ASHESI UNIVERSITY

AN EXAMINATION OF THE RELATIONSHIP BETWEEN PUBLIC DEBT AND
ECONOMIC GROWTH: A FOCUS ON GHANA.

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University in partial fulfilment of the requirement for the award of Bachelor of Science degree in
Business Administration

B.Sc. Business Administration

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DECLARATION

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

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Date: May 11, 2020

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by Ashesi University College.

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Date: May 11, 2020

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ACCRONYMS

MDRI …………… Multilateral Debt Relief Initiative

HIPC……………… Heavily Indebted Poor Countries

OLS………………... Ordinary Least Squares

GDP………………… Gross Domestic Product

IMF…………………. International Monetary Fund

VECM………………. Vector Error Correction Model

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ABSTRACT

Ghana's public debt has been rising for the entire post-independence era. The only time Ghana's public debt fell was when there were international interventions in the form of debt relief such as the Multilateral Debt Relief Initiative (MDRI) in the 1990s. Despite the continues rise in public debt, economic growth has been moderate. In fact, according to the IMF, although Ghana's debt was at an all-time high in August 2019, Ghana was also one of the four fastest growing economies in Africa in October 2019.

This study investigated whether the surging public debt levels in Ghana is a credible challenge to growth similar to what occurred in Latin America and European countries. The study used an OLS regression model, the discrete threshold regression technique, and the Granger causality test to analyze the relationship between Ghana's rising debt and its economic growth using data from 1970 to 2018. The discrete threshold regression technique was used to investigate nonlinear relationships between the variables.

The study revealed that debt granger-causes growth (unidirectional). At debt-to-GDP ratio below 25 percent, growth is negative (-1.348), but becomes insignificant at debt threshold between 25 percent and 45 percent. However, when debt is above 45 percent of GDP, growth is significantly positive. Between 45 and 60 percent of GDP, growth is 3.21 percent, whiles when debt supersedes 60 percent of GDP growth is significantly around 6 percent.

The study recommends prudent borrowing above 45 percent of GDP by the Ghanaian government to invest in productive sectors of the economy whiles ramping up efforts in formalizing the huge informal sector to spur growth.

BACKGROUND AND PROBLEM STATEMENT

African countries have experienced rapid increase in their public debt in recent years (Bernadini and Fomi, 2017). This requires much attention and knowledge for informed policy decisions. These debt surges are as a result of several situations. One reason is that Governments often lack the required funds to finance major investments projects, finance tax cuts, or even bail out financially distressed banks. The Increased public expenditure due to the urgency in which governments must tackle these problems has led to dramatic increases in demand for leverage which has resulted in high levels of accumulated public debt in recent times (Ncanywa & Masoga, 2018; Kouretas & Vlamis, 2010).

However, there is no consensus in the economics literature on the exact causal effect of debt on economic growth. For example, scholars such as Reinhart and Rogoff (2009), Shahor (2018), Mankiw (2014), Balassone (2011), and Barrow (1999) have found a negative relationship between the variables, greatly attributing the relationship to the crowding out of investment capital via public debt servicing.

Others such as Reinhart and Rogoff (2010, 2011) and Anning et al. (2016) found that the relationship is positive between public debt levels and economic growth. Contrary to the aforementioned findings, several other scholars found that there is no relationship at all between the variables (Cohen, 1993; Panizza and Presbitero, 2013).

More interestingly, some scholars have suggested that there is a 'conditional relationship' between the variables. For example, Yener, Stengos, and Yazgan (2017) argue that the macroeconomic fundamentals of a country are key in analyzing the relationship between public debt and economic growth. The authors explain that when the fundamentals are weak, there is no

need for policymakers to think about any debt policy that could spur growth because there is no such policy. But when the economic fundamentals are strong, then it is feasible to think of optimal debt policies that could spur growth. Similarly, Anning et al (2016) concludes that debt has no negative consequences on the Ghanaian economy, but the benefits of debt can only be realized when borrowed funds are put into productive use rather than diverted into private pockets.

