



**THE IMPACT OF FOREIGN DEBT ON ECONOMIC GROWTH IN SUB SAHARAN
AFRICA**

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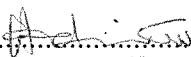
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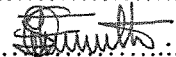
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List of abbreviations

HIPC	-	Heavily indebted and poor countries
DSERV	-	Debt service to export ratio
FDGNI	-	Foreign debt to GNI ratio
SSA	-	Sub- Saharan Africa
SAP	-	Structural adjustment programs
GDP	-	Gross domestic product
GNP	-	Gross national product
IMF	-	International monetary fund
OPEC	-	Organization of petroleum exporting countries

Abstract

This research carries out an empirical research on the impact of foreign debt on the economic growth of sub-Saharan Africa countries using cross sectional regression method suggested by Sala-i-Martin and Robert Barrow. The study also incorporates the Solow growth model. Tests for both debt overhang and crowding out effect are conducted on ten Sub Saharan African countries over the period of 1980-2010. The findings show that, although there is no significant evidence of debt overhang effect, a negative impact of foreign debt through the crowding out effect is severely setting back economic growth in Sub Saharan Africa.

Key words: *External debt, economic growth, debt overhang, debt servicing and debt crowding out.*

1 Introduction

1.1 Background to the study

Foreign borrowing has been seen as highly beneficial, as it provides the resources needed to promote economic growth and development. This is despite the costs, which include debt service, debt overhang, crowding out effect and capital flight. Debt service payment is usually made in foreign currency, which means, debt service obligations can be met only through export earnings, reduced imports or additional external borrowing. An increase in debt service payments makes it difficult to fulfill the debt obligations and this is brought about by an increase in imports, a decrease in exports earnings, or an increase in interest rates.

Developing countries go for foreign aid when they notice a savings- investment gap in their economy, (Oyedele, Emerah, & Ogege, 2013). Foreign borrowing increases capital funds to the developing economy and therefore, should increase economic growth through factor accumulation and productivity growth, (Imori, 2015). (Were, 2001) mentions, "Huge external debt does not necessarily imply a slow economic growth; it is a nation's inability to meet its debt service payments fueled by inadequate knowledge on the nature, structure and magnitude of the debt in question".

Some economists, such as (Chowdhury, 2001), argue that capital mobility increases economic growth in developing countries, at the initial stages, because of the increased investment opportunities. If put to good use, for example, if it's used for productive investment, the increased capital can be a much needed boost to a developing economy, as it provides the resources needed to promote economic growth and development.

Foreign debt affects countries economically both in the long and short run. The Keynesian approach takes a short run perspective, where public deficits raise public spending and thus aggregate demand, have a stabilizing effect, fostering economic growth. The Neo-classical approach on the other hand, tries to explain the evolution of economies in medium and long run, where, public debt crowds out investment, decreasing economic growth in the long run.

(Agénor & Montiel, 2008) argue that debt crisis, was originally caused by excessive borrowing by the public sector to service their current debts. This problem was caused by the inverse

relationship between the real interest rate in the international market and the overall real GDP growth rate in the heavily indebted poor countries (HIPCs). During 1970's, the real long term rate of interest in the developed countries fell well short of the real growth rate of GDP by HIPCs. Developing countries saw it as a viable option for the public sector to service their existing debt through new borrowing, instead of generating their own resources finish off the debt obligation. This resulted into many of the countries experiencing a large fiscal deficit.

1.2 Foreign debt in Africa

After most of the African countries gained independence, in the 1960's, their main source of loans was provided by the external governments. However, during the oil supply shocks that occurred between the 1970's and 1980's, Sub Saharan African countries experienced the balance of payment problems, where payments of imports were greater than revenue from exports. This caused SSA to increase their borrowing to service their existing debts. However, due to the global financial crisis that occurred in 1982, and as a result of the two major oil shocks, commodity prices hiked up, causing a massive increase in inflation, and therefore, increasing the price of borrowing. Tighter monetary policies adopted by the developed creditor countries, also increased interest rates, resulting into debt service payments to multiply. Therefore, the loans were used as payment for the exports debt rather than being used for investments, which would yield a greater payoff in the future.

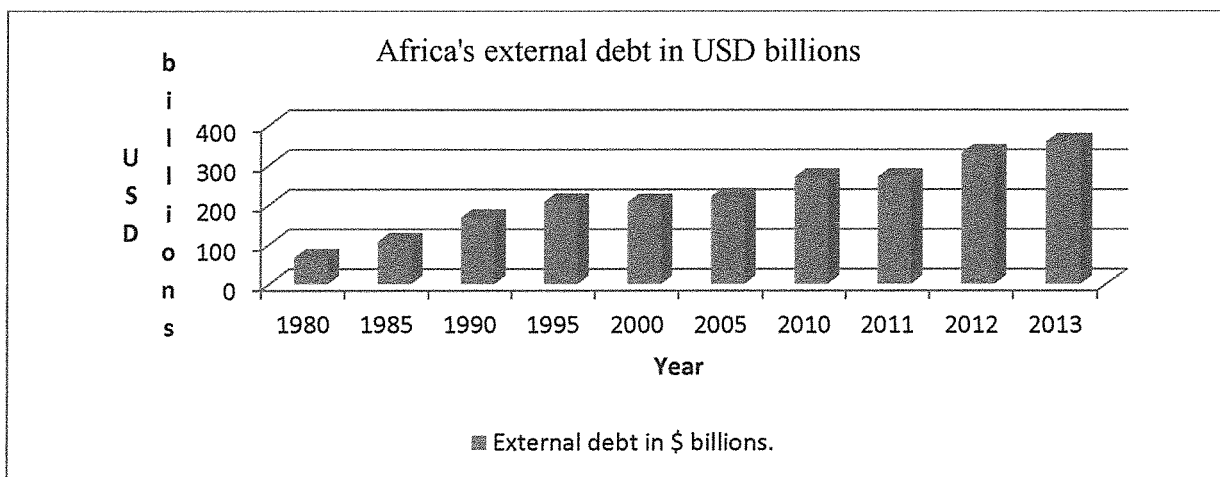


Figure 1 Source; World Bank database as at 2015

As Milton Friedman once stated, there is nothing like free lunch. In exchange of providing loans to sub Saharan Africa countries, the creditors like IMF and the world bank imposed stiff

conditions on the policies of these African countries, having an enormous sway over them. Financial liberalization, aimed at attracting more foreign investments to compensate for shortfalls in export revenues, instead fostered more instability, due to the volatility of exchange rates resulting from speculative short-term capital flows. This, combined with higher interest rates, "crowded" out both public and private investments. One of the suggestions The IMF and World Bank recommended was the structural adjustment programs, (SAPS). SAPS were presented as a program that would restore stabilization in the short term and facilitate sustainable growth in the medium to long term, (Iyoha, 1999). SSA adopted this strategy in the 1980's, which meant, a decrease in income and living standards, an increase in unemployment, and a similar increase in poverty. This deflation needed by SAPS resulted in a fall in national income available for consumption and investments, and therefore, a decline in economic growth.

Table 1: Gross domestic product based on purchasing-power parity (PPP) per capita GDP in USD billion

	1981-1990	1991-1995	1996-2000	2001-2005	2006-2010	2011-2013
Developed countries	14,588	21,910	26,714	32,455	39,041	42,353
Developing Asian countries	921.553	1,728	2,466	3,502	5,773	7,982
Latin America and Caribbean	5,527	7,289	8,585	9,719	12,632	14,763
Middle east and North Africa	4,533	5,797	6,847	8,149	10,724	12,429
Sub Saharan Africa	1,404	1,612	1,829	2,199	2,951	3,466

Table 1 presents the comparison of GDP for different regions. The sample periods selected represents the time length in which the global market resulted to excessive borrowing as a result of the oil shocks causing GDP of the different countries to show great disparity. The data presented was obtained from World economic outlook database 2015.

