Macroeconomic Determinants of Public Debt Accumulation in Kenya

Evans Kirui
Macroeconomic Division

Kenya Institute for Public Policy
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KIPPRA in Brief

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Bishops Garden Towers, Bishops Road
PO Box 56445-00200 Nairobi, Kenya
tel: +254 20 2719933/4; fax: +254 20 2719951
email: admin@kippra.or.ke
website: http://www.kippra.org

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Abstract

The high and continuous increase in public debt, alongside its servicing burden, is increasingly impeding Kenya's efforts in achieving a sustained economic growth rate of 10 per cent per annum as conceived in the Kenya Vision 2030. This burden calls for the need to determine the perceived macroeconomic determinants of public debt accumulation in Kenya. This study attempted to establish and evaluate those macroeconomic elements that give rise to public debt accumulation in Kenya. Whereas such macroeconomic elements can be classified into domestic and external factors, they are actually interlaced. The external factors impinge on what happens domestically and vice versa. The study analyzed the role of some of the macroeconomic variables in determining debt accumulation in Kenya from 1975 to 2015. It attempted to establish the quantitative relationship between public debt as a percentage of GDP and some major internal macroeconomic variables (Gross Fixed Capital Formation, Interest Payments on the Debt, Real Growth Rate of GDP, Real Interest Rate and Savings Gap) and also external factors (Exchange Rate, Trade Openness and Foreign Direct Investment). From the study findings, all the identified variables significantly determine public debt variation in Kenya except for real interest rate which was insignificant and hence no valid conclusion could be inferred from it. The results suggest that while external factors were significant, internal factors seemed to play a major role in explaining the variations of debt as a percentage of GDP, implying that the domestic authorities could explore both monetary and fiscal policy tools to control debt accumulation and reduce too much dependence on borrowing. The study used annual time series data from 1975 to 2014. The data was sourced from KNBS, Central Bank of Kenya, the National Treasury and the World Bank.

Abbreviations and Acronyms

DSA	Debt Sustainability Analysis
GDP	Gross Domestic Product
HIPCs	Heavily Indebted Poor Countries
KNBS	Kenya National Bureau of Statistics
LIEs	Least Industrialized Economic
PFM	Public Finance Management

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1 Introduction

1.1 Overview

The sudden surge in public debt levels across economies and the emerging concern about the nature of public sector finance following the 2008-09 global financial crisis have emphasized the need for substantial fiscal adjustment and judicious public debt management strategies across the economies. Prolonged rise in public debt levels generates increased expenditure on payment of interest. It could replace expenditures that enhance growth, such as investments by the government (Mupunga and Reux, 2014). It is widely believed that high levels of public debt impede economic growth and discourage capital accumulation as argued by Checherita and Rother (2010). This may come into play through such channels as possible decline in private investments, rise in inflation, lower growth enhancing primary spending, high real long term interest rates, and expected decline in distortionary taxation. Debt servicing constitutes a significant component of export earnings and, as a result, debt financing particularly the interest component of the debt ought to be drawn from exports. The burden of public debt unavoidably constrains growth prospects. The principal together with the interest payments burden significantly divert resources, which negatively affects investments in other productive ventures. This is aggravated when a significant portion of debt service is drawn from national revenue. This might lead to serious economic upheavals such as problems of forex earnings. Funds for debt service form budget adjustments which could lead to a reduction in expenditure resources (Ajayi, 1991).

The mounting public debt level of Sub-Saharan African countries has raised concerns since it is negatively impacting efforts to finance critical imports and new development projects.

Sub-Saharan Africa debt problem can be traced to a greater extend to governments' actions particularly the accumulation of foreign debt for infrastructural development. Since independence, most Sub-Saharan African countries have been undertaking their infrastructural investments in a bid to strengthen their economic performance usually through support from donors and more often with heavy reliance on foreign financing through loans (Greene, 1989). Most of these development projects had been designed to enhance infrastructure and domestic industry as opposed to boosting export production. The underlying assumption was that, as the economies grew over time, boom in export production coupled with the fair trends in export, prices would ensure that the debt service obligations arising from these projects could be easily met (Blanchard, 1983).

Following the first turn of oil prices shock in 1973, the prices of major primary commodities particularly cocoa, tea, groundnuts, sisal, sugar, coffee, phosphate, etc experienced a sharp increase that was followed by a sudden plunge (Krumm, 1985). These developments in the commodity prices greatly affected many of Sub-Sahara African countries including Burundi, Ethiopia, Kenya, Madagascar, Sierra Leone, Central African Republic and Tanzania (all coffee growers), Niger (uranium producer), Senegal (producer of groundnut and phosphate), Cote d'Ivore (cocoa and coffee), Malawi (sugar and tobacco grower), and Togo (phosphate producer). Most of the affected countries reacted to the initial commodity price increase by aggressively enlarging their public expenditure (Larrecq, 1980). Revenues arising from commodity taxation did not rise as fast, though they were higher and hence the economies resorted to foreign financing to meet the balance of the cost of development projects. As commodity prices fell, expenditures did not decline commensurately and therefore the previous loans were supplemented with an additional borrowing to sustain the expenditure levels. During those periods, many countries relied on minerals such as iron ore (Mauritania and Liberia), Copper (Zambia), whose prices again fell in the 1970s and these countries borrowed externally with the expectation that the prices would recover. Foreign debt also piled up in several oil-producing countries as of mid-1970s following the decline in real prices (Krumm, 1985).

During the 1980s the Sub-Saharan African debt burden accelerated in the wake of second oil price shock of 1979-80. This was a reflection of a joint effort by industrialized countries to contain the subsequent inflationary consequences, as industrial growth was been seen to be sluggish compared to 1970s. As a consequence, non-oil commodity prices were still low and by 1980, they had fallen sharply. By 1988, Sub-Saharan African countries' terms of trade except for Nigeria were 25 per cent below the levels in 1980s and therefore export earnings below the nominal values by 5 per cent even in spite of increased export volumes by 16 per cent. The debt service obligation more than doubled, reflecting both the debt overhang during 1970s and the subsequent continuous borrowing. With the decline of export earnings and rising import prices, Sub-Saharan African countries found it increasingly challenging to fulfill their debt service obligations while at the same time maintaining a sustainable level of imports (Greene, 1989). This was the case with countries such as Zambia that had expanded their import-intensive manufacturing sector and had therefore highly depended on import of raw materials.

The rise in interest rates in Sub-Saharan African countries was also widely believed to the reason for exacerbation of debt accumulation. This was attributed to the preponderantly official nature of the Sub-Saharan Africa public debt. The rise in interest rates largely affected most countries that borrowed which, include

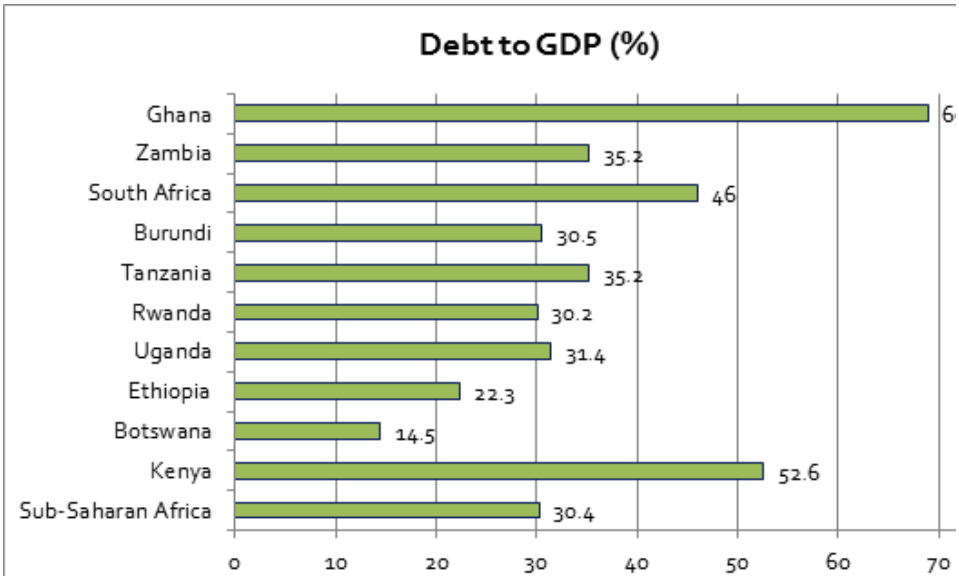
Botswana, Kenya, Malawi, Cote d' Ivore, Mauritius, Zambia, Nigeria, Senegal, Niger, Zaire and Zimbabwe (Greene, 1989). Despite these loans carrying fixed interest rates, a higher proportion was mainly denominated in flexible exchange rate or was negotiated at new and higher fixed rates.

