forms of corruption include kickbacks, money laundering, and extortion. Control of Corruption Index (COR) shows the effectiveness of a government to prevent corruption. Corruption shifts public expenditure from the health sector, and education increases inflation and discourages investment and innovation.

Political stability (PEACE) is selected because the HDI trend graph indicates a drop in years that Kenya has experienced violence. Most of the election cycles in Kenya are marred with violence, which affects the delivery of healthcare, education, and employment. The government also engages in heavy borrowing to finance projects which they use as a campaign tool. The Political Stability Index measures political stability, and it includes the absence of violence, terrorism, and conflicts. Political stability creates enabling conditions for quality institutions, political freedoms, human rights, and adequate expenditure on the social sectors.

3.3. The Quadratic Model

The quadratic model is effective in investigating thresholds. Previous research studies such as Zaghdoudi (2018) mapped the relationship between external debt and human development from 95 developing countries using the panel threshold regression model and established that the external debt and human development had a non-linear relationship. However, the threshold regression model requires a large sample size to generate valid statistical inferences. Our sample size is, however, small because governance indicators have data for less than 20 years.

The quadratic function is used to estimate the threshold effects of external debt on human development. The turning points that are generated by the model indicate the leverage and the crowding out level of external debt on human development. Rutayisire (2015) used the quadratic method to find the threshold effects in Rwanda's inflation and economic growth relationship. Hermes & Lensink (2001) also used the quadratic function to determine the optimal share of government spending that maximizes economic growth. The research studies conducted using this model indicate that the quadratic function is an effective model to study non-linear relationships to obtain threshold effects.

In line with these studies, quadratic equation 6 was used this study. Equation 6 is an improvement of equation 5 by the inclusion of the external debt squared term, exd^2. The squared term of external debt on GNI, exd2, measured the crowding-out effect of a high debt level. Hdi, exd, and exd^2 were the main variables. fdi, gcf, pgr were used as control variables. cor and peace were used as exogenous variables.

$$\ln hdi = \beta_0 + \beta_1 exd + \beta_2 exd^2 + \beta_3 fdi + \beta_4 gcf + \beta_5 pgr + \beta_6 cor + \beta_7 peace + \varepsilon_t \ldots\ldots 6$$

3.4. Calculating the Threshold Level
3.4.1. The Turning Points
All coefficients in equation 6 were significantly different from zero; therefore, the turning points of the quadratic function are calculated. The critical point indicating the external debt threshold level was calculated by finding the partial derivative of equation 6 with respect to external debt, exd, and setting it to zero.

$$\delta \ln hdi / \delta exd = \beta_1 + 2\beta_2 exd = 0 \ldots\ldots\ldots\ldots\ldots\ldots..\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 7$$

The solution for exd in equation 4 is the threshold point of external debt beyond which the marginal effect of external debt will lead to crowding out effects.

$$exd^* = -\beta_1 / 2\beta_2 \quad \ldots\ldots\ldots\ldots..\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 8$$

3.5. Data Sources

The study used annual data of 48 observations between 1970 and 2017 to study the threshold effects of external debt on human development. The data was obtained from three sources. HDI data was derived from the UNDP official website database. Data on EXD, FDI, GCF, and PGR was derived from the World Bank Development Indicators (WDI) database. Data on COR and PEACE was taken from the World Bank's Worldwide Governance Indicators.

CHAPTER FOUR
ESTIMATION RESULTS AND INTERPRETATION

The study employed a four-stage econometric approach. In the first step, the descriptive statistics were displayed to reveal the main characteristics of the data used in the study. The second step involved examining the variables for stationarity. The variables were found to be stationary. The results of the quadratic regression model were displayed and examined to identify the non-linearity in the relationship between external debt and the human development index. Finally, the results were discussed.

4.1. Descriptive Statistics

Table 3 summarizes variable descriptive statistics of the quadratic regression model.