Gross domestic product based on purchasing-power-parity (PPP) per capita GDP in USD billion

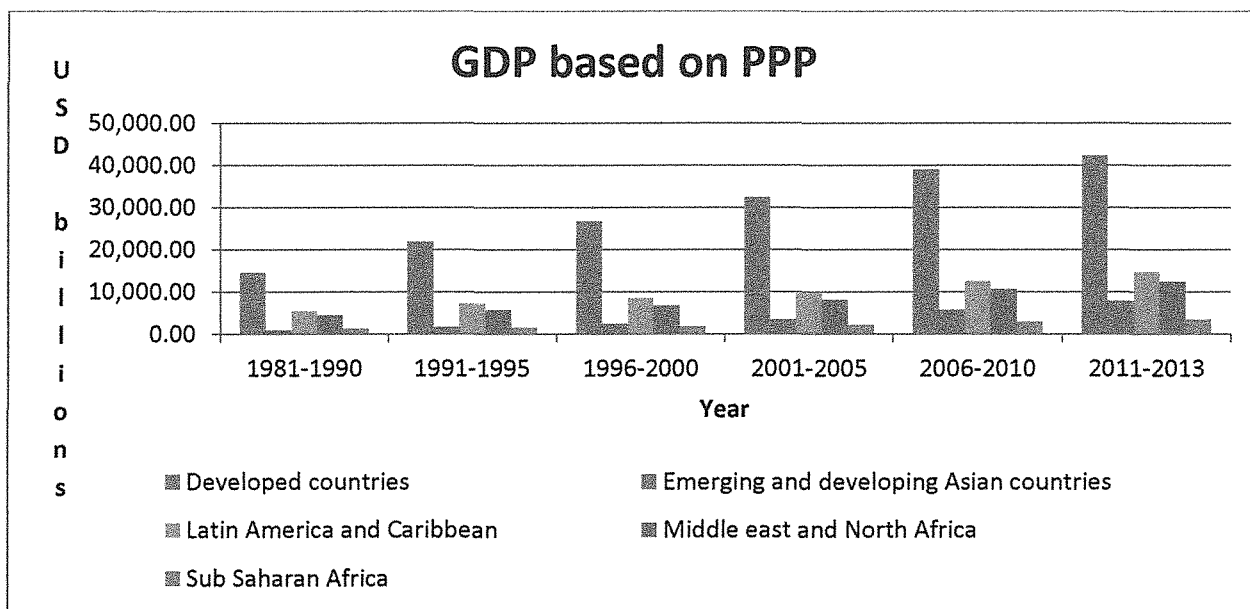


Figure 2 Source; World economic outlook database as at 2015

The sub Saharan Africa debt service ratio doubled in 1980 to 1985 from 78.6% to 173.3%, and doubled again, when it shot up to 329.4% from 1985 to 1991, and the ratio of actual debt payment to scheduled debt payment fell in the 1980's from 66% in 1983 to 47% in 1989, (Iyoha, 1999).

Debt indicators sub-Saharan Africa

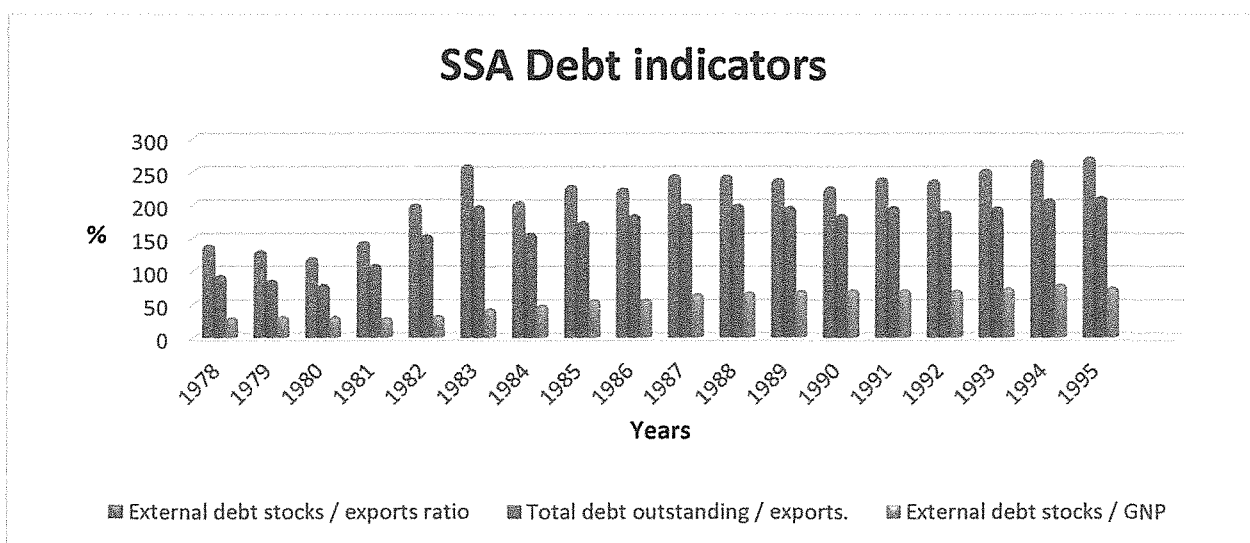


Figure 3 Source; world economic outlook database as at 2015

(Stiglitz, 2000), states that, IMF programs are often asserted to be “antigrowth” and to hurt poor nations. IMF policies were claimed to make recessions only “longer” “deeper” and “harder. According to (Barro R.J, 1998), the availability of IMF lending has also been depicted as a source of “limitless bailouts” and “moral hazard”. (Stiglitz J. , 2003), mentions that, the IMF, whose responsibility is to ensure stability of the global financial system, has fared miserably in its mission to stabilize international financial flows, making matters arguably worse. He goes on to state that “Keynes would be turning over in his grave if he were to see what has happened to his creation.” Instead of helping countries to adopt contractionary policies to solve economic crisis, the IMF has instead forces countries to adopt contractionary policies, which only exacerbated economic downturns.

1.3 Problem statement

Over the last three decades, SSA debts have been on a steady rise, projecting a very small chance of a decline in the near future. According to the IMF statistics provided in 2015, SSA foreign debt stood at 360 billion USD in 2013, from 67 billion USD in 1980, 168 billion USD in 1990, 206 billion in 2000 and 268 billion in 2010. After the oil shocks of 1970’s and 1980’s, tightening of monetary policies, and falling global prices for primary commodities, have been major driving forces behind the almost four fold multiplier effect on debt.

Some of the studies that have been carried out on the subject of foreign debt and economic growth include (Fosu, 1996), who found a negative impact of foreign debt on economic growth through debt overhang effect, (Iyoha, 1999) , who found both the debt overhang and crowding out effect on economic growth as a result of foreign debt and (Were, 2001), who, found that although both debt overhang and crowding effect occurred, Kenya would need external financial assistance to achieve its goal of becoming an industrialized nation by the year 2020. (Ayadi & Ayadi, 2008) , who use both OLS and GLS methods, confirm a negative impact of foreign debt on economic growth along with other researches carried out, getting negative impacts on economic growth like (Patillo, Poirsson, & Antonia, 2011).

In contrast, several researchers have found that external debt has a positive impact on economic growth by boosting the economy through the additional funds it provides. (Hansen, 2001) Finds foreign debt positively impacts economic growth through investment and GDP Growth along with (Khan & Kumar, 1997), and (Warner A. , 1992). (Uzun, Karakoy, Kabadayi, & Emsen,

2012), find a positive impact of external debt on economic growth, supported by the findings of (Bhatta, 2010) and (Zaman & Arslan, 2014), when researching the impact of foreign debt on economic growth using OLS regression. Prior theoretical and empirical studies offer neither theoretical nor empirical consistent conclusion about the relationship between foreign debt and economic growth. This study aims to bring forward new evidence to address this inconsistency and contribute to the existing debate on the impact of foreign debt on economic growth.

1.4 Research Objective

The overall objective of this study is to find out the effect of foreign debt on the economic growth in Sub-Saharan Africa.

1.5 Research hypothesis

The study hypothesizes that high foreign debt service has a negative impact on economic growth.

1.6 Significance of the research

Since one of the main indicators of economic prosperity of a nation is economic growth, this study will be of benefit to the governments, creditor countries, intentional financial intermediaries and the development of the financial markets of debtor countries through the formulation of economic policies and strategies that look to promote economic growth in sub-Saharan Africa.

2 Literature review

Foreign debt has been the focus of many studies, with conflicting results. Some studies show proof of a positive impact of foreign debt on economic growth, while others show proof of a negative impact of foreign debt on economic growth, through the debt overhang hypothesis and the crowding out effect, and others even show proof of a non-linear relationship between foreign debt and economic growth, where, foreign debt doesn't have a constant impact on economic growth, but forms a U-shaped relationship, where it keeps on changing.

2.1 Foreign debt and concepts in foreign debt

Foreign debt is considered a common phenomenon for all developing countries, as domestic capital is not enough for investment purposes, (Todaro & Smith, 2006). The World Bank defines foreign debt as "a debt owed to non-residents repayable in foreign currency, goods or services." Debt crisis history began with Mexico as the pioneering country. The Mexican government issued an announcement on its inability to service 80 billion US dollar debts to its international lenders. By October 1983, 27 countries, including Brazil, Argentina, and Venezuela followed suit, (Abera, 2013).

The origin of debt crisis can be attributed to two periods in history. The first period started from 1973 and lasted to 1978. After the war between Egypt and Israel, in 1973, oil prices shot up, resulting to a disorder in the international market. The industrialized world increased both domestic and international prices to absorb this effect. This led to inflation and therefore a balance of payment problem in developing countries. This was termed as the first oil shock. To help sort out this problem, they started borrowing from banks in the international capital market, like the World Bank and the international monetary fund, (IMF).