The domestic policies adopted by most Sub-Saharan African countries were also considered to be the reason for their high indebtedness. Many of them opted for aggressive infrastructural development programmes and ambitious expansionary fiscal policies during the periods of commodity boom in late 1970s in which external expenditure increased faster than the rise in tax revenues. However, besides the expansionary fiscal measures and outright borrowing for purposes of consumption by African countries, they pursued policies that dampened their external positions. Surge in demand for private credit and growing fiscal deficits led to rapid monetary expansion across the economies, which lead to rising inflation with the consumer prices on average rising to about 20 per cent, since their currencies did not appreciate so as to offset the inflationary pressures as many currencies had been overvalued. This hindered exports and triggered the formation of twin exchange markets. Domestic policies also promoted importation through currency over-valuation and other measures because they subsidized imported petroleum products, food and fertilizers as a matter of policy. Furthermore, tariff legislation encouraged the growth of inefficient import-intensive manufacturing establishments through imposition of high tariff rates on imports of finished goods while tariffs on imported raw materials and intermediate goods were low, and at some point inexistent. Negative real interest rates discouraged domestic borrowing in many of the countries, which encouraged massive capital outflows and therefore the need for substantial foreign borrowing to finance investment projects which significantly increased debt accumulation (Greene, 1989). At the end of 1999, almost 70 per cent of the low-income countries total long-term debt was due to governments or multilateral institutions. For Sub-Saharan African countries, the share was slightly high, about 70 per cent. During that period, low income countries received as much grants as they had repaid in debt servicing.

With the onset of the 2009 global financial crisis, African countries' fiscal and current account balances weakened, such that several years after the financial crisis, fiscal balances were still lower compared to the period before the crisis. Frontier markets experienced the highest deterioration of fiscal balances, and public debt built up following countercyclical measures adopted during this period. Many of the counties maintained expansionary policies and their budget deficits were financed through sovereign bonds issues as for instance the debut issued by Kenya, Namibia and Zambia (African Development Bank, 2015).

Although poverty and external components were deemed to be the underlying reasons for the indebtedness of developing nations, deliberation on what drives the demand for external borrowing by developing countries has been going on. While external borrowing facilitates capital deficient nations to accelerate their economic growth, trouble arises when a significant portion of finances are taken up for debt servicing, creating a situation where the financial gap becomes unmanageable. The past debt provokes further foreign borrowing resulting to a vicious circle problem. From selected African countries, Ghana has got high public debt to GDP ratio of 69 per cent (Figure 1.1), Kenya comes second at 52.6 per cent, followed by South Africa with 46 per cent (IMF, 2015).

Figure 1.1 Selected Sub-Saharan African countries public debt levels



Source: IMF (2015)

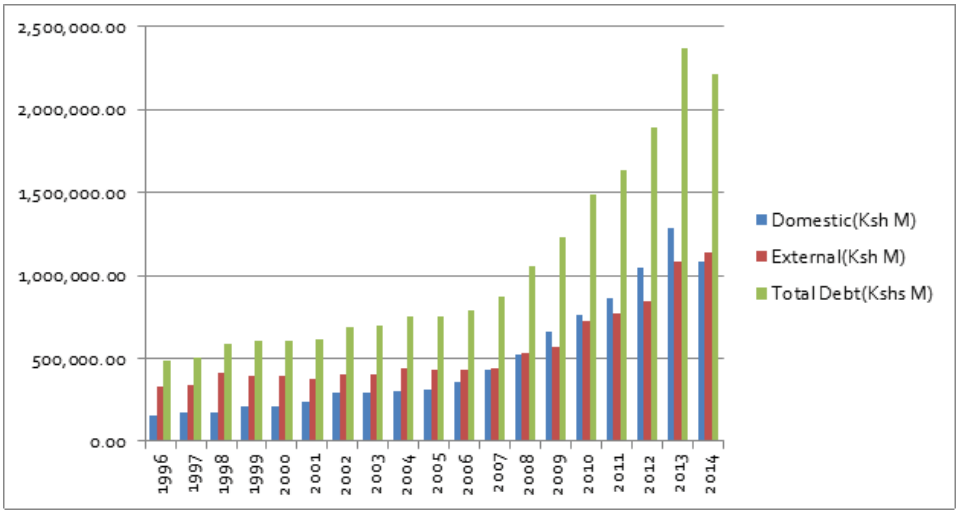
Kenya like other developing countries, has been borrowing externally to supplement capital stock so as to spur economic growth. This problem is not unique to Kenya but it has been a big challenge to developing economies and generally a concern for the global finance and world economy at large. Economies of least industrialized economies (LIEs) are highly vulnerable to external shocks which include deterioration in terms of trade (rise in import prices and fall in exports prices), fluctuations in world interest rates, cyclical fluctuations in capital flow, contagion and exchange rate volatility.

Internal shocks and economic ills that have been experienced comprise of policy failures that have negatively impacted growth, domestic savings, exports and revenue. In addition exchange rate overshooting has exacerbated the debt accumulation in LIEs. If currency depreciation does not correct inflation, the

real exchange rate appreciates and export performance will consequently suffer. Furthermore, politics are not free from debt problems, since excessive borrowing has often been considered to be better option than the painful, long-fruitful and politically costly economic adjustments such as increasing taxes. Fiscal measures might be beneficial in the long-run but as long as it is politically unfavorable, politicians will opt to go for borrowing as a short-term remedy. The ultimate result for such shocks and policy failures may lead to macroeconomic problems such as fiscal deficit, low savings, trade deficit and exchange rate variations which necessitate countries to borrow externally. If external borrowing is not used for productive investments, the debt repayment capacity is constrained and debt accumulates. This will result in a sort of poverty cycle.

While debt sustainability has not yet raised any challenge, public debt management could pose difficult challenges given the rising cost in public expenditures, particularly the social component of government budget such as public sector wage bill. The cost of servicing outstanding debt has also soared, coupled with the impact of external shocks such as fluctuations in terms of trade, thus making the country highly vulnerable to shocks. IMF (2009) contends that, taking the stock of public debt into account, Debt Sustainability Analysis (DSA) shows that Kenya faces a greater risk of unfavourable debt developments particularly under a shock to GDP growth. Even at a temporarily lower GDP growth, the Net Present Value (NPV) of public debt to GDP, NPV of debt to revenue and the ratio of debt service-to-revenue would be set on a sharply increasing trend. Potentially large but unreported contingent liabilities also place additional risks to debt sustainability. Figure 1.2 shows the rising trend of public debt over years. The trend could be attributed to rising public expenditure pressure, widening budget deficit, and revenue shortfalls among other factors (KIPPRA, 2014). The situation is unfolding even in spite of government efforts to enhance revenue collection through tax reforms by for instance enhancing tax administration and expenditure rationalization. The policy on public borrowing in Kenya is provided for under debt management strategy, which prefers external borrowing to domestic. The reason is to protect the domestic economy, particularly private investment, from being crowded out by public investment. However, domestic debt as a proportion of total debt has also been rising over time, which clearly contravenes debt management strategy of keeping its debt-GDP ratio below 45 per cent.