Table 3: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
HDI	32	.49275	.0524939	.377	.59
EXTD	48	49.57524	24.24516	21.36	131.9
EXTDsqr	48	3033.286	3233.284	456.2496	17397.61
GCF	48	5.343551	15.46694	-31.50183	37.74889
FDI	48	.7491368	.7471943	.0047207	3.457345
PGR	48	3.167095	.4616313	2.523111	3.817828
COR	19	-.9939253	.0868675	-1.158849	-.8561925
PEACE	19	-1.185508	.1806655	-1.425457	-.6538995

Source: STATA results

4.2. Quadratic Regression Model Results

Stationarity Test

The use of the Ordinary Least Square technique requires that all variables included in the model are stationary to avoid spurious regression. The Augmented Dickey-Fuller (ADF) unit root test was applied with the inclusion of the trend term and drift term. The results of the unit root tests are shown in Table 4. The results of the ADF unit root tests for all the variables used in the paper show that the null hypothesis of non-stationarity is rejected at 5% significance level. Therefore, all the variables were found to be stationary, and the results obtained from the regression of the variables

consistent. Therefore the relationship between human development and other variables will not be spurious.

Table 4: Augmented Dickey-Fuller Test

	Test Statistic	5% c
HDIlog	-1.475	-1.321
EXTD	-3.977	-1.682
GCF	-5.959	-3.516
FDI	-4.056	-3.516
PGR	-6.426	-3.516
COR	-3.162	-1.796
PEACE	-2.217	-1.796

Source: Author's Computation

4.3. Quadratic Model Estimation

The estimation results of the quadratic model in Table 4 show that the relationship between external public debt and human development is non-linear. The coefficient of the linear term of external debt, EXTD, has a negative sign, and the coefficient of the squared term has a positive sign. The two coefficients are statistically significant. The results show that low levels of external debt enhance human development, while higher levels dampen human development. The findings, as predicted in the specific objectives, point out to the existence of a threshold level of external public debt that when exceeded, external debt begins to generate crowding out effect on Kenya's human development.

The coefficient of determination (R-squared) shows that the explanatory variables explain 94.86% variation in human development. Therefore, only 5.14% is not explained by the explanatory variables and can be considered an error. The estimated Durbin Watson (DW) statistic is greater than R-squared; therefore, it rejects serially correlated errors. The F statistic of 0.0000 shows that the model is significant at all levels of significance. We are 99% confident that we can reject the null hypothesis, which states that R squared=0. Therefore, the explanatory variables are jointly significant, and the regression model has explanatory power. It also shows that the

model passes diagnostic tests for normality, serial correlation, and heteroskedasticity. Thus, the model is well specified, and its results are valid for reliable interpretation.

The theoretical predictions and empirical results show that external debt expressed in GNI (EXTD) and annual population growth rate (PGR) are statistically significant in the model, and they have a negative impact on human development. A1% increase in external debt causes a 0.028% decrease in human development. A 1% growth in population causes a 1.03% decrease in human development. The result for Gross Capital Formation (GCF) violates the theoretical prediction as they indicate a negative relationship with human development. An increase in GCF indicates that much of the value-added to the economy is invested rather than being consumed. Therefore, it does not translate to the expansion of the market or an increase in disposable income. Foreign Direct Investment (FDI), Control of corruption (COR), and absence of violence (PEACE) have a positive relationship with human development in line with theoretical predictions. The absence of violence has the highest positive impact on human development. The constant term, which accounts for other factors that may have affected human development, is significant.

Table 5: Quadratic Model Estimation

Variable	Coefficient	t-statistic	
extd	-0.0279	0.011	
Extd^2	0.0003	0.040	
gcf	-0.00006	0.939	
fdi	0.0059	0.474	
pgr	-1.0279	0.000	
cor	0.0005	0.995	
peace	0.0967	0.223	
cons	2.7863	0.000	

No. of observations- 19

R-squared- 0.9486

Source: Author's computation

From the estimation results in Table 5, the threshold level of external debt was obtained in a two-step process. First, the partial derivative of the quadratic regression model with respect to external public debt was computed. Second, the derivative was equated to zero, and then a solution for EXTD was computed to find the turning point, EXTD*. The following results were obtained.