SOME DEBT CRISIS IN THE WORLD

The Latin American Crisis

In the 1980s, large shocks of oil prices led to current account deficits in most Latin American countries, notably Argentina, Peru, Chile, Brazil, Mexico, and Nicaragua. In comparison, the price shocks created current account surpluses in the oil exporting countries. As a fundamental investment principle, US banks, encouraged by the Bush administration, served as intermediaries in receiving large deposits from the gainers of the shocks and lending to the Latin American countries (Sims & Romero, 2013). By the end of 1970, outstanding debts for Latin American countries to foreign financial institutions totaled US$29 billion, but this amount skyrocketed by five folds to US$159 billion eight years later in 1978. By 1982, Latin American nations were owing an estimated amount of US$327 billion.

Following the recession of world economies in 1981, Europe and America tightened monetary policy. Commercial banks, in response, shortened repayment periods and charged higher interest rates on debts. As a result of the precautionary measures by the banks, Latin American countries soon found themselves with unsustainable debt burdens (Devlin and Ffrench-Davis, 1995).

Shockingly, by mid-1982, the Mexican government announced its decision to default on its debts repayment which stood at US$80 billion. Immediately after the Mexican government's announcement of debt defaults, other countries quickly followed suit in defaulting their outstanding debts, whiles sixteen other Latin American countries rescheduled their debt repayments (Sims & Romero, 2013).

In response to the defaulting news, banks ceased lending to Latin American countries and the consequences became fatal. As countries suffered financial turbulence, Latin American countries' last resort was borrowing, so lending cuts plunged most of them in severe recessions because they lacked access to investment capital to spur growth (FDIC, 1997).

Consequentially, output per head in 1990 was nine percent lower than in 1980, inflation was in double digits for most countries and even three to five digits for Brazil, Argentina, Nicaragua, and Peru. Unemployment levels surged and investment per worker massively fell (Felix,1990).

EUROZONE DEBT CRISIS

The Eurozone debt crisis, which was mainly triggered by the 2008/09 global financial crash, created a lot of macroeconomic imbalances within member countries. These imbalances were mainly current account deficits and rising external debt (Storm & Naastepad, 2015). Following the European monetary and financial integration, people got more access to credit inflows from other countries which boosted demand domestically during the pre-crisis period.

Eventually, in 2008, private and public debts had reached unsustainable levels across the Euro area with Greece becoming the biggest victim. Fueled by the debt overhang problem, the

Euro area eventually entered a recession in 2008. By 2014, Greece, Spain, Portugal, and Italy's

GDP fell by 26.3, 5.7, 6.8, and 9.6 percent respectively (Storm & Naastepad, 2015).

Although, the debt crisis was, fueled by the monetary integration which saw the use of

the Euro as a common currency, different policy implementations across the union led to varying

outcomes in different countries.

According to Richard (2013), the Greece crisis erupted from policymakers' goal of

providing production-compromising social welfare and many other populist policies for citizens.

Just like their European counterparts-in-debt, they socialized private debts by granting bailouts to

financially distressed banks. Greek government increased its defense spending (due to the

conflict with Turkey over Cyprus) and increased public sector employment. Coupled with

revenue deficits, the increased spending led to budget deficits and the Greek government resorted

to borrowing to sustain its policies, hence the genesis of the debt crisis (Dimitraki and

Kartsaklas, 2017).

Prior to the crisis in 2008/09, the Greek economy after its reconstruction in the 1950s,

became the fastest growing economy within the EU-15 and the OECD countries until the 1980s

(Dimitraki & Kartsaklas, 2017). For the same period, the Greek debt to GDP ratio was around 17

percent in the1960s; 20 percent in the 1970s; 37 percent in the 1980s; 104 percent in the 1990s

whilst it reached 157 percent of GDP in 2012 (IMF, 2012). As depicted in Figure 1.0 below, the

debt ratio kept rising even after the crisis and reached about 180 percent of GDP in 2018. This

continuous rise in debt levels compelled EU countries to grant Greece a debt relief of US$300

billion until 2032 where they will reassess the debt situation (CNBC, 2018).

Also, a look at Greece's economic growth shows poor growth during the period of its debt crisis (which coincided with the global financial crisis in 2008/09) until 2014 when it started recovering, as reported by CNBC (2019).