Figure 1.2: Current public debt stock in Kenya (Ksh millions)

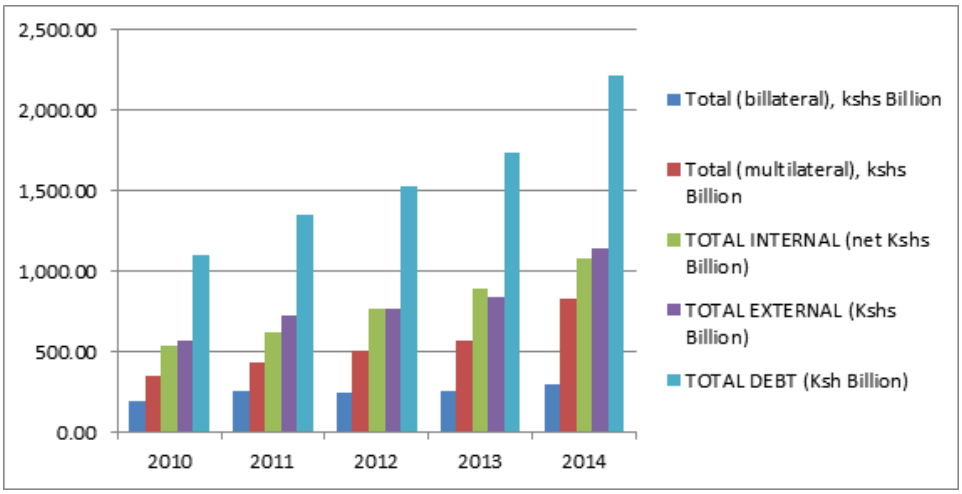


Source: National Treasury and Central Bank of Kenya

Any attempt to curtail increase in public debt through tax increase or scaling down expenditure would negatively impact on attempts to achieve a 10 per cent economic growth as envisaged in the Kenya Vision 2030. Any shock to Kenya's economy during transition to fiscal decentralization structure might also worsen Kenya's indebtedness.

The official creditor accounts for 79.8 per cent of total public and publicly guaranteed foreign debt. Debt owed to multilateral creditors amounts to Ksh 751.04 billion, which includes debt owed to IDA (Government of Kenya, 2015). Bilateral debt stands at Ksh 470.44 billion, equivalent to 30.73 per cent of total external debt which also includes Ksh 42.66 billion guaranteed debt. For internal debt, growth in stocks of treasury bills, treasury bonds and overdraft at the Central Bank of Kenya is the reason for the increase in stock of internal debt (Figure 1.3). The external debt strategy prescribes guaranteeing or contracting of external loans with highly concessional terms whereas domestic debt prescribes holding it more on longer dated instruments. There has been a deliberate strategy to shift the composition of domestic debt away from treasury bills to treasury bonds so as to downplay refinancing risk, lowering the cost of borrowing and enhancing development of domestic markets for government securities.

Figure 1.3: National outstanding debt by source



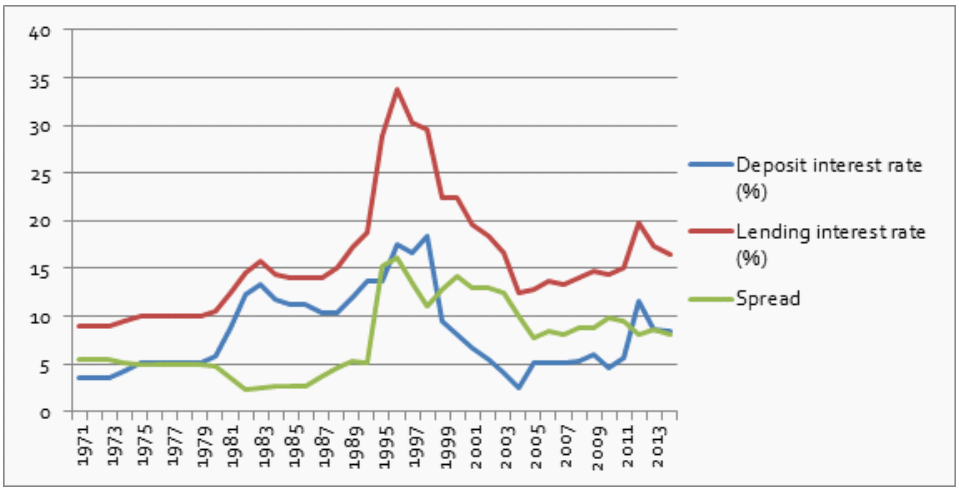
Source: Economic Survey, 2015

1.2 Review of Selected Macroeconomic Variables

1.2.1 Domestic savings

Low domestic savings has been one of the reasons for the low levels of investment, revenue base and source of rising government expenditures through social support and subsidies. Economic theory contends that increasing level of domestic savings, everything else kept constant, would lead to external borrowing declining since there will be more investible funds from the financial sector of the domestic economy (Samson, 2002). A decreasing level of domestic saving implies that a country will have to borrow more to complement low levels of domestic savings. However, increase in domestic savings might result in more borrowing. In such a situation, domestic savings will be directly related to external debt. For Sub-Saharan Africa, the levels of domestic savings are low compared to the rest of the world. For the case of Kenya, domestic savings have been low, and therefore a tight credit market has created a strong impulse for external borrowing. Low levels of income also lead to low domestic savings in Kenya due to poverty since most Kenyans live in rural areas where they depend on subsistence agriculture. Low deposit rates also lead to low domestic savings. Deposit interest rates had been increasing since 1973 until 1999 when they recorded 18 per cent. However, the rates have been on a declining trend, reaching 8 per cent in 2014 compared to banks' lending rates (Figure 1.4).

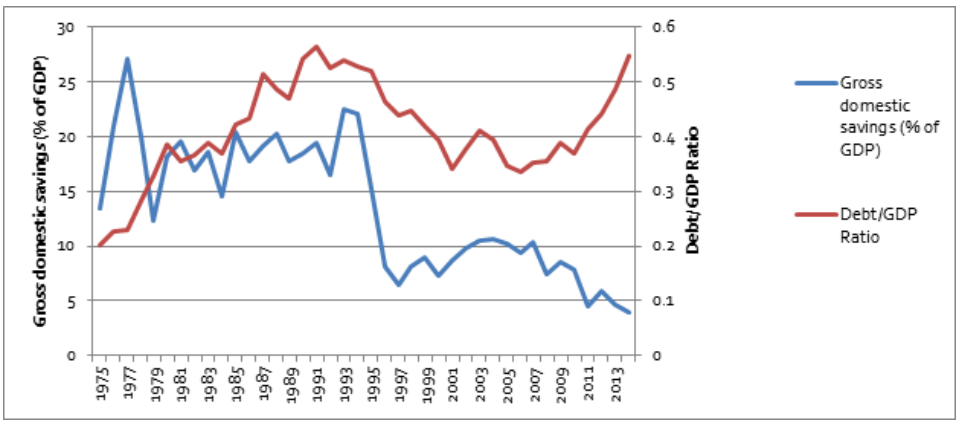
Figure 1.4: Trends in deposit, lending and interest rate spreads for Kenya since 1971



Source: Author's computation using data from the World Bank

The interest rate problem can be attributed to inadequate financial sector regulations by the Central Bank of Kenya and large informal sector in Kenya which makes it difficult to tap potential savings into productive investments (UNCTAD, 2007). In Kenya, gross domestic savings as a percentage of GDP have been declining, less than 10 per cent since 1995 (Figure 1.5). From the figure, domestic savings were higher in 1977 but by 1994, the trend has been declining which might be attributed to drought during that period. The trend in 2014 was less than 10 per cent.

Figure 1.5: Trends in gross domestic savings as a percentage of GDP and debt/GDP ratio

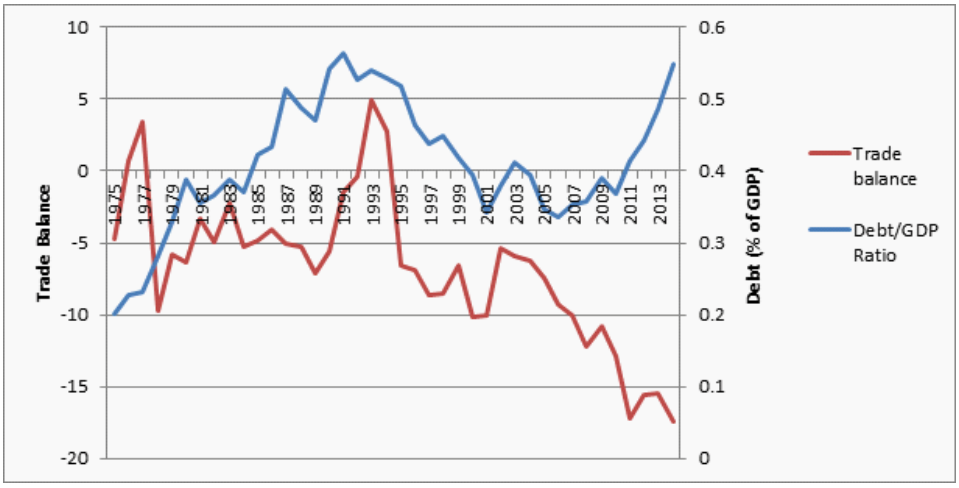


Source: Author's computation using data from the World Bank

1.2.2 Trade deficit

Trade balance is actually the difference between a country's import payments to the trading partners and export earnings. Deficit occurs when imports exceed exports, which are the largest share of current account component of balance of payments (BOP). BOP is a national account identity showing all the business transactions valued in monetary terms between a country and the rest of the world. The transactions include payments for the exports and imports of a country's goods and services, including financial capital and financial transfers. Economic theory posits that a balance of payment problem calls for borrowing to finance trade. In debt literature, foreign exchange gap is a consequence of trade balance. The Kenyan economy has been experiencing a persistent trade deficit since 1980s. However, there was a trade surplus in 1993 that lasted only for two years and for subsequent years trade balance had been deteriorating (Figure 1.6). Import volumes have been on a rising trend while export volumes and prices have been declining. Kenya is an import-dominated country, largely on consumables and construction materials. Debt repayments are supposed to be drawn from export earnings, and therefore trade balance is a significant variable in explaining the changes in debt accumulation in Kenya.