The second period shock started from 1979 and lasted until 1982. The major event that led to the high level of indebtedness was the decision made by petroleum exporting countries, (OPEC), to increase the price of crude oil by more than double the amount. In 1979, OPEC raised the price of price of crude oil from \$13 to \$ 32 per barrel. This led to the second oil shock. Industrialized countries developed a tight monetary policy as response to the second oil shock, which worsened the conditions for developing countries, as they now had to borrow at a higher interest rate. From 1981 to 1983, world recession occurred, making it harder for developing countries because it led to a fall in their price and volume of exports and export earnings.

Krumm (1985), states that the root of these problems started in the 1970's due to the economic and political conditions of many poor and developing countries. According to (Krumm, 1985), the first major oil shock brought about a boom in Africa's exports, followed by a sharp burst. The indebted countries governments responded to the increase in price by increasing the public expenditures, supporting this increase with an increase in foreign borrowing. During this period, when, international banks like WB and IMF loaned out money for public investment projects, they turned out to be "unproductive, ill-conceived or mismatched with the financing maturity structure." She continues to state that most developing countries were poorly positioned to absorb the second oil shock, given their already high debt structure, poorly formed investments and inflexible public expenditures. The severe drought that affected Africa is also taken into account as a reason for the increased spike in foreign debt.

2.2 The effect of foreign debt on economic growth

Nakatani & Herrera (2007), feel that external debt is a self-perpetuating mechanism for poverty aggravation, over exploitation of work, and constraint on the development of developing countries. This burden of debt does not contribute to the financing of economic development in the sub Saharan African countries.

Mahdavi, (2004) and (Fosu, 1996) argued that expenditure on debt servicing may shift the public expenditure away from social sectors like health and education, and public investment, which hampers the economic growth. However, (Eaton, 1993) using the traditional neoclassical growth model and endogenous growth model, found that the increase of foreign debt can promote economic growth. This explanation can be used on the basis of, if the money borrowed is put to good use, for example, the money is put into sound investments, it will produce returns in the future

Patillo, Poirson, & Rici (2011) did a research on external debt and economic growth, with the aim of finding a non-linear relationship between foreign debt and economic growth. By using panel data from 93 developing countries, spanning sub Saharan Africa, Asia, Latin America and the Middle East, and Generalized method of moments, (GMM), they have results that support a non-linear hump-shaped relationship between debt and growth, more so, when the debt burden is developed as a measure of GDP. This implies that at low levels of external debt, growth is affected positively but at higher levels of total debt, this relationship becomes negative. (Patillo,

Poirson, & Ricci, External debt and growth, 2011) State that, by getting additional flow of capital from the foreign debt, economic growth increases economic growth, but the average impact of debt becomes negative at 160-170 percent of exports or 35-40 percent of GDP. This research was a follow up on the previous research done by (Patillo, Poirson, & Ricci, 2004), who studied the relationship between total external debt and the growth rate of GDP for developing countries and concluded a nonlinear relationship, in the form of an inverted-U shape, but (Schclarek, 2004), conducted a similar research using 9 developing and 24 industrial countries and did not find existence of an inverted U shape relationship between total external debt and economic growth as claimed by (Patillo, Poirson, & Ricci, 2004).

Patillo, Poirson, & Ricci, (2011) also conclude that investment is not the main channel through which external indebtedness reduces growth; rather, the impact is via mostly the quality of investment, instead of the level of investment, as stated by (Easterly & Levine, 2001). They state that the channels through which external debt affects economic growth are total factor productivity and capital accumulation. However, (Fosu, 1996), feels that investment directly affect growth and states that high level of indebtedness, decreases investment growth rate and therefore decreases growth rate of GDP, resulting into a decline in economic growth.

Ayadi (2008), Carried out an empirical research on the effect of foreign debt on the economic growth of Nigeria and South Africa, and used the neo-classical approach model that incorporates the external sector, to explore the linear and non-linear impact on economic growth. He also incorporates the ordinary least square (OLS) method generalized least square (GLS) method in his methodology. He states that foreign debt burden has dramatically limited developing countries participation in the world economy and paying debt service obligations continues to impede economic growth and development. Debt burden has led to a decrease in capital of the countries and therefore inability to support any private investment opportunities, which would lead to a boost in the economy of the indebted countries. This would indirectly affect employment levels by reducing them, because of a decrease in the private sector of the economy. It would also affect literacy levels and lead to an increase in poverty.

However, when doing his study on Nigeria, (Ayadi & Ayadi, 2008), realized that external debt contributed to positive growth of the economy, until a certain level, when it started deteriorating. This is in line with what (Chowdhury, 2001) was saying when he explained that foreign debt can

be good to the economy, at its initial phase, as it provides an initial flow of capital into an economy. This flow of capital should be put into productive investments, to bring about positive growth of the economy.

The negative effect of debt can be explained using the direct effect of debt hypothesis, (DEDH), and the traditional hypothesis, which include both the debt overhang effect and the liquidity constraint effect that “crowds out” investment. DEDH, as explained by (Fosu, 1996), in his paper, is when a country facing large debt service payments relative to its available resources is likely to show a low productive investment mix. Even if debt service payments do not reduce investments and savings levels substantially, they can decrease output growth directly, by reducing productivity as a result of the poor investment mix. DEDH, therefore, suggests that debt service is harmful and deleterious to the growth of the economy. (Fosu, 1996) uses cross country OLS regression and concludes that highly indebted countries face a 1% reduction of GDP growth rate annually, therefore, debt directly and negatively affects economic growth.

Okonkwo (2012), Carried out research in selected West African countries to measure the impact of foreign debt on economic growth. He uses unit root test, cointegration test and the error correction model and concludes that external debt as a percentage of GDP seemed to be negatively relevant for all countries, which contrasts what (Adegbit & Ayadi, 2008) find in their research. However, his results are in line with (Fosu, 1996), who states that debt has a direct negative effect on economic growth in SSA countries by affecting productivity, and shows proof of DEDH hypothesis in his research. He uses Engel Granger 2 step co integration technique to examine the effect of indebtedness on output growth in an error correction model, finding that external debt exerts an immediate and significant negative influence on output growth in all our countries, which seems to be in agreement with the “direct effect of debt hypothesis.” These conclusions coincide with (Were, 2001), who, when doing the impact of foreign debt on Kenya’s economic growth, found a negative relationship.

2.3 Debt overhang and crowding out effect

Several studies done to assess the impact of foreign debt on economic growth use the debt overhang hypothesis as one of the theory that explains the negative effect of foreign debt on economic growth. For (Krugman, 1988), debt overhang asserts that, if there is a probability that country’s future debt will be more than its repayment ability, then, anticipated costs of debt-

servicing can depress the investment. Governments of highly indebted countries increase taxes as a way of getting extra capital to service their debts. High indebtedness can be seen as tax on future output, therefore reducing savings and investments. The high taxes act as disincentive effects for investors.

Serieux & Sammy (2001), when researching on the debt service burden and growth, use evidence from low income countries to map out a relationship between foreign debt and economic growth. They state that debt overhang will create a disincentive effect on private investments through increase in taxes or debt induced crisis, which will lead to an economic growth slow-down. This reduction of growth will further reduce investment. As the economy will slow down, the debt-to-income ratio will increase, which will reinforce the disincentive effect. Therefore, low investment, slow growth and a huge debt obligation reinforce each other, leading to stagnation, and the only way to break this cycle is “debt reduction and improving the prospects for sustained growth and rapid human development.”

Matelis (2014), carried out a research on effects of foreign debt on various economic sectors in Latin America and found the existence of debt overhang. He finds that “a debt overhang problem not only creates difficulties with debt management, repayment, ability of growth but also leading to lower investment incentives.” The fact that returns from investments in the country would be facing high taxing levels; domestic investment will not be attractive to the investor anymore, resulting into the investor to carry out his/ her investments in foreign countries. The country would then lose out on the revenue it should have received from the productive investment, from the individual.

Sachs (1990), studied debt and economic growth, and states that, if higher taxes are levied to cover the debt servicing, then these taxes are likely to reduce the economic growth. Higher taxes cause distortions in the economy which would decrease economic growth. Some examples of these distortions include tax evasion, barriers to trade, capital flight and even a reduction in the effort employees put in their work. The neo-classical view explains this point, where, taxes on factors of production, which are capital and labor, are disruptive to the creation of wealth. Corporate and shareholder taxes discourage people to invest. Fewer investments mean fewer productive workers and therefore a reduction in wages. Taxes on wages will reduce the incentive to work and reduction of work will therefore; reduce economic growth of the country. (Feldstain,

1995) Follows this trend of thought and regards debt overhang as the government needing to impose taxes on the private sector to finance debt obligations resulting in the sinking of returns of investment, leading towards a decrease in Investment and economic growth.