Lnhdi=2.7863-0.027extd+0.0003extd^2-0.00006gcf+0.00591fdi-1.0280pgr+0.00058cor+0.0967peace

Dlnhdi/dextd=-0.027+0.0006extd

0.027=0.0006 extd

Extd*=45

These results show that the threshold level of external debt stock as a percentage of GNI= 45

According to the results, human development peaks when external debt to GNI reaches the threshold level of 45%. The graph of external debt against human development takes the shape of an inverted U because the second derivative is positive. This optimum threshold level separates the low external debt regime from the high external debt regime.

The figure is consistent with the IMF's set threshold external debt level for SSA countries. It follows that in Kenya, external public debt maximizes human development when it is below 45% of GNI. As long as the external debt level is below this optimum threshold point, the leverage effect of external debt outweighs the crowding-out effect. Unlike previous studies that stated whether the external debt has a positive, negative, or no effect on human development, this study provides a threshold level that separates the leverage and crowding effect of external public debt on human development.

A low debt regime supports leverage effects on human development because the government does not cut budgetary allocation to the social sector for debt repayment. External debt also supplements deficits in domestic saving. Foreign debt in Kenya has been used to finance basic infrastructure, enhance public services and improve the

conditions of health and education services. External debt also breaches budget deficits and helps prevent the rise in inflation, which could worsen poverty levels.

Conversely, external debt beyond the threshold level crowds-out on human development. The government reduces spending on public investment, which leads to low-income growth per capita. Essential sectors such as education, health, environmental protection, water, sanitation get a low budgetary allocation. External debt beyond the threshold level also affects the private sectors as the investors are discouraged because they predict high future taxes in anticipation of repayment of the debt service. Investors in this condition prefer short-term projects which have a low overall effect on socio-economic progress. High debt service crowds out human development in both the private and public sectors.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATION

The study investigated the relationship between external public debt and human development using time series data of Kenya for the period between 1970 and 2018. The main objective was to examine the existence of threshold effects between the two variables. A quadratic regression model was used to assess the threshold level of external debt. The results of this study indicate that external debt and human development are non-linearly related to Kenya. A turning point of external debt was found to exist at 45% of GNI.

The mean value of an external debt of 49.57 shown in Table 3 exceeds this threshold. For the values below the optimum level of 45%, external debt has a leverage effect on human development. External debt above this threshold attracts crowding-out effects on human development. It reduces public spending on health, water, sanitation, education, and environmental protection. High external debt also crowds out private sector investment in the form of high inflation rates, and a fragile financial system.

The results of this study are crucial as they provide a baseline study in search of optimal external debt for growth in human development in Kenya. The findings of his study are consistent with the results of studies carried out in developing countries. Zaghdoudi (2018) conducted a similar study using a panel threshold regression model on 95 developing countries and found the threshold level of external debt to be 41.7%.

The results of this paper have important policy implications. First, the population growth rate poses the highest negative impact on human development. This finding implies that the growth in resources is not commensurate to population growth. The challenge may occur due to limited employment opportunities or a lack of employable skills among the population. The government should have a greater focus on population control to enhance human development.

External debt has the second-highest negative impact on human development. The treasury's external debt to GNI target of 25.31% is still lower than the threshold of 45% found in this study. Crowding out effects have set in before surpassing the threshold because of a higher percentage of commercial loans that have market-based interest rates and a shorter repayment period. The treasury should borrow more

bilateral and multilateral loans and less of commercial loans. Multilateral loans would have the highest leverage effects because they are issued at concessional interest rates. The use of borrowed money is more transparent and accountable. An external debt mix where commercial loans were at most 11% of multilateral loans by June 2013 generated higher leverage effects on human development. The debt management department of the treasury should also consider prioritizing the allocation of external debt to the most productive sectors to generate quick and sufficient returns to repay the loans.

The absence of violence (PEACE) has the highest positive impact on human development. The government should enhance focus on programs that foster peace and social stability. Foreign Direct Investment (FDI) has a lower positive impact on human development compared to the absence of violence. Therefore, the government should create favorable conditions for investment such as ease of registration of businesses, favorable tax regimes and reduction of red tape. Control of Corruption has the lowest positive impact on human development. The government should increase transparency in the management of government debt. Stringent audit standards and measures to flag out risks should be implemented to minimize misuse of borrowed funds. The treasury should mobilize local resources to finance development.

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