Figure 1.6: Trends in trade balance and debt as a percentage of GDP



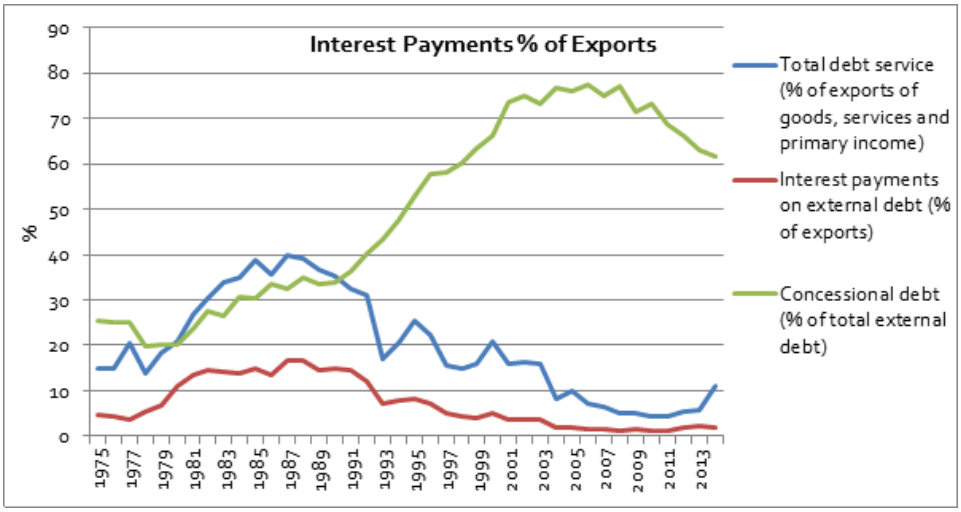
Source:

1.2.3 Interest payments

Kenya benefits from highly concessional loans at low global financial market interest rates since the country borrows much from multilateral organizations. The share of interest payments in total external debt service has been, on average,

around 15 per cent whereas principal payments accounts for 75 per cent (World Bank, 2015). Interest payment constitutes over 35 per cent of the total external debt service and has been less than 20 per cent of exports but the total debt service has been over 60 per cent of exports for a long time (Figure 1.7). Given that exports play a critical role in repayments of interest rates on external debt, deteriorating trade balance is compounding the debt problem in Kenya.

Figure 1.7: Interest payments as percentage of exports



Source:

1.4 Statement of the Problem

High and growing public debt has been cited as source of economic challenges affecting most developing countries since their political independence. The current state of affairs is a major blow to double digit economic growth in debtor economies. Borrowing, either from domestic or external source, would support capital deficient economy so as to hasten growth; the challenge develops when a huge share of such borrowing goes into debt repayments. This will arouse further borrowing leading to a vicious circle of borrowing. This is the current situation for developing countries particularly Kenya.

The Public Finance Management Act (PFM) 2012 provides an essential framework that ensures that Kenya continues to pursue prudent public debt management. The framework prescribes for highly concessional externally borrowing as opposed to domestic borrowing. There is also a shift of domestic debt from treasury bills to treasury bonds to curb crowding out effects on private investment and associated risks of inflationary pressures. However, despite these policies, domestic debt as a proportion of total debt has been rising. Kenya's current debt stood at Ksh

2.7 Trillion (Government of Kenya, 2016) which shows that both domestic and foreign debt has rapidly risen. Government's debt statistics shows that total debt has risen more than four times between 2000 and 2015. This raises concern for the country's debt sustainability over the increasing trends in public debt over the years. Given the effect of the stability of macroeconomic variables, which are key determinants of debt accumulation in Kenya, it has been widely acknowledged that prudent and sustainable debt level is crucial (Budget Policy Statement, 2013). Recent analysis by IMF indicates that Kenya faced a low risk of external debt distress since all external public debt indicators were found to be below the relevant debt burden threshold for Kenya. However, persistence in recent trends could signal fiscal distress (IMF, 2013). Threats to public debt that might ruin Kenya's fiscal position include unfavourable terms of payment on new loans, the exchange rate overshooting, and widening current account deficit which might result in sluggish pace of economic growth.

This raises concern over factors that have widely been believed to escalate public debt accumulation which differs across the countries. For Kenya, salient among such factors includes trade deficit, exchange rate overshooting, volatile terms of trade, rising interest rates, among others. Despite the fundamental economic importance of knowledge of these drivers of public debt accumulation in Kenya, there have not been specific study(s) attempting to adequately analyze the contribution of such factors to debt escalation. Most existing literature mainly addresses only the effects of either domestic or foreign debt on economic growth in Kenya. To effectively combat this problem, there is need to investigate how key macroeconomic components lead to a rise in public debt accumulation in Kenya. This study strives to fill the research gap by providing an empirical investigation based on well-grounded theoretical considerations.

1.4 Research Questions

In an attempt to establish the role of macroeconomic components responsible for public debt accumulation in Kenya, the paper sought to answer the following research questions:

1. What are the macroeconomic variables that determine public debt accumulation in Kenya?
2. What are the policy implications drawn from the study findings?

1.6 Objectives of the Study

The overall objective of the study was to evaluate macroeconomic factors that have led to rising public debt accumulation in Kenya. The specific objectives are to:

1. Determine the factors responsible for public debt accumulation in Kenya.
2. Derive policy implications from the study findings.

1.7 Justification of the study

The study attempts to provide an analysis of the theoretical and empirical foundations of public debt accumulation and to ascertain specific policy recipes for prudent public debt managements in Kenya. It specifically identifies key macroeconomic variables whose changes have escalated public debt accumulation in Kenya. The study is important since vulnerable fiscal policy can induce debt crises leading to debt distress and might endanger the economy. Understanding of the behaviour and changes of macroeconomic variables that influence debt accumulation is indispensable in formulation of prudent public debt management policies and to specifically assess the vulnerability of a country to debt crisis.

2 Literature Review

2.1 Introduction

This section addresses both the theoretical and the empirical literature relevant to the study. The first part gives the introduction and the second part presents theoretical underpinnings of why countries borrow from both overseas and domestic sources. The third section deals with the empirical section of the literature, followed with a section on critique of the literature, or overview.

2.2 Theoretical Literature

2.2.1 Savings-investments gap theory

There has been wide consensus among economists that poverty plays a critical role in driving countries into borrowing. From this circumstance, the economic justification for foreign borrowing is closely tied to the rising gap between domestic investment and national savings (Menbere, 2002). There has been an argument that a country may choose to find resources for investment at the expense of running a current account imbalance even if its domestic savings are low. Foreign indebtedness, as argued by others, is caused by a vicious circle of poverty. Singer (1990) put it that poor nations are poor since their savings and investments are low and they have low savings and investments because they are poor.

The major hindrance to development in the developing world is this vicious circle of savings-investment gap which can be described as follows: productivity is low because of low investment, investment is low since savings are low, savings are low since income is low, income is low because productivity is low, therefore poor nations are poor because they are poor (Root, 1990). The savings gap therefore reflects the inability of poor countries to have sufficient amount of resources for financing the desired level of investments necessary for self-sustained level of growth. Foreign borrowing to generate resources is therefore a consequence since domestic savers are unable and unwilling to sacrifice. The argument therefore is that the deficit in developing countries is a development deficit that is inevitable if countries were to achieve sustained long-run economic growth. This deficit cost is then the reason behind the increase in foreign debt (Root, 1990). IMF (2003) acknowledges that increase in debts levels in low income countries at the beginning of 1970s and peaking in 1980s was a consequence of a dismal performance in their fight against poverty.