Oreyema (2009) Examined the impact of external debt on economic growth in SSA over the period 1990-2005, and used the neo-classical growth model, and with panel data estimation techniques, shows that external debt stock to GDP ratio had statistically significant negative effect on economic growth, concluding that debt overhang was the main channel through which external debt negatively affected economic growth in SSA between 1990 and 2005. (Fosu, 1996), through the OLS technique, similarly concluded that debt overhang was the main channel through which external debt impacted economic growth in sub-Saharan Africa results in curtailing the GDP growth and further estimated that on average a country having high levels of debt, shows 1 per cent reduction in GDP growth rate.

Although the debt overhang problem has been identified and its impacts researched upon by many researchers, (Afxentiou & Serletis, 1996), carried out an independent research on it from the period of 1970 to 1980, and found no causal relationship between external debt and GDP, and therefore concluded that the debt overhang hypothesis is rather exaggerated. They stated that developing countries used foreign loans to help absorb the shock of oil price increase. The debt overhang effect started occurring from the 1980's, effecting the economic growth of the indebted countries. A research carried out by (Presbitero & Panizza, 2012) on developing countries shows that total public debt exerts a negative influence on growth up to 90% of the debt to GDP share.

Allesina & Tabellini (1988) Suggest that foreign debt should be paid by the government resulting into an increase in taxes. Most scholars may not agree with this opinion, because it is more of an added problem rather than a solution. An increase in taxes would lead to the debt overhang hypothesis. Investors would be discouraged to invest in a country with very high taxes, as most of their returns would be taken by the government through tax. (Allesina & Tabellini, 1988) feel that capital flight occurs because of uncertainty of government fiscal policies and therefore resulting to a reduction in domestic investments, which will lead to over accumulation of external debt.

However, according to (Dornbusch, 1988), the government should increase inflation rates to pay off debts instead of increasing taxes, which would result into foreign debt influencing economic

growth through inflation rates rather than tax rates. Through inflation, due to an increase in prices, more money is pumped into the economy. However, I think, if there is hardly any money in the economy, inflation rise will not be able to stop a decline in economic growth.

Liquidity constraint hypothesis states that debt servicing or payment of external or foreign debt decreases funds available to carry out investment purposes. This hypothesis is captured by the crowding out effect. The “crowding out effect” is mentioned by (Diaz-Alejandro, 1981) in his research. Due to the large amounts of money the government borrows, there is a significant rise in interest rates, which leads to a reduction in private investments, because it discourages individuals and businesses from borrowing money for investment. (Stiglitz, 2000) Comments on the crowding out effect by stating that the government borrowing can crowd out investment, which will reduce future output and wages. Any revenue the government receives from taxes, exports and even foreign aid goes into servicing debt obligations. This leaves no capital remaining for injecting into private investments.

Serieux & Sammy (2001) Found that crowding out effect of external debt is very strong but say that its effects are more on the quality of investment rather than on the rate of investment. They feel that the debt servicing cost crowds out public investment, therefore reducing total investment, both directly and indirectly, by reducing private expenditure and quality of investments. Debt obligations lead to import compression that lead to lower investments and growth. This happens because there is a reduction in capital imports. However, in contrast to other scholars, (Serieux & Sammy, 2001), feel that debt overhang is more muted and less important than liquidity constraints.

Clements, Bhattacharya, & Nguyen (2003) observed that, crowding out effect could result from high debt service, which would increase interest rate costs and budget deficits, therefore decreasing public savings. Therefore, there would be a competition for the credit available which would crowd out private investments and the end result would be a decrease in economic growth. (Presbitero & Panizza, 2012) research on impact of foreign debt using a panel of 152 developing countries over the period 1977-2002, and conclude a negative linear relationship between external debt and economic growth. Their conclusion includes that the main channel through which debt impacts economic growth is by the crowding out effect. (Were, 2001), similarly conducted a research in Kenya, to assess the impact of foreign debt on economic growth, and

concluded a negative relationship, a result from both the debt overhang and the crowding out effect.

Cohen (1993), through his research, shows that in highly indebted developing countries, level of external debt does not have any role in slowness of investment. His conclusions include high level of debt not being a predictor for low investment rate. His results show proof of foreign debt service crowding out investment; "1% of GDP paid abroad reduced domestic investment by 0.3% of GDP". (Clements, Bhattacharya, & Nguyen, 2003) support this inverse relationship in their research, where, a decrease in debt ratio by 5.7% would result into an increase in investment of 0.1 %.

On one hand, the cost of debt servicing reduces public investments and on the other hand, increase in taxes reduces incentives for investment, which is extremely necessary for the payment of debts. Heavy debt servicing result into many countries into a fiscal deficit, which may lead to many problems, namely, raising taxes to pay the debts, therefore decreasing investments, leading to debt overhang. Another effect is that countries use most of their resources trying to service the foreign debt, even the foreign aid they receive, which will result to the plummeting of the economy. Generally, as a result of heavy debt service payments and decreased government spending, growth will be severely impaired.

2.4 Empirical literature review

Empirical literature on the relationship between foreign debt is very controversial, as some researches find a positive result, and others, a negative relationship. Foreign debt can increase capital and labor force of an economy if its put into wise public investment ventures like health, education and infrastructure. (Warner A. , 1992) carried out a panel data regression with debt crisis as the dummy variable to check the impact of foreign debt on economic growth of heavily indebted countries and found a positive relationship, rather than a negative one, as predicted by some researches. (Warner A. , 1992) Argued that the debt was used in public investments, and therefore, had an end result of a positive impact on economic growth.

Chowdhery & Khorshed (1994) carried out regression and causality tests using Logarithmic transformed time series data on GNP to get the cause-effect relationship between external debts and fall in economic growth and found a positive relationship between economic growth and foreign debt. (Khan & Kumar, 1997) Found a similar result in their study.

However, although many studies found a positive impact of foreign debt on economic growth, just as many found a negative impact, one of them being (Fosu, 1996), who found that on average a highly indebted country faces about one percentage reductions in GDP growth rate annually, by using cross country OLS regression. (Were, 2001) used an error correction model to study the impact of external debt in Kenya and showed that foreign debt accumulation had a negative impact on private investments and economic growth in Kenya. (Iyoha, 1999) carried out his research in SSA using 2SLS method and found that the large stock of external debt and heavy debt service payments had negatively affected investments and growth in SSA. (Clements, Bhattacharya, & Nguyen, 2003) Found that a reduction in foreign debt increased economic growth and used the dynamic GMM estimation for their research.

Afxentiou & Serletis (1996) carried out a research on 55 developing countries that faced debt service problem to find the statistical relationship between foreign debt and economic productivity. They used 1970-1990-time period and classified in two periods: the first period (1970 – 1980) which is characterized by an alarming growth in foreign debt and the second period (1981 -1990) was the era of debt servicing problem. In the first period, they didn't find a negative relationship between indebtedness and national productivity. They argued that, on this period developing countries used the foreign debt to overcome the shock from the oil price increase. The result from the second group showed a negative relationship between indebtedness and productivity of the severely indebted developing countries. This was the period during which the debt forgiveness and Rescheduling began. (Afxentiou & Serletis, 1996) Concluded that, foreign debt was misused by indebted developing countries.

As mentioned previously in my problem statement, there have been numerous studies done on the topic with contradictory results, depending on the geographical and economic state of the country, and even the model employed. Most studies done, have used OLS regression to carry out their empirical research, mainly resulting into a negative debt impact on growth through debt overhang and crowding out effect. This research will employ the regression model as suggested by (Sala-i-Martin, 1997), the Sala-i-Martin cross sectional economic growth model, along with the Solow economic growth theory to check whether foreign debt has a positive impact on economic growth or a negative one, through crowding out hypothesis or debt overhang hypothesis, or both occurring at the same time.

3 Methodology

3.1 Introduction

This study adopts the methodology proposed by (Sala-i-Martin, 1997) which was later modified by him and Barro (Barro & Sala-i-Martin, Economic growth, 2004) and used by (Ejigayehu., 2013) to measure impact of foreign debt on the economic growth of HPIC countries. The Barro and Sala-i approach modifies the Sala-i-Martin cross section regression model, to carry out a panel regression instead of following the cross sectional approach Sala-i-Martin preferred. The Solow model was also being incorporated in the regression analysis, as it can measure the impact of debt overhang hypothesis and crowding out effect separately as well as measuring their combined impact. Since Solow growth model is a closed economy model, it does not take trade into account but measures production by using labor and capital. Therefore, the impact of foreign debt on economic growth was calculated using its effect on savings, which was used as investment in a closed model. We can measure both the debt overhang and crowding out effect individually from the Solow growth model.

3.2 Data and sampling

This study seeks to determine the impact of external debt on the economic growth of sub Saharan Africa using data from 1980 until 2010. The starting period, 1980 is chosen, because it when sub Saharan African countries began their heavy external borrowing, after the two global economic shocks, and therefore the impact is best covered from this period to 2010.