Figure 1.0: Greece's Debt-GDP Ratio, GDP growth, Revenue (%GDP), and Expenditure (%GDP) from 1980-2018
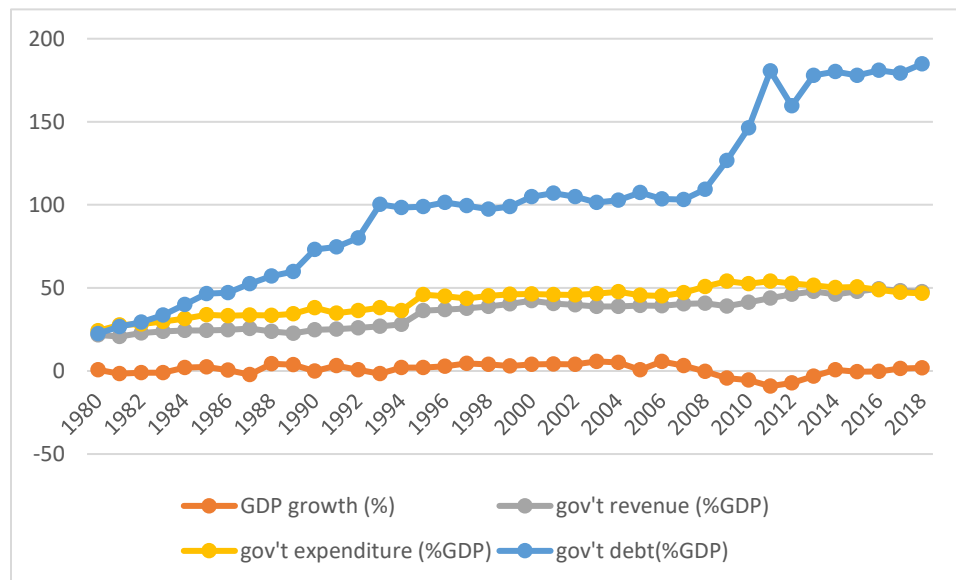
Source: IMF's World Economic Outlook

In 2008/09, the Portuguese economy was hit by the global financial crisis (Reis, 2013). Whiles massive capital inflows for both the private and public sector (in the early 2000s) led to rising debt levels, the Portuguese economy experienced almost no growth, productivity was stagnated, and unemployment was at a record high (Blanchard, 2007).

Surprisingly, a look at the government expenditure and revenue during the pre and in-crisis period (from 1990 to 2010) showed no significant variation – they remained constant till the post crisis period in 2011 where they both slightly moved in opposite directions. Revenue

slightly appreciated whiles expenditure fell slightly as well. This observation could be a result of

fiscal tightening policies aimed at salvaging the economy from the crisis by authorities.

As suggested by the literature above, the economy experienced almost no growth during

the pre-crisis and post-crisis period, and this is depicted by the movement of the GDP per capita

growth along zero percent or below in *Figure 1.1*. However, the debt-to-GDP ratio kept creeping

upwards despite a lack of its reflection in the growth of the economy until 2011 where it began

stabilizing due to policy interventions by European and international financial institutions

(CNBC, 2018).

Figure 1.1: Portugal's government revenue, expenditure, GDP per capita growth, and debt

[percent of GDP] for 1990-2018
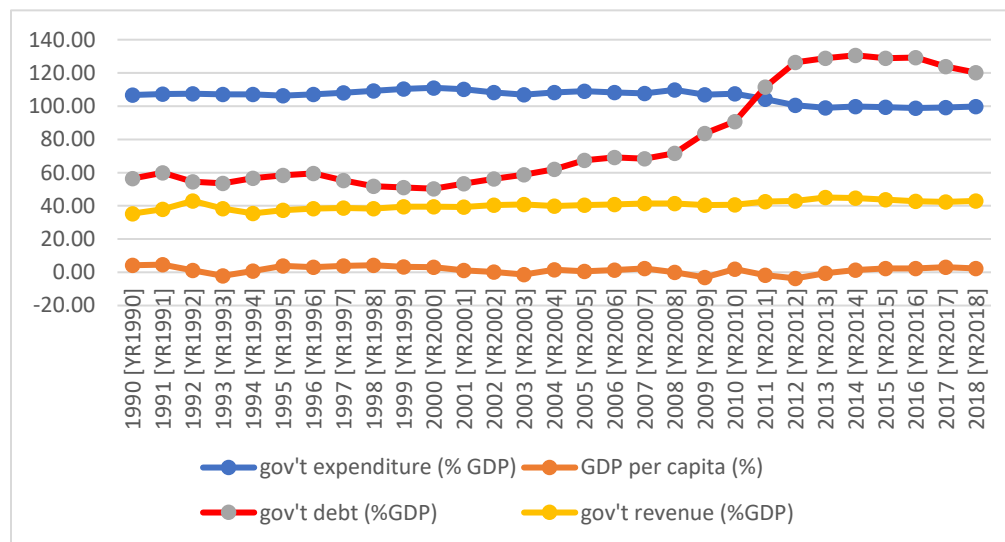
Source: IMF's World Economic Outlook