2.2.2 Foreign exchange gap

Export-import gap, also known as foreign exchange gap, is an equally vital justification for foreign borrowing by developing countries. Even in the absence of capital deficiency and savings gap, the growth rate of developing countries can still be hindered by the foreign exchange gap. This implies that in developing countries, savings are necessary but it is not a sufficient condition for raising investment to the desired level (Menbere, 2002). This gap focuses on foreign exchange earnings as the primary constraint to domestic investment and growth. The main argument in this theory is that foreign resources are supposed to fill the gap between the required import expenditures and the actual export earnings. These export earnings boost investment that will increase economic growth. This can also be linked to the structure of imports for the developing countries, since import of capital goods is crucial for the expansion of the tradable sector. Export earnings could be the reason for the increasing debt levels since they are insufficient to generate enough foreign exchange that is needed to finance importation, therefore making foreign borrowing inevitable. Loans and grants therefore allow for savings in richer countries to be shifted to investments in poor countries and therefore supplement foreign exchange requirements.

2.2.3 Return argument for foreign borrowing

The return argument for foreign borrowing is more of a supply-side story that is yet another justification for external borrowing. The main argument is that since developing countries are financially deficient, and in contrast the developed nations have surplus, capital should then move from latter to the former. This is the neoclassical-growth theory that argues that since the capital-labour ratio is lower in developing countries, the marginal product of capital is bound to be higher. In contrast, developed nations have a higher capital-labour ratio because of a high level of savings, and therefore investment opportunities are fully exploited (Menbere, 2002). Savings from these developed nations are then invested in developing countries where the expected rate of returns turns ought to be higher. This implies that the flow of resources from rich countries to developing ones is mutually beneficial. The developing countries can make use of resource flow from rich countries to finance their investments while the rich countries can invest in poor countries where the expected rate of return is higher than in their countries (Nigel, 1995). The argument is that marginal efficiency of capital is higher in developing countries than in the developed nations.

2.3 Empirical Literature

Ensuring the public debt becomes sustainable requires better understanding of what factors make debt to accumulate in a particular country so that such that debt reduction strategies can be addressed both locally and even internationally. Several studies have identified and emepirically evaluated those factors that are deemed to be cause debt accumulation in different time periods and in different countries.

Using annual data from 1930-38 for 16 to 23 countries, Eichengreen and Portes (1986) using a panel data that while export instability, real GDP growth rate degree of openness were positively correlated with government foreign debt. On the other hand using data for 79 developing countries, Hajivassiliou (1987) for the period 1970-82, and treating the supply of loans separately, it was found out that the demand for borrowing was positively determined by total debt service to export ratio, import to GDP ratio, interest and principal to export ratios and negatively with the real GDP per capita. Mcfadden (1983) obtained similar results.

Ajayi (1991) used macroeconomic analysis to study the causes of foreign debt accumulation in Nigeria from 1970 to 1988. The variables employed in the analysis were; fiscal deficit, real interest rate, real exchange rate, growth of income in industrialized countries and terms of trade against debt to GDP ratio as the dependent variable. From the analysis, the most significant variables in debt distress were fiscal performance, real exchange rate and terms of trade. Terms of trade, interest rate and oil price shocks was classified in the study as external factors, whereas exchange rates (overvaluation of currency), fiscal deficit and economic mismanagement were classified as domestic factors. However the study was inconclusive in terms of which category contributes more to debt accumulation but there was a conclusion that linkages existed between domestic and foreign factors and that there was a thin line between some of the variables.

In Tanzania, Mbelle (2001) highlighted domestic factors including ineffective fiscal policies whose proxy was government administration expenditure, lack of prudent management policy and weak financial accountability. The external factors were lending policies of the creditors (length of repayment periods), balance of payment problems, oil price shocks, general decline in foreign aid, accumulation of interest arrears due to delayed repayment for concessional debt, and fluctuation in real exchange rates. However, the study was mainly descriptive and therefore there was no empirical approach.

Samson (2002) analyzed the public foreign debt in Morocco and Nigeria for the period 1980 to 2001 and identified, among other factors, fiscal policy inefficiency (over-ambition to accelerate development with inadequate domestic resources) and low level of domestic savings. External factors included oil price shocks, deterioration of exchange rate, declining terms of trade, collapse of commodity prices in world markets and rising interest rates in the international market. It was found that both domestic and external factors had a significant effect on accumulation of external debt but the contribution of domestic factors such as growth of fiscal expenditure and domestic savings was relatively high compared to external factors, mainly balance of payment and interest payments.

Easterly (2002) carried out a study on the determinants of external indebtedness by regressing an average of each policy indicator for the period 1980-97. The objective was to identify the determinants of HIPCs indebtedness. The study found that the HIPCs were categorized under such group because of unfavourable exogenous shocks such as war and terms of trade, and those countries exercised bad policies. Also HIPCs had a greater desire to discount into the future. The main conclusion of the study was that the HIPCs got indebted due to the bad policies, and with the aid of international institutions.

Anoruo et al (2006) using a panel data of 29 HIPC countries in Sub-Saharan Africa from 1984 to 2000 analyzed external debt. From the panel data regression analysis, the study found out that there was a strong relationship between growth of external debt to GDP ratio and variables: real exchange rate, non-interest current account balance, economic slowdown, governance indicators such as corruption, interest payments, bureaucratic quality, internal conflicts and government stability. It was found that all the variables were statistically significant. However domestic and external factors were not classified in the study.

Abdul (2006) used an econometric approach to analyze domestic debt of Pakistan by determining various factors responsible for the growth of domestic debt in Pakistan. The sample period for estimation was from 1991-2002. The ordinary least square method was used to estimate the parameters of the equation. The results of the study confirmed that primary balance and interest rate payments were relevant in explaining the accumulation of domestic debt in Pakistan during the period under study. The results suggested that the only way to curtail public debt accumulation process was to reduce the primary deficit through continuous fiscal adjustment. The process of such an adjustment was not to be achieved through cost cut in development expenditures but rather a need for serious quest to increase domestic tax revenue.

Majed and Magableh (2009) in Jordan carried out a study to examine how domestic debt and external debt respond to changes in some explanatory variables which were: savings gap, real exchange rate, foreign aid and government budget deficit. The results revealed that all the parameters had a significant effect on the outstanding balance of external public debt. Government budget deficit had expected positive and significant effect on external debt whereas the size of foreign aid and the real exchange rate had negative and significant effects. Also, both savings gap and budget deficit had a significant and positive effect on domestic debt. This suggested that the government of Jordan tends to borrow from domestic sources to finance the deficit. The increase in savings gap increased the need for the government to borrow more. The conclusion of the study was that the savings gap, real exchange rate, government budget deficit and the flow of foreign aid were the key determinants of public debt accumulation during that period.

Mupunga and Pierre (2014) analyzed public debt dynamics in Zimbabwe using annual time series data from 1980-2012. The objective of the study was to analyze the factors that influence the public debt dynamics in Zimbabwe. The variables examined were GDP growth, output gap, primary balance, exchange rate and effective interest rate on government debt. The results indicated that public debt in Zimbabwe was mainly influenced by substantial stock flow adjustments that reflected unbudgeted political and social expenditures. It was also found that automatic debt dynamics influenced public debt dynamics prior to introduction of the multicurrency regime in Zimbabwe. This reflected high interest rate payments on the domestic debt portfolio against subjugated economic growth rates. Simulation analysis was also carried out and the results revealed that Zimbabwe would require a primary surplus of 4.98 per cent. The study also confirmed that excess of real interest rate on nominal GDP growth rates had a adverse effects on public debt and would automatically increase public debt even when the primary balance was in equilibrium.

2.4 Literature Overview

While most studies have empirically tested for the effects of rising public debt on growth, little attention has been paid to establishing those factors that are deemed to be behind debt accumulation particularly for Kenya. The existing literature has mainly focused on the effects of external debt on economic growth without due regard to succinctly attempt to ascertain what determines debt accumulation specifically for Kenya. The focus of this study is to identify macroeconomic factors behind the accumulation of public debt in Kenya and empirically test for their contribution to this situation.