The data used for the purpose of this research was secondary data provided by the World Bank database and the IMF database, along with the Kenyan treasury.

3.3 Econometric model used

Sala-i-martin (1997) started developing his model with the basic regression model as shown below;

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon \quad (1)$$

Where Y is the dependent variable, showing rate of economic growth and $X_1 \dots X_n$ are the independent or explanatory variables and ε is the error term. (Sala-i-Martin, 1997) Modifies the above basic regression to include three fixed variables affecting economic growth, which

include, level of income, life expectancy and primary school enrollment rate. The fixed variables used for this study are suggested by (Solow, 1956) in his economic growth model. Since Solow growth model is a closed economy model, it does not take trade into account but measures production by using labor and capital. Therefore, impact of foreign debt on economic growth can be calculated using its effect on savings, which is used as investment in a closed model. Besides investment, Solow argues that another actor in determining economic growth is the population of the economy, which is backed up by (Barro R. , 1996), who also mentions the importance of population growth when carrying out research on determinants of economic growth. My third fixed variable is the log of GDP per capita for the case of convergence as suggested by (Solow, 1956). “Solow predicts a negative coefficient for initial GDP, which enters the system in a logarithmic form”, (Barro R. , Determinants of economic growth: an cross-country empirical study, 1996). (Solow, 1956) argues that a country’s per capita growth is inversely related to its initial level of income per person, therefore, poor or developing countries have a faster growth rate than the rich or already developed countries. This effect was later supported by (Barro & Sala-i-Martin, Economic growth, 2004), (Mankiw, Romer, & Weil, 1992), and (Barro & Sala-i-Martin, 1992) among numerous other researchers. The first regression is then developed to calculate the effect of variables suggested by the Solow growth model;

$$\frac{Y_{it+1}-Y_{it}}{Y_{it}} = \beta_0 + \beta_1 INV_{it} + \beta_2 LGDP_{io} + \beta_3 P_{it} + \beta_4 TBS_{it} + \varepsilon_{it} \quad (2)$$

Total debt service measures debt service payments on long-term debt, the use of IMF credit and interest on short term debt, (Iyoha, 1999). As done by (Ejigayehu., 2013), to see the direct impact of net total debt service on economic growth, the next variable added to the regression will be a result of subtracting total debt relief from total debt payment, and added alongside the variables suggested by (Solow, 1956), to form the regression below;

$$\frac{Y_{it+1}-Y_{it}}{Y_{it}} = \beta_0 + \beta_1 INV_{it} + \beta_2 LGDP_{io} + \beta_3 P_{it} + \beta_4 TBS_{it} + \beta_5 NTDS_{it} + \varepsilon_{it} \quad (3)$$

As brought forward by (Krugman, 1988), the negative impact of foreign debt on economic development is shown by the debt overhang hypothesis. (Were, 2001) And (Iyoha, 1999). when carrying out empirical investigations on Kenya and SSA respectively, use foreign debt to GDP

ratio to capture debt overhang hypothesis. I therefore added the foreign debt to GDP ratio to my next regression;

$$\frac{Y_{it+1} - Y_{it}}{Y_{it}} = \beta_0 + \beta_1 INV_{it} + \beta_2 LGDP_{it} + \beta_3 P_{it} + \beta_4 TBS_{it} + \beta_6 FDGDP_{it} + \varepsilon_{it} \quad (4)$$

The second negative impact of foreign debt on economic growth is the liquidity constraint hypothesis, which is captured by the crowding out effect, as proven by (Were, 2001), (Iqbal & Zahid, 1998), (Iyoha, 1999), and (Clements, Bhattacharya, & Nguyen, 2003), among others. To investigate crowding out effect, I use the debt service to export ratio variable, as previously used by (Iyoha, 1999) and (Were, 2001), to check its impact on economic growth. The regression used was;

$$\frac{Y_{it+1} - Y_{it}}{Y_{it}} = \beta_0 + \beta_1 INV_{it} + \beta_2 LGDP_{it} + \beta_3 P_{it} + \beta_4 TBS_{it} + \beta_7 DSERV_{it} + \varepsilon_{it} \quad (5)$$

Although debt overhang and crowding out effects may occur separately in some cases, this study will also carry out the impact of both crowding out and debt overhang on economic growth at the same time, by combining the debt service ratio variable and foreign debt to GDP ratio in the same regression;

$$\frac{Y_{it+1} - Y_{it}}{Y_{it}} = \beta_0 + \beta_1 INV_{it} + \beta_2 LGDP_{it} + \beta_3 P_{it} + \beta_4 TBS_{it} + \beta_7 DSERV_{it} + \beta_6 FDGDP_{it} + \varepsilon_{it} \quad (6)$$

To measure the combined effect of both debt service to export ratio for crowding out effect and net total debt service, both the variables are added to the regression, as suggested by (Ejigayehu., 2013);

$$\frac{Y_{it+1} - Y_{it}}{Y_{it}} = \beta_0 + \beta_1 INV_{it} + \beta_2 LGDP_{it} + \beta_3 P_{it} + \beta_4 TBS_{it} + \beta_7 DSERV_{it} + \beta_5 NTDS_{it} + \varepsilon_{it} \quad (7)$$

To get the impact of both the debt overhang effect and total debt service on economic growth, foreign debt to GNI ratio and net total debt service variable are added to the regression as suggested by (Ejigayehu., 2013), to form the model below;

$$\frac{Y_{it+1} - Y_{it}}{Y_{it}} = \beta_0 + \beta_1 INV_{it} + \beta_2 LGDP_{it} + \beta_3 P_{it} + \beta_4 TBS_{it} + \beta_5 NTDS_{it} + \beta_6 FDGDP_{it} + \varepsilon_{it} \quad (8)$$

Finally, the study will test the impact of all the variables, combined, to get the overall impact on economic growth, forming, the main econometric model of this research, as shown below;

$$\frac{Y_{it+1}-Y_{it}}{Y_{it}} = \beta_0 + \beta_1 INV_{it} + \beta_2 LGDP_{it} + \beta_3 P_{it} + \beta_4 TBS_{it} + \beta_7 DSERV_{it} + \beta_6 FDGDP_{it} + \beta_5 NTDS_{it} + \varepsilon_{it} \quad (9)$$

Where; -

$\frac{Y_{it+1}-Y_{it}}{Y_{it}}$ = Economic growth for country i between period t and $t+1$

β_0 = the intercept

INV_{it} = growth rate of investment for country a

$LGDP_{it}$ = log of initial GDP per capita.

P_{it} = population growth rate

TBS = Trade balance

$DSERV_{it}$ = debt service export ratio

$FDGDP_{it}$ = foreign debt to GNI ratio

$NTDS_{it}$ = net total debt service ratio

ε_{it} = error term

3.4 Variables chosen

Table 2: variables chosen for methodology

Variable	Justification.
Economic growth	It is the dependent variable and is represented by growth rate of real GDP per capita.
Growth rate of investment.	Investment is directly proportional to economic growth, according to the neo-classical growth model. Used by (Solow, 1956). It has a positive and direct effect on economic growth.
Log of real GDP per capita	(Barro R. , Determinants of economic growth: an cross-country

	empirical study, 1996) Uses it as an explanatory variable for his research and mentions that “the coefficient on the log of initial GDP has the interpretation of a conditional rate of convergence.” (Barro J. , 2003) mentions the convergence effect when he is carrying out empirical analysis of his research as poor economies grow faster per capita and tend to catch up to richer economies, therefore the use of log of initial GDP is used for Convergence hypothesis. (Ramséy, 1928) Mentions the convergence hypothesis in the neoclassical growth model along with (Solow, 1956).
Population growth rate.	(Barro R. , 1996) Uses it as a variable in his empirical study, mentioning that a growing population takes up extra investment of the economy due to the provision of capital for extra workers, therefore, he predicts that an increase in the population growth rate will have a negative impact on economic growth.
Trade balance	Trade balance is defined as the difference between export and import over a period of time. It is used by (Ejigayehu., 2013), alongside Solow growth model variables to check if it has any impact on economic growth
Debt service export ratio.	Used to measure crowding out effect. Used by (Were, 2001), when conducting an empirical analysis of the impact of external debt on the economic growth in Kenya.
Foreign debt to GDP ratio.	Used to test for debt overhang effect. (Bank, 2012) Use this variable as an indicator for external debt burden of developing countries.
Net total debt service ratio	It is calculated by subtracting annual debt relief from annual debt service. Used by (ElBadawi & Ndun'gu, 1996) as a direct channel through which indebtedness in sub Saharan Africa works against economic growth

Table 2 illustrates why each variable has been chosen and which previous studies it has been used in.