The high levels of sovereign debts (As in *Figure 1.1* and *1.0* for Portugal and Greece

respectively) of those countries increased the default risk on lenders and investors and they

responded by demanding for higher bond yields (Schambaugh, 2012). As a result, troubled

eurozone countries like Portugal had fewer capital inflows from lenders during and briefly after

the crisis and more importantly, the increased bond yields even led to increased debt-GDP ratio

given growth (the denominator in the ratio) fell and interest rates surged. The interest rate surge

led to limited access to capital inflows to drive investment and growth, hence the beginning of

recessions in the euro area.

1.3 GHANA DEBT PROBLEM AND THE HIPC INITIATIVE

Ghana's debt problem has its roots in the 1960s, even before debt crisis became common

(Harrigan & Younger, 2000). Although at a lower level, Ghana's first debt crisis erupted in

1980s after her outstanding debt amounted to US$577 million with a debt to GDP ratio of 30.2

percent. As the timing of the crisis may suggest, the oil price shocks in the late 1980s, high rises

in international cost of borrowing, as well as the recession in the Europe and Latin America

preceded the crisis (Osei & Quartey, 2001).

Between the 1970s and the 1990s, total debt rose by over 300% due to borrowings for

projects that produced little export earnings and low returns (de Bruijn & Rehbein,2011). But

despite incredible surges in debt levels in the early 1990s, by the end of the 1990s, debt levels

became sustainable, falling from 56.57 per cent in 1988 to 36.95 in 1990 (Osei & Quartey,

2001). The sustainability of debt in 1990 was not coincidental because Ghana was benefitting

from the Multilateral Debt Relief Initiative (MDRI) which allowed it to get total debt relief from

debts owed to monetary institutions such the IMF, IDA, and the World Bank (Anning et al.,

2016). This debt relief allowed the country to step up its borrowing demands to finance

infrastructure projects and eventually debt levels rose again eight years later and declared

unsustainable by the world bank in 1999 (de Bruijn & Rehbein,2011).

The increased debt levels were also partly motivated by the IMF's Economic Recovery

Program (ERP). The ERP sought to ensure improvements in debt repayments, restoring

international creditworthiness, and attracting inflows of foreign capital to boost infrastructure

and growth (Osei & Quartey, 2001). Not until the emergence of the ERP could Ghana borrow as

much because its creditworthiness was low on the international stage.

de Bruijn and Rehbein (2011) explained that the unsustainability of debt was down to a

number of issues: (i) falling commodity prices, (ii) High fiscal debt, and (iii) heavy dependence

on external flows. Since cocoa and gold were the main source of foreign exchange, downward

price shocks in the early 1980s and 1999 led to reduced foreign exchange earnings and Ghana

had to resort to borrowing to survive. On high fiscal deficits, the government's continuous

spending on unproductive sectors of the economy, coupled with the collapse of the cedi in

1999/2000 pulled the trigger (de Bruijn & Rehbein,2011).

As can be seen in Figure 1.1, between the 1980s and the 1990s (the period associated

with debt crisis), economic growth was highly volatile for Ghana as growth fell mostly below the

zero per cent line. However, after the debt relief via the HIPC initiative, growth stabilized, and

the country is now on track as one of the fastest growing economies in the world despite the

rising debt levels (Naidoo and Wallace, 2019).