3 Methodology

3.1 Introduction

This section outlines the methodology, model specification, measurements of variables, estimation techniques and data to be used in empirical analysis. We present the research design used in the study and give the theoretical framework used in the study while the last part of this section gives the empirical model to be estimated.

3.2 Research Design

This paper investigated the macroeconomic determinants of public debt accumulation in Kenya. Ordinary least squares (OLS) estimation was used to capture how changes in each of the identified macroeconomic variables contributed to debt accumulation in Kenya.

3.3 Theoretical Framework

3.3.1 Determinants of foreign borrowing

The theoretical framework that identifies the need for external borrowing begins by summarizing the determinants of current account balance following Mcfadden et al (1983). As shown in equation 3.1. Current account is the difference between items that yield foreign exchange and those that need foreign exchange expenditure.

$$CA = X - M - ILF - OTP \quad \text{..... (3.1)}$$

Where *CA* - Current account balance, *X* - Exports, *M* - Imports, *ILF* - interest paid on foreign loan and *OTP* - Other net factor payments and transfer to foreigners. Equation 3.1 can be transformed to reflect current account surplus.

$$CA = \Delta NIR + \Delta BF - (\Delta LF + FDI) \quad \text{..... (3.2)}$$

The current account from equation 3.2 is the difference between the changes in international reserves (ΔNIR) and domestically-placed foreign bonds (ΔBF), and an increase in foreign loans (ΔLF) and the foreign direct investment (FDI). The change in foreign loans is the difference between payment for foreign principal loan denoted by PLF and the new foreign borrowing denoted by *N* in equation 3.3 below. Therefore, the demand for new external loans would be:

$$N = PLF + ILF + \Delta BF + \Delta NIR + OTP + M - FDI - X \quad \text{..... (3.3)}$$

Equation 3.3 implies that the demand for new loans is an increasing function of interest paid on foreign loans (*ILF*), payments of foreign loans principal due (*PLF*), changes in international reserves (ΔNIR), domestically-placed foreign bonds (ΔBF), other net factor payments and transfers to foreigners (*OTP*) and imports (*M*) but a decreasing function of foreign direct investment and exports.

The sum of interest paid and the principal amount is actually the debt service paid, which is also the difference between total debt service due which includes the past arrears owed and the current arrears. Denoting the total debt service paid by *DSP*, total debt service due by *DSD* and current arrears by *A*, substituting the above relationships into equation 3.3 give the equation for the demand for new loans, equation 3.4.

$$N + A = DSD + \Delta NIR + \Delta BF + OTP + M - FDI - X \quad \text{..... (3.4)}$$

An assumption can be discerned from the discussion above is that country prefers to roll over the external debt rather than by arrears. This gives rise to a new equation for a one period prediction for the demand of new loans as,

$$N^D = DSD^e + \Delta NIR^e + OTP^e + \Delta BF^e + M^e - FDI^e - X^e \quad \text{..... (3.5)}$$

Where N^D represents the new loan demanded. The subscripts *e* represent the expectations while other variables are as defined before. Equation 3.5 implies that the demand for external loans is an increasing function of the change in international reserves, the total debt service, net transfers to foreigners, the change in domestically placed foreign bonds which reflects the capital flight and imports. However, export revenues and capital inflows in form of foreign direct investment reduce the demand for external borrowing.

3.4 Specification of the Empirical Model

From the equations derived above, the variables and their behaviour that contributes to foreign debt accumulation was identified. Other variables were added such as exchange rate, real GDP growth, trade openness, foreign direct investment, real interest rate, savings gap, interest payments and gross capital formation. The estimated model for external debt accumulation was stated as follows:

$$PDGDP_t = \xi_0 + \xi_1 TOP_t + \xi_2 RGDP_t + \xi_3 GFCF_t + \xi_4 SG_t + \xi_5 NER_t + \xi_6 FDI_t + \xi_7 IPD_t + \xi_8 RIR_t + \mu_t \quad (3.6)$$

Where the variables, their definitions and sources are presented in table 3.1.

For the domestic debt accumulation, the forces behind it are summarized in the government budget constraint as follows:

$$DD_t = (1 + i_t)DD_{t-1} + (G_t - T_t) \quad (3.7)$$

Where DD_t represents total domestic debt stock at the end of period t, i_t is the average domestic debt interest rate, G_t is non-interest government expenditure and T_t is the total government revenue such that, G_t is the primary budget deficit. The variables that contribute to domestic debt accumulation were identified from the above equation. They are Real GDP growth rate, gross fixed capital formation as a percentage of GDP, interest payments on the debt and real interest rate. All these variables entered the empirical equation 3.6 that was estimated.

Table 3.1: Definition, measurement and sources of variables

Variable	Definition	Expected Sign	Source
PDTGDP	Total public debt to GDP ratio		KNBS and National Treasury and World Bank
TOP	Trade openness. Obtained by summing imports and exports and dividing by GDP	+ve or -ve	World Bank Database
RGDP	Growth rate of Real GDP	-ve	KNBS
NER	The nominal exchange rate between Kenya and USA	-ve	Central Bank of Kenya.
FDI	Foreign direct investment	+ve	Kenya National Bureau of Statistics
IPGDP	Interest payments on the debt as a percentage of GDP	+ve	The National Treasury
SG	Savings gap = Domestic savings – Gross Fixed Capital formation.	+ve	Kenya National Bureau of Statistics
GFCFGDP	Gross fixed capital formation as a percentage of GDP	-ve	Kenya National Bureau of Statistics
RIR	Real interest rate	+ve	World Bank

3.5 Data Analysis

Before the model was estimated, preliminary tests were done. The first one was the stationarity test, since stationary time series have often been prone to contain unit roots that would have an effect of yielding spurious result. In testing for stationarity, the Standard Augmented Dickey-Fuller Test was used to test for the existence of the unit roots (Dickey, 1979; Fuller, 1979). Diagnostic tests were also done on the estimated model to establish whether the model suffered from econometric problems such as serial correlation, heteroscedasticity, misspecification and non-normality of the error terms.

The objective of the study was achieved by establishing the statistical significance of the individual coefficient using two-tailed test. This was done by estimating OLS regression specified in equation 3.6.

Long-run relationship was established by using the Engle-Granger two-step procedure which is actually a residual based approach to testing for co-integration among the variables. After testing for the existence of the long-run relation among the variables, an Error Correction Model (ECM) was constructed to test for the short-run and long-run dynamics. The error correction equation was modeled by regressing the first difference of the dependent variable against the differenced values of the explanatory variables, plus the error term lagged once as shown in equation 3.7.

$$\Delta PDGDP_t = \xi_0 + \xi_1 \Delta TOP_t + \xi_2 \Delta RGDP_t + \xi_3 \Delta GFCF_t + \xi_4 \Delta SG_t + \xi_5 \Delta NER_t + \xi_6 \Delta FDI_t + \xi_7 \Delta IPD_t + \xi_8 \Delta RIR_t + \gamma ECT_t + \mu_t \quad \text{(3.8)}$$

4. Findings

4.1 Introduction

In this section, empirical findings are given. First, preliminary tests results were presented. They include descriptive statistics, stationarity tests, co-integration tests, ordinary least square estimations, diagnostic tests on the estimated model and finally presentation of the key findings.

4.2 Descriptive Statistics for Variables

The preliminary statistical characteristics of all the study variables are summarized in Table A1 in the appendix. They are Jaque-Bera statistics, sample mean, standard deviation, kurtosis and skewness. The Jaque-Bera test was used to test whether variables were normally distributed. It is an asymptotic test that computes kurtosis and skewness measures using the following test statistic:

$$JB = n[s/3 + ((k-3)/12)] \quad \text{..... (4.1)}$$

Where s represents skewness coefficient, n is the sample size and k is kurtosis. If the data is normally distributed, then $k = 3$ and $s = 0$. Therefore the Jaque-Bera test for normality is the joint hypothesis test that k and s are 3 and 0 respectively. From the preliminary results, all the variables were found to be normally distributed except for foreign direct investment as a percentage of GDP. The non-normality of this variable did not affect the model estimation since the sample observations were not asymptotic but assumed to be identically and independently distributed.