4 Results and analysis

4.1 Hausman specification test

Before carrying out the regressions, I had to determine which panel data estimation technique would be best suited, between the fixed effects model and the random effects model. Hausman test was used for the selection, as put forward by (Hausman, 1978). The results give a p value of 0.732 which means we fail to reject null hypothesis and the best estimation technique to carry out this regression is the random effects model. This shows that the findings can be generalized for the remaining sub Saharan African countries, besides the ten that have been chosen.

4.2 Model interpretation

Table 3 Impact of Solow growth models

Economic growth	Coefficient	Std. Error	P> z
LogGDP	-0.048	0.029	0.100
Investment growth rate	0.370	0.025	0.000
Population growth rate	-2.751	1.451	0.058
Trade balance	0.255	0.102	0.012
Constant	0.220	0.102	0.031

Table 3 illustrates panel data regression using variables suggested by Solow growth model which include investment growth rate, population growth rate, trade balance and the log of initial GDP to account for convergence theory.

The result from the first regression shows that investment growth, population growth and trade balance are all significant. Investment growth rate has a positive and significant impact on economic growth, while population growth has a negative but significant impact on economic growth, just as (Solow, 1956) stated in the Solow growth model and (Barro J. , 2003) stated in his research. A 1% increase in investment growth will cause economic growth by 0.36% while a 1% population growth will lead to a drop in economic growth by 2.75%. There is a statistically negative relationship between the log of GDP and economic growth, whereby a 1% increase in log of GDP will lead to a drop in economic growth by 0.048%. this result supports the Solow neoclassical growth model along with (Cass, 1965), who state that the per capita growth of a country is inversely related to the initial level of income a person earns, whereby, countries

having a lower level of initial per capita income grow at a greater rate than countries with a higher initial per capita income.

Table 4 Impact of debt service

Economic growth	Coefficient	Std. Error	P> z
Net Total debt service	-0.104	0.084	0.214
LogGDP	-0.045	0.029	0.130
Investment growth rate	0.367	0.025	0.000
Population growth rate	-2.56	1.460	0.079
Trade balance	0.268	0.102	0.009
constant	0.209	0.103	0.043

Table 4 illustrates an added variable of debt service to the variables suggested by Solow to show if debt forgiveness and grants provided by the creditor countries have any impact on economic growth

The additional variable that separates model 2 from model 1 is the net total debt service, to counter the direct impact of debt service on economic growth, (Ejigayehu., 2013). From the results, net total debt service is negatively correlated to economic growth, although it's insignificant. a 1% increase in debt service will bring down economic growth by 0.1%. The negative relationship is due to the fact that money outflow from a country's economy, will lead to a negative impact on economic growth. The addition of this variable doesn't affect the significance of population growth, investment growth or even trade balance from the previous model.

Table 5 Impact of debt service to export ratio

Economic growth	Coefficient	Std Error	P> z
Debt Service Export Ratio	-0.170	0.053	0.001
LogGDP	-0.062	0.029	0.033
Investment growth rate	0.355	0.025	0.00
Population growth rate	-1.231	1.505	0.414
Trade balance	0.278	0.100	0.006
Constant	0.247	0.100	0.014

This table tests the crowding out effect of foreign debt on economic growth by adding the debt service to export ratio variable to the regression.

Debt service to export ratio is added to this model to account for the crowding out effect on economic growth. Results show that the debt service to export ratio is highly significant and has a negative impact on the economic growth of a country. A 1% increase in the ratio will lead to a drop of the economic growth by 0.17%. This result, therefore, shows that African countries are using the money they receive from exports to service their accumulating debts instead of investing it in the economy for growth, which is clear proof of the crowding out effect. Although the rest of the variables remain significant, population growth rate becomes insignificant to economic growth with the addition of debt service to export ratio to the regression.

Table 6 Impact of foreign debt to GNI ratio

Economic growth	Coefficient	Std. Err.	P> z
Foreign debt to GNI ratio	-0.030	0.012	0.011
LogGDP	-0.041	0.029	0.151
Investment growth rate	0.359	0.025	0.00
Population growth rate	-2.393	1.444	0.097
Trade balance	0.232	0.101	0.022
Constant	0.216	0.101	0.033

Table 6 illustrates the impact of debt overhang on economic growth through the foreign debt to GNI ratio.

Foreign debt to GNI ratio is added to the regression to test the direct impact, if any, of debt overhang effect on economic growth. The results show that it is a significant variable with a negative impact on economic growth. A 1% in the FDGNI ratio would lead to a 0.03% drop in the economic growth rate. This shows that the accumulation of too much debt in the country's has led to a decrease of both public and private investment, and hence, economic growth. From the result of model 3, African countries selected were suffering from both the debt overhang and crowding out effect. With the addition of FDGNI ratio, population growth rate become significant and has a negative impact on economic growth. The rest of the variables are also significant to economic growth.

Table 7 Impact of both debt service to export ratio and foreign debt to GNI ratio

Economic growth	Coefficient	Std. Err.	P> z
Debt Service Export Ratio	-0.138	0.058	0.017
Foreign debt to GNI ratio	-0.020	0.013	0.137
LogGDP	-0.057	0.030	0.060
Investment growth rate	0.352	0.025	0.000
Population growth rate	-1.340	1.510	0.375
Trade balance	0.267	0.103	0.009
Constant	0.245	0.103	0.017

Table 7 shows the combined impact of both crowding effect and debt overhang effect on economic growth

This regression has two of the main variables, debt service to export ratio, and foreign debt to GNI ratio, which are able to answer the main question of this research, which is, does excess debt in a country impact its economic growth through both the debt overhang and crowding out effect with DSERV representing crowding out effect and FDGNI representing the debt overhang effect, the result shows that both have a negative impact on economic growth. A 1% increase in debt service to export ratio will cripple economic growth by 0.139% and a 1% increase in FDGNI ratio will bring down economic growth by 0.02%. Although both have a negative impact on economic growth, DSERV is significant, showing effects of crowding out in the selected countries, meanwhile, FDGNI ratio is calculated as insignificant, translating to the fact that the selected African countries have not experienced debt overhang in the past three decades.

In this model, both investment growth and trade balance remain significant, while population growth rate continues being insignificant. Population growth rate is significant to economic growth in both regression 1 and 2, but becomes insignificant when crowding out effect is measured by adding the DSERV variable.

Table 8 Impact of debt service ratio combined with total debt service

Economic growth	Coefficient	Std. Err.	P> z
Debt Service Export Ratio	-0.167	0.057	0.003
NTDS	-0.017	0.088	0.851
LogGDP	-0.062	0.030	0.038
Investment growth rate	0.356	0.025	0
Population growth rate	-1.233	1.508	0.414
Trade balance	0.280	0.101	0.006
Constant	0.245	0.102	0.016

Table 8 illustrates the impact of the addition of both debt service ratio and total debt service to check if crowding out effect incurs when debt grants and forgiveness are carried out by the creditor countries and the IMF and World Bank

To measure the direct impact of net total debt service and crowding effect together on economic growth, DSERV and NTDS variables are added to the regression. Debt service to export ratio has a statistically significant and negative impact on economic growth of a country. A 1% increase in the DSERV ratio causes a drop in economic growth by 0.18%. Although debt service also has a negative impact on economic growth, it is insignificant. The negative sign shows that debt relief carried out in the chosen countries doesn't have a significant effect on total debt amount reduction and therefore cripples economic growth. While trade balance and investment growth continue to be significant to economic growth, population growth still shows an insignificant effect on economic growth.

Table 9 Impact of Foreign debt to GNI ratio combined with total debt service

Economic growth	Coefficient	Std. Err.	P> z
Foreign debt to GNI ratio	-0.031	0.013	0.019
Net Total debt service	-0.043	0.088	0.623
LogGDP	-0.044	0.032	0.165
Investment growth rate	0.359	0.025	0.00
Population growth rate	-2.366	1.473	0.108
Trade balance	0.257	0.106	0.016
Constant	0.223	0.107	0.038

Table 9 illustrates the impact of whether debt grants and forgiveness provided by both creditors and IMF and World Bank and debt overhang have any combined impact on economic growth.

In this regression, the direct impact of both debt service and debt overhang on economic growth is measured by adding the NTDS and FDGNI ratio variables. While FDGNI shows both a significant and negative relationship with economic growth, accounting for the debt overhang effect, NTDS also shows negative impact on economic growth, although the relationship is weakly significant. A 1% increase in the FDGNI ratio will lead to a 0.03% decrease in economic growth, while a 1% increase in debt service annually will cripple economic growth by 0.04%. Both investment growth and trade balance are strongly significant, while population growth shows a weakly significant impact on economic growth.

Table 10 Main regression model; combination of all variables

Economic growth	Coefficient	Std. Err.	P> z
Debt Service Export Ratio	-0.139	0.060	0.021
Foreign debt to GNI ratio	-0.022	0.014	0.111
Net Total debt service	0.008	0.090	0.925
LogGDP	-0.062	0.034	0.068
Investment growth rate	0.351	0.025	0.000
Population growth rate	-1.455	1.532	0.342
Trade balance	0.291	0.109	0.007
Constant	0.265	0.112	0.018

Table 10 illustrates the effect of incorporation of all variables selected for the regression. Solow growth model variables, combined with debt service to check the impact of debt grants and forgiveness, foreign debt to GNI ratio to study if there is occurrence of debt overhang effect and debt service to export ratio to study if there is any occurrence of crowding out effect

This model includes all the variables used in the study, and can be regarded as the general model. While FDGNI, NTDS and population growth rate are insignificant, DSERV, Lgdp, trade balance and investment growth rate are strongly significant to economic growth. Since Debt service to export is statistically significant and has a negative relationship with economic growth, it is clear proof that crowding out effect has been occurring in the sub Saharan Africa for the past three decades. This evidence shows the negative impact of foreign debt on the economic growth of

Sub Saharan Africa. With a 10% increase in the debt service to export ratio, economic growth will decline by 1.4%.

Investment growth rate is strongly significant and has a positive impact on economic growth. A 10% increase in economic investment growth rate will boost the economy by 3.5%. IGDP for convergence effect is slightly significant on economic growth with a negative relationship, whereby, a 10% increase in IGDP will lead economic growth to drop by 0.62%. Trade balance, on the other hand, is strongly significant, with a positive impact on economic growth. A 10% increase in trade balance will lead to a 2.9% increase in economic growth.

Table 11 Summary of all the regression results

Explanatory Variable	MODEL							
	1	2	3	4	5	6	7	8
LogGDP	-0.048 (0.029)	-0.045 (0.029)	-0.062 (0.029)	-0.041 (0.029)	-0.057 (0.03)	-0.062 (0.03)	-0.044 (0.032)	-0.062 (0.03)
Investment growth rate	0.37 (0.025)	0.367 (0.025)	0.355 (0.025)	0.359 (0.029)	0.352 (0.025)	0.356 (0.025)	0.359 (0.025)	0.351 (0.025)
Population growth rate	-2.75 (1.45)	-2.56 (1.46)	-1.231 (1.505)	-2.39 (1.44)	-1.34 (1.510)	-1.233 (1.508)	-2.366 (1.473)	-1.455 (1.532)
Trade balance	0.255 (0.101)	0.268 (0.102)	0.278 (0.100)	0.232 (0.101)	0.267 (0.103)	0.28 (0.101)	0.257 (0.106)	0.291 (0.109)
Debt service to export ratio			-0.170 (0.053)		-0.138 (0.058)	-0.167 (0.057)		-0.139 (0.060)
Foreign debt to GNI ratio				-0.03 (0.012)	-0.02 (0.013)		-0.031 (0.013)	-0.022 (0.014)
Net total debt service		-0.104 (0.084)				-0.017 (0.088)		0.08 (0.090)

Within R2	44.25	44.58	46.11	45.79	46.69	46.13	45.94	46.93
between R2	52.67	52.01	60.06	53.66	58.02	59.70	52.68	57.13
overall R2	44.22	44.51	46.1	45.44	46.48	46.10	45.67	46.45
Number of observations	300	300	300	300	300	300	300	300

Table 11 shows a summary of all the regressions carried out for the eight different models to illustrate the various impacts of selected variables on economic growth

4.3 Analysis

Combined with the variables from Solow growth model, debt service to export ratio shows a significant and negative relationship with economic growth, while foreign debt to GNI ratio was found to be insignificant with economic growth. These results are consistent with the findings of (Ejigayehu., 2013), (Fosu, 1996) and (Rockerbie, 1994), among others. (Ejigayehu., 2013) found a negative and significant relationship between debt service to export ratio and economic growth supporting findings by (Rockerbie, 1994), and (Fosu, 1996) argues that the impact of debt overhang is not as important than the direct effect of debt hypothesis, where debt service payments reduce output growth by reducing productivity.

The econometric models also include log of initial GDP, trade balance, investment growth rate and population growth rate, from the neo-classical Solow growth model. While investment growth rate and trade balance are strongly significant and impact economic growth rate positively, population growth rate was found to be insignificant as opposed to (Solow, 1956) theory and (Ejigayehu., 2013) research. Net total debt service, was found to be insignificant with economic growth, showing that debt relief was negligible in the selected countries over the past three decades.

5 Conclusion

The central focus of this research was to study the long term impact of foreign debt on the economic growth of developing countries of Sub-Saharan Africa. 10 countries were chosen over a span of thirty years. This study has been carried out to research the relationship between foreign debt and economic growth, using both the measures of debt burden, which are the debt overhang effect and the crowding out effect. Debt overhang is measured by foreign debt to GNI ratio, while crowding out effect is measured by the debt service to exports ratio. According to previous researches done, either both effects were found to be present, or one of the effects, and some even found foreign debt to have a positive impact on economic growth. This research predicted the presence of both debt overhang and crowding out effect as a side effect of the heavy debt burdens sub-Saharan African countries have been shouldering.

Sub Saharan Africa's huge external debts can be traced to both internal and external factors. Some of the main internal causes include economic mismanagement, excessive budget deficits, and distorted trade policies, while external factors leading high foreign debt burdens include major global oil shocks between 1970 to 1989, deterioration of the terms of trade leading to balance of payments deficits, very high international interest rates, misaligned exchange rates, and liberal lending policies of international commercial banks. The failure of structural adjustment programs imposed by the IMF further deteriorated the conditions of Sub Saharan Africa countries and led to an increase in debt burden, instead of reducing it.

By combining the Solow growth model and (Sala-i-Martin, 1997) regression model, the results show that foreign debt leads to a drop in economic growth, instead of boosting it. The main channel through which deterioration of economic growth occurs is the crowding out effect. Most of the income countries are receiving from exports and the money they receive from foreign aid is used to service foreign debts instead of being injected in the economy to increase economic growth. Sub Saharan Africa countries are absorbed in a vicious circle, where economic growth is being sacrificed for repayment of external debt.

In contrast to some of the previous researches done, for example, (Were, 2001), this research doesn't find significant evidence supporting long term impact of foreign debt on economic growth through the debt overhang effect. This study also finds that debt relief countries are receiving is negligible and has no significant impact on boosting economic growth.

Solving Africa's debt problem should be a combined effort of all the parties included. In line with the suggestions from (Lekomola, 2010) and (Todaro M. , 1997), creditor countries should ease up their monetary policies, which have multiplied African countries debt amounts. Putting up a cap on real interest rates will also reduce amount of debt of the indebted countries. Creditors and well developed countries should also increase amount of imports from developing countries to boost the export program of Sub Saharan countries. This will create a big source of income for developing countries. Discrimination against developing countries' exports should be stopped along with trade barriers. Creditors should also consider debt payment rescheduling over longer periods of time, debt for equity swaps, conventional debt buy backs and debt forgiveness and grants.

Sub Saharan Africa countries should also make an effort on their part to try and reduce their debt burdens. One of the main improvements they need to make is to take up proper economic management, with sound economic policies. This will reduce waste and mismanagement of resources. Corruption levels in the governments should be targeted and there should be vast improvement in transparency levels. Governments should also commit themselves to liquidate debt stocks through prudent economic management.

References

- Abera, D. (2013). *The Effect of External Debt On Economic growth*. Sweden: Soderton University.
- Adegbit, E., & Ayadi, F. (2008). The impact of Nigeria's external debt on economic development. *International journal of emerging markets*, 285-301.
- Afxentiou, & Serletis, A. (1996). Foreign indebtedness in low and middle income developing countries. *Social and economic studies*, 135-159.
- Agénor, P.-R., & Montiel, P. J. (2008). *Development Macroeconomics. third edition*. Princeton University press.
- Allesina, A., & Tabellini, G. (1988). *External debt, capital flight and political risk*. Los Angeles: UCLA.
- Artadi, E. V., & Sala-i-Martin, X. (2003). *The Economic Tragedy Of The XXth century: growth in africa*. New York: Cambridge.
- Ayadi, F., & Ayadi, F. (2008). The impact of external debt on economic growth: a comparative study of Nigeria and South Africa. *Journal of sustainable development in Africa*, 234-264.
- Bank, W. (2012). *Global development finance 2012: external debt of developing countries*. World bank.
- Barro R.J. (1998, May 17). The IMF doesnt put out fires; it starts them. *Business week*.
- Barro, & Sala-i-Martin. (1992). Convergence. *Journal of political economy*, 223-251.
- Barro, J. (2003). Determinants of economic growth. *Annals of economics and finance*, 231-274.
- Barro, R. (1991). Economic Growth In A Cross-Section Of Countries. *The Quarterly Journal Of Economics*, 407-443.
- Barro, R. (1996). *Determinants of economic growth: an cross-country empirical study*. National Bureau of Economic Research.
- Barro, R. (1996). *Determinants of economic growth: an cross-country empirical study*. National Bureau of Economic Research.
- Barro, R., & Sala-i-Martin. (2004). *Economic growth*. London: MIT press,Cambridge.
- Barro, R., & Sala-i-Martin, X. (2004). *Economic growth*. London: MIT press,Cambridge.
- Bhatta, G. (2010). *An Assessment of the Impact of External Debt on Economic Growth of Nepal*. Nepal: Economic review.
- Borensztein, E. (1990). Debt overhang, credit rationing and investment. *Journal of development economics*, 315-335.
- Cass, D. (1965). Optimum growth in an aggregative model of capital accumulation. *The review of economic studies*, 233-240.