4.2.1 Correlation analysis results

The assumption of multicolinearity states that if two or more of the exogenous variables are correlated with each other, basing on its comparative characteristic, one of them should be dropped from the study. Correlation analysis results were reported. Adam and Twenoboah (2008) suggested that if a pair of variables is correlated more than 0.8 value of correlation coefficient, then multicolinearity will pose a serious validity of the estimated results. The worst consequence of presence of multicollinearity is that the standard errors and variances of OLS estimates are high, which implies low values of t-statistics (Granger, 2001). The results of correlation analysis are reported in Table A2 in the Appendix. As shown in the table, all the correlation values were less than 0.8, therefore no variable was dropped.

4.3 Stationarity Analysis

This analysis was conducted to check whether the variables are stationary (do not contain a unit root) or non-stationary (presence of a unit root). Stationarity pretest for the variables was done to ensure that they were all stationary before estimation to avoid spurious results. The results of the unit test are showed in Table 4.1.

Table 4.1: Unit root test results

Variables	Dickey-Fuller Unit Root Test						Order of integration
	Level			1st Difference			
	Intercept	Trend and intercept	None	Intercept	Trend and intercept	None	
Trade Openness (TOP)	-2.967623 (10)	-2.890165 (10)	-0.557959 (10)	-7.707928* (10)	-7.654511* (10)	-7.783761* (10)	I (1)
Gross Fixed Capital Formation (%GDP) DGFCFGDP	-0.925017 (10)	-3.693290 (10)	-0.92517 (10)	-8.291376* (10)	-4.47418** (10)	-8.29106* (10)	I (1)
Exchange Rate (ER)	1.083505 (10)	-1.446664 (10)	3.170068 (10)	-5.709690* (10)	-5.709690* (10)	-5.109126* (10)	I (1)
Real GDP Growth Rate (RDPG)	-4.154401* (10)	-4.223187* (10)	-1.386197 (10)	-1.386197 (10)	-5.437272 (10)	-5.561135 (10)	I(1)
Public Debt (% of GDP)	-1.607713 (9)	-2.093463 (10)	-0.504694 (9)	-6.452465 (9)	-6.476113 (9)	-6.541330 (9)	I(1)
Foreign Direct Investment (%GDP)	3.236871 (10)	0.298053 (10)	4.333259 (10)	-3.534366* (10)	-4.933842* (10)	-0.739534* (10)	I(1)
Interest Payments (IPUS)	-1.997610 (10)	-1.952393 (10)	0.000965 (10)	0.000965* (10)	-5.338558* (10)	-5.388171* (10)	I(1)
Real Interest Rate (RIR)	-3.846999 (10)	-4.035465 (10)	-0.965784 (10)	-7.727008* (10)	-7.728587* (10)	-7.87453* (10)	I(1)

***Notes**:*
1. (*) indicates a rejection of the null hypothesis of presence of a unit root (non-stationarity) at 1%, 5% and 10% levels of significance.
2. The lag order for ADF test is chosen by the Schwarz Information Criterion (SIC).
3. MacKinnon (1996) critical values are used for ADF test at 1%, 5% and 10% levels of significance.

From Table 4.1, the stationarity results indicates that all the variables were stationary after the first difference; that is, they were *I (1)*. The null hypothesis of presence of unit root was rejected at all levels of significance at the first difference. Evaluation of the results was guided by the critical values provided by MacKinnon (1996).

4.4 Co-integration Test Results

The presence of long-run co-movement among the variables was tested by conducting co-integration test. To test for the presence of co-integration, the model in its short-run form was first estimated and the residuals generated were subjected to stationary test to establish whether they had unit roots. The results of the short-run model and residuals together with their unit root test using ADF test are presented in Table A3 in the Appendix. The test statistics of the residuals were compared to the Davidson and Mackinnon (1993) critical values for co-integration test. The results revealed that the residuals were stationary confirming the existence of a long-run relationship among the variables. Engel and Granger (1987) argued that, if there is a long-run co-movement among the variables, then they must have an error correction mechanism (ECM). An ECM was therefore constructed and the error term was then estimated together with other variables in the model. Formulating an ECM entails regressing the first difference of the endogenous variable on the first difference of the explanatory variables plus the value of one lag error term. An ECM relates the short term changes in the endogenous variable to the short-term changes in regressors. This then links it with changes to the long-run effect through feedback mechanism (Kirui, 2014). It also measures the speed through which the dependent variable adjusts to changes in the exogenous variables before converging to equilibrium.

4.5 Diagnostic Test Results

The estimated model of public debt-GDP ratio as the dependent variable against nominal exchange rate, real interest rate, trade openness, gross fixed capital formation as percentage of GDP, foreign direct inflows as a percentage of GDP, interest payment as a percentage of GDP, real GDP growth rate, savings gap as the independent variables together with the error correction term was estimated and the results are reported in Table 4.2. Diagnostic test for the estimated model was done and hereby discussed.

First, to test whether non-linear combinations of the estimated values can help explain the endogenous variable, the Ramsey Regression Equation Specification Error Test (RESET) test (Ramsey, 1969) is a general specification test for the linear

regression model. The intuition behind the test is that if non-linear combinations of the explanatory variables have any power in explaining the endogenous variable, then the model is mis-specified. The null hypothesis of the test is that the model is linear against an alternative. The results in Appendix Table A4 show that the null hypothesis of non-linearity was rejected at 5 per cent. It was therefore concluded that the model was correctly specified.

Serial correlation is a statistical term used to describe the situation where the residual is correlated with lagged values of itself, which is not desirable. Breusch-Godfrey Serial Correlation LM Test was used to test for the presence of serial correlation on the residuals. The null hypothesis is of no serial correlation against an alternative. From the results in Table A5 in the Appendix, the p-value is 0.7399 (73%) which is more than 5 per cent (p>0.05). Therefore, we fail to reject the null hypothesis. The conclusion is that residuals (u) are not serially correlated.

Heteroscedasticity test was also conducted. It is a situation where the variance of the residuals of the estimated model is not constant. Breusch-Pegan-Godfrey test (B-P-G Test) was used to test for heteroscedasticity. The results of this test are reported in Table A.6. There was a p-value of 0.5235 (52%) which shows that null hypothesis of homoscedasticity cannot be rejected. This implies that the residuals have constant variance, which is desirable.

Jaque-Bera statistic was used to test for normality of the variables used in the model. One of the assumptions of the regression model is that the error term follows the normal distribution. The result in Table A7 in the Appendix shows that the value of this statistic is 6.491244 while the corresponding p value is 0.038944. From the results, the null hypothesis of normal distribution was rejected, implying that population residual was not normally distributed but asymptotically assumed to be normally distributed. Also, the error term was assumed to be identically and independently distributed.

4.6 Effect of Selected Variables on Public Debt Accumulation

Table 4.2: Regression model results

Variable	Coefficient	t-Statistic	Prob.
Dependent Variable: Differenced Public Debt GDP Ratio (PDGDPR)			
Error Correction Term (ECT)	-0.561622	-2.879753	0.0073
Exchange Rate (ER)	0.010872	2.442105	0.0209
Trade Openness (TOP)	0.012386	-2.855250	0.0079

Differenced Foreign Direct Investment (DFDIGDP) (%GDP)		-0.022732	2.978086	0.0000
Differenced Gross Fixed Capital Formation (%GDP) DGFCFGDP		-0.027549	1.762676	0.0885
Differenced Interest Payments (IP%GDP)		0.016058	4.884059	0.0000
Differenced Real GDP Growth Rate (DRGDP)		-0.022801	-3.129602	0.0040
Differenced Real Interest Rate (DRIR)		0.000319	1.081089	0.2886
Differenced Savings Gap (DSG)		0.016498	2.362474	0.0251
Adjusted R-squared	0.911564	**Durbin-Watson stat**		2.024778
Prob. (F-statistic)	0.000000			

Source:

From Table 4.2, Adjusted R^2 is 91.1 per cent. This shows that 91 per cent of the variations in the value public debt to GDP ratio are explained by all the variables except the real interest rate. The F-statistic was significant at all confidence levels, implying that the hypothesized relationship between public debt to GDP ratio and the other variables was validated. The value of Durbin-Watson statistic was found to be 2, implying that the model was not suffering from autocorrelation.

4.7 Discussion of the Results

The results show that all the variables except for real interest rate which is insignificant affect the public debt accumulation in Kenya. This implies that gross capital formation, exchange rate, foreign direct investment, interest payments, real GDP growth, trade openness and savings gap determine public debt accumulation in Kenya. For a one percentage rise in trade openness, the model predicts that debt accumulation will increase by 1.2 percentage points. The intuition behind it is that rising trade openness implies that the country is importing more and exporting less coupled with slow rate of GDP growth rate needed to compensate for over-reliance in capital imports. Poor export performance may have also attributed to this trend since there have been decline in Kenya's commodity export prices such as those for tea and coffee.