- Chowdhery, & Khorshed. (1994). A Structural Analysis of External Debt and Economic Growth; some evidence from selected countries in Asia and the Pacific. *Journal of applied economics*, 1121-1131.
- Chowdhury, A. (2001). *External debt and growth in developing countries: a sensitivity and causal analysis*. Helsinki: WIDER .
- Clements, Bhattacharya, & Nguyen, R. (2003). *External debt, public investment and growth in low income countries*. Washington D.C: IMF.
- Cohen, D. (1993). Low investment and large LCD debt in the 1980's. *Ameran Economic Association*, 437-449.
- Cunningham, R. T. (1993). The effects of debt burden on economic growth on heavily indebted nations. *Journal of economic development*, 115-126.
- Diaz-Alejandro. (1981). *In Economic stabilization in developing countries*. Washington.
- Dornbusch, R. (1988). *Brazilian Debt: A Requiem for Muddling Through*. UC Berkeley: Department of Economics, Institute for Business and Economic Research.
- Easterly, w., & Levine, R. (2001). Its not factor accumulation; stylized facts and growth models. *World bank economic review*, 177-219.
- Eaton. (1993). Sovereign debt: a primer. *world bank economic review*, 137-172.
- Ejigayehu., D. A. (2013). *The effect of external debt on Economic Growth: A panel data analysis on the relationship between external debt and economic growth*. Journal of the Department of Economics Sodertorn University.
- EIBadawi, & Ndun'gu, N. (1996). *Debt overhang and economic growth in sub-saharan Africa*. IMF/World Bank.
- Feldstain, M. (1995). The effect of marginal tax rates on taxable income. *The journal of political economy*, 551-572.
- Fosu, A. (1996). the impact of external debt on economic growth in sub-Saharan Africa. *journal of economic development*, 93-118.
- Hansen, H. (2001). *the impact of aid and external debt on growth and investment insights from cross country analysis*. Helsinki: WIDER.
- Hausman, J. (1978). Specification Tests in Econometrics. *Journal of the econometric society*, 1251-1271.
- Imori, G. (2015). The Impact of External Debt on Nigerian Economic Growth. *Archives of Business Research*, 69-80.
- Iqbal, & Zahid, G. (1998). Macroeconomic determinants of economic growth in Pakistan. *The Pakistan development review*, 125-148.

- Iyoha, M. (1999). *External debt and economic growth in sub-Saharan African countries: An econometric study*. Benin: university of Benin.
- Khan, & Kumar. (1997). Public and Private Investment and the Growth process in developing countries. *Oxford bulletin Of Economics and Statistics*, 69-88.
- Krugman. (1988). Financing vs forgiving a debt overhang. *Journal of developement economics*, 253-268.
- Krumm, K. (1985). *The External Debt of Sub-Saharan Africa. Origins, Magnitude, and Implications for Action*. Washington D.C: The world Bank.
- Lekomola, M. (2010). The African Debt Dilemma: An Overview of Magnitude, Causes, Effects and Policy Options. *Journal of American Science*, 63-69.
- Levine, & Renelt. (1992). A sensitivity analysis of cross-country growth regresion. *American Economic review*, 942-963.
- Levy, A., & Chowdhury, K. (1993). An integrative analysis of external debt, capital accumulation and production in Latin America, Asia PACific and sub-saharan Africa. *journal of Economics and finance*, 105-119.
- Mahdavi, S. (2004). shifts in the composition of government spending in response to external debt burdens. *world development*, 1139-1157.
- Mankiw, Romer, & Weil. (1992). A Contribution to the empiics of economic growth. *Quarterly Journal Of Economics*, 407-437.
- Matelis, A. (2014). *Effects of external financial debt on various economic sectors in Latin America*. Vilnius: ISM university of management and economics.
- Nakatani, P., & Herrera, R. (2007, June 1). the south has already repaid its external debt to the north: but the north denies its debt to the south. *Monthly review*.
- Okonkwo, C. S. (2012). *External Debt, Debt Burden And Economic Growth Nexus: Empirical Evidence And Policy Lessons From Selected West African States* . UK: University Of Nottingham.
- Oreyema, J. (2009). *Impact of external debt on economic growth in sub Saharan Africa: a panel data analysis*. Kampala: Makerere University.
- Oyedele, S. O., Emerah, A. A., & Ogege, S. (2013). External Debt, Debt Servicing and Poverty Reduction in Nigeria: An Empirical Analysis. *Journal of Economics and Sustainable Development* , 174-179.
- Patillo, C., Poirson, H., & Rici, L. A. (2011). External debt and growth. *Review of economics and institutions*.
- Patillo, C., Poirsson, H., & Antonia, L. (2011). External debt and growth. *Review of economics and institutions*, 2(3) 1-30.

- Patillo, Poirson, & Ricci. (2004). *What are the channels through which external debt affects growth?* . International Monetary Fund.
- Persson, J. (2013). *The Effect of External Debt On Economic Growth*. Flemingsberg: Södertörns högskola.
- Presbitero, A., & Panizza, U. (2012). *Public debt and economic growth: is there a causal effect*. Ancona: Money and finance research group.
- Ramsey, F. (1928). A methematical theory of saving. *Economic journal*, 543-559.
- Rockerbie, W. (1994). Did the Debt Crisis Cause the Investment Crisis? Further Evidence .*Journal of applied economics*, 731-738.
- Sachs. (1990). External debt, structural adjustments and economic growth. *International monetary and financil issuesfor the 1990s*, 45-55.
- Sala-i-Martin. (1997). I just ran two million regressions. *The American economic review*, 178-183.
- Sala-i-Martin, X. (1997). I just ran two million rgeressions. *The American Economic Review*, 178-183.
- Sala-i-Martin, X., & Subramanian, A. (2013, May). Addressing the natural resource curse: An illustration form Nigeria. *Journal Of African Economies*, 570-615.
- Sawada. (1994). Are heavily indebted countries solvent? tests of inter tempora borrowing constraints. *Journal Of Developement Economics*, 325-337.
- Schclarek, A. (2004). *Debt and Economic Growth in Developing and Industrial Countries*. sweden: Lund university.
- Serieux, J., & Sammy. (2001, August 18). THE DEBT SERVICE BURDEN AND GROWTH: EVIDENCE FROM LOW INCOME COUNTRIES. *United Nations university. WIDER paper*, pp. 1-22.
- Siddique, A. (1994). *The external debt problem of Sub-Saharan Africa: 1971-1990*. University of Western Australia.
- Solow, R. (1956). A contribution to the theory of economic growth. *Quarterly journal of economics*, 65-94.
- Stiglitz. (2000, April 14). What i learned at the world economic crisis. *The new republic*.
- Stiglitz, J. (2003, May 17). Dealing with debt; how to reform a global financial system. *Harvard international review*, pp. 54-59.
- Suma, D. F. (2007). *The external debt crisis and its impact on economic goth and investment in Sub Saharan Africa. A regional econometric approach of ECOWAS countries*. vienna: Doctoral thesis, WU Vienna University of Econmics and Business.

- Taghavi, M. (1992). debt, growth and inflation in large European economies: a vector auto-regression analysis. *Journal of evolutionary economics*, 159-173.
- Todaro, M. (1997). *Economic Development*. London: Longman Publishers.
- Todaro, M., & Smith, S. (2006). *Economic development*. Pearson Addison-Wesley Printing Press.
- Uzun, A., Karakoy, C., Kabadayi, B., & Emsen, O. S. (2012). The Impacts of External Debt on Economic Growth in Transition Economies. *Chinese Business Review*, 11(5), 491-499.
- Warner, A. (1992). Did the debt crisis cause the investment crisis? *Quarterly Journal of Economics*, 1161-1186.
- Warner, A. M. (1992). Did the debt crisis cause the investment crisis. *Quarterly journal of economics*, 1161-1168.
- Were, M. (2001). *Impact of external debt on economic growth in Kenya: an empirical assessment*. World institute for development economics (WIDER), United Nations University(UNU).
- Zaman, R., & Arslan, M. (2014). The Role of External Debt on Economic Growth: Evidence from Pakistan Economy. *Journal of Economics and Sustainable Development*, 5(24) 140-147.