The coefficient of exchange rate bears the expected sign and is statistically significant at 1 per cent. It is inferred from the result that a unit increase in depreciation of exchange rate increases debt to GDP ratio by one percentage point and vice versa. Exchange rate overshooting in Kenya has been seen as an assortment of ills affecting the current account balance. Heavy reliance on foreign

import capital flows is indirectly affecting foreign debt accumulation in Kenya. This is supported by the fact that loans are denominated in foreign currencies, and that external debt service and debt stock are affected by fluctuations in exchange rates.

It can also be deduced from the result that savings gap, which is a proxy for poverty, is significant and positively affects debt accumulation in Kenya. The model predicts that debt accumulation increases by 1.6 percentage points for a unit increase in savings gap. This suggests that low level of domestic savings is one of the major determinants of debt accumulation in Kenya. Real GDP growth rate significantly and negatively affects public debt. A unit increase in its value will cause debt to GDP ratio to fall by 2.28 percentage points. This implies that as long as GDP growth rate is increasing, a country finds no need to borrow to bridge the resource gap since a high rate of output growth will work towards reducing the debt.

The value of foreign direct inflows is significant and negatively affects debt accumulation. Direct inflows tend to increase the output, and this works towards reducing debt. A similar conclusion can be made for the value of gross fixed capital formation, which is also significant and negatively affects the debt to GDP ratio. This is a proxy for investment and therefore a unit increase in its value will lead to a 2.8 percentage points decrease in the value of debt to GDP ratio.

For interest payment as a percentage of GDP, the sign of this variable was as expected. A unit increase in the amount of interest payments increases debt accumulation by 1.6 percentage points. This is in line with theory since the higher the debt, the higher the amount in terms of interest paid on the debt. Real interest rate was found to be positively related with debt to GDP ratio but statistically insignificant and therefore no valid conclusion could be drawn.

The coefficient of the error correction term in the model is negative and statistically significant. The significance of the coefficient of ECM term supports the existence of a long-run equilibrium relationship between debt to GDP ratio and the other variables which influence it. This term indicates that the rate of adjustment towards equilibrium in the long-run is about 66 per cent which is relatively a high rate of adjustment. The implication is that if debt distress could occur due to the factors explained above, 66 per cent rate of adjustment is required to restore the equilibrium position, further implying that debt to GDP ratio is very sensitive to changes in the significant variables of the estimated model.

4.8 Policy Recommendations

The high and increasing public debt, along with its servicing burden, is clearly hindering Kenya's efforts to achieve higher and sustained economic growth rate of 10% as envisaged in the Kenya Vision 2030. This burden implies the necessity to studying the perceived determinants of this debt accumulation in Kenya. Better understanding of determinants of debt accumulation can be of great importance for its sustainability. Although most of Kenya's debt ratios fall within the IMF sustainability threshold levels, analysis of determinants of public debt accumulation suggest that more domestic efforts can be crucial for debt sustainability going forward. Thus, this study examined how public debt responds to changes in some macroeconomic variables that exacerbate debt problems. It was found that gross capital formation, exchange rate, foreign direct investment, interest payments on the debt, real GDP growth rate, trade openness and savings gap determine public debt accumulation in Kenya.

The implication derived from these results calls for policies that could reduce debt accumulation or stabilize debt to GDP ratio for sustainability. Specifically, there is need for an analysis of the economic and social profitability of debt financed projects to ensure that gains made out of it must exceed the interest and capital repayment. This is to prevent the deadweight effect of public debt on the economy and make it sustainable. The use of funds borrowed for government projects must be closely monitored to ensure that they are used efficiently and effectively on productive ventures that are self-liquidating.

Since a higher rate of growth in output will reduce the need for borrowing, which consequently reduce public debt, there is need for the government to restructure its revenue base to finance the expanding fiscal deficit rather than opting to go for external or internal borrowing. This can be realized by improving the revenue sources and efficient pursuit of tax reforms which will help in curbing tax evasion and avoidance. Also, the government should create an enabling environment for foreign investors to make Kenya an export platform, where export commodities could be manufactured for the international market which will help to strengthen Kenya's terms of trade and improve the terms of trade to reduce the debt burden problems.

From the findings of the study, it was found that trade openness increased debt burdens. For it to reduce the debt to GDP ratio, Kenya has to take appropriate macroeconomic measures to boost her exports. Kenya needs to, *inter alia*, increase export competitiveness, diversify exports from primary goods to value added goods, improve and strengthen trade infrastructures, foster infant industries by

providing financing, support the technological content of exports and enhance overall productivity and competitiveness.

Since the Central Bank of Kenya is in control of exchange rate, efforts must be put in place to ensure that exchange rate is stable to stem inflationary pressures and improve the purchasing power of the shilling. This will go a long way in reducing foreign debt which is denominated in foreign currency.

Appropriate debt management strategy should be adopted because with rising debts, excess foreign loans are harmful in achieving economic growth. The government should use borrowing for productive and commercial purposes to generate sufficient resources that will accelerate economic growth and ensure that debt service does not reverse the gains made. In addition, a comprehensive debt monitoring system is needed to enable early indication of possible risks resulting from the country's debt accumulation to avoid debt default risk.

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Appendix

Table A1: Descriptive statistics

	EXGDP	EXR	FDIGDP	GFCFGDP	IPGDP	RGDP	RIR	SG	TOP
Mean	0.410491	46.32789	0.596436	18.84954	7.193966	4.012011	6.460985	-6.702235	57.61005
Std. Dev.	0.089683	30.50375	0.568511	2.079925	5.311144	2.707060	7.205611	5.153332	6.541851
Skewness	-0.288582	-0.071439	1.816125	0.418329	0.502337	-0.088401	0.015233	-0.001162	0.735150
Kurtosis	2.748417	1.304959	6.149864	3.479426	1.688650	2.175516	2.596908	3.128229	2.764540
Jarque-Bera	0.660686	4.822628	38.52480	1.549743	4.548344	1.185054	0.272353	0.027414	3.695374
Probability	0.718677	0.089697	0.000000	0.460763	0.102882	0.552928	0.872689	0.986387	0.157601

Table A2: Correlation analysis

	EXGDP	EXR	FDIGDP	GFCFGDP	IPGDP	RGDP	RIR	SG	TOP
EXGDP	1.000000								
EXR	0.221319	1.000000							
FDIGDP	-0.034129	-0.044099	1.000000						
GFCFGDP	-0.134381	-0.188940	0.147920	1.000000					
IPGDP	0.368993	-0.742531	-0.174295	-0.046644	1.000000				
RGDP	-0.165371	-0.019504	0.072193	0.499901	-0.146136	1.000000			
RIR	0.398203	0.417712	-0.255511	-0.191301	-0.085837	-0.097122	1.000000		
SG	-0.017531	-0.591697	0.132897	-0.268274	0.482912	-0.289990	-0.248461	1.000000	
TOP	-0.236562	-0.252253	0.230963	0.245929	-0.046540	0.043961	-0.259039	0.451660	1.000000

Table A3: Unit root test for the residuals

Null Hypothesis: ECT has a unit root				
Exogenous: Constant				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.626364	0.0082
Test critical values:	1% level		-3.552666	
	5% level		-2.914517	
	10% level		-2.595033	
*MacKinnon (1996) one-sided p-values.				

Table A4: RESET test

Ramsey RESET Test				
Equation: UNTITLED				
Specification: EXT_GDP_RATIO1 C BD1 REER1 TOT1 TOP1 ECT1				
Omitted Variables: Powers of fitted values from 2 to 4				
	Value	df	Probability	
F-statistic	0.092984	(3, 47)	0.9636	
Likelihood ratio	0.331385	3	0.9540	

Table A5: Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.260997	Prob. F(2,48)	0.7714
Obs*R-squared	0.602442	Prob. Chi-Square(2)	0.7399

Table A6: Heteroscedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.807112	Prob. F(5,50)	0.5501
Obs*R-squared	4.182271	Prob. Chi-Square(5)	0.5235
Scaled explained SS	6.109685	Prob. Chi-Square(5)	0.2957

Table A7: Normality test