Figure 1.2: *Ghana's government revenue, expenditure, GDP per capita growth, and debt*

[percent of GDP] for 1980-2018
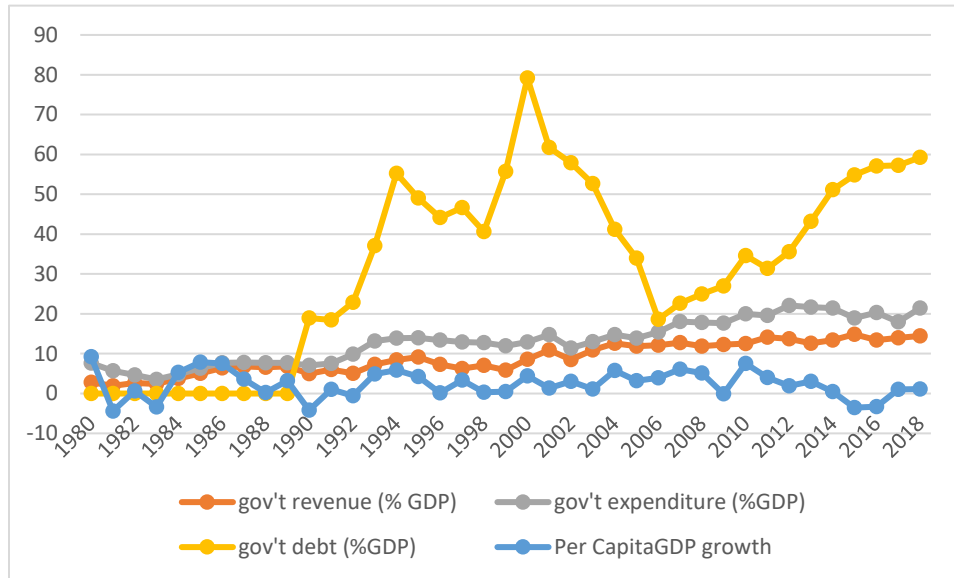
Source: IMF's World Economic Outlook and World Development Indicators

After taking over a country with highly unsustainable debt levels in 2001 (refer to Figure

1.2), President Kufour's government argued that it could do little in terms of fighting poverty

and boosting economic development (Osei & Quartey, 2001). As a result, Ghana requested to

join the Heavily Indebted Poor Countries (HIPC) initiative by the IMF and the World bank (IMF,

2004). The purpose was to obtain debt relief from creditor countries such as the US, Japan,

Britain and Germany, and to secure low interest loans to invest in productive sectors to spur her

stagnant economic growth.

Under the HIPC initiative, in 2002, Ghana received debt relief amounting to US$275.2

million. In 2003, the country enjoyed debt relief of US$290.8 million and US$318.3 million as at

November 2004 (BoG, 2005).

WAS THE HIPC PROGRAM NECESSARY FOR GHANA?

The donor countries agreed to the HIPC initiative because they intended it to be used in a way that will benefit the poor (Osei & Quartey, 2001). The resources made available after debt relief could boost economic growth by reducing domestic borrowings. This reduction in domestic borrowings makes available funds that firms and individuals alike can borrow to finance investment projects, hence, to spur economic growth. But is debt relief enough to spur growth or prevent further debt crisis? The evidence is clear— despite the debt relief through the HIPC initiative, Ghana's debt has not stopped surging upwards (refer to Figure 1.4). Similarly, the surging debt levels has not stopped the economy from steadily growing along.

Before the HIPC program, in 1998, the poverty headcount ratio at US$2 a day (PPP) was 63 percent and 39 percent for US$1.25 a day. However, in 2009 (5 years after the HIPC initiative), the poverty headcount ratio for US$2 and US$1.25 a day fell from 63 percent and 39 percent to 54 percent and 28.5 percent respectively (de Bruijn & Rehbein,2011). Infant mortality rate had dropped from 68 per cent to 47 percent within the same period too. At this point, it is fair to argue that the HIPC initiative achieved the donors' aim of reducing poverty, but could Ghana have achieved that poverty milestone without the HIPC initiative?

As Osei and Quartey (2001) argue, Ghana could not have achieved that reduction in poverty rate within five years without making rigorous structural adjustment in its policies. First of all, about 80 percent of the total workforce are in the informal sector which makes it difficult for government to raise enough tax revenue for development projects. The constrained tax base has always made it a difficult task for the government to finance its budget, thereby resorting to

borrowing. The government could have taken measures towards formalizing the informal sector

to broaden the tax base to increase its revenue generation potential.

Also, Ghana depended heavily on cocoa and gold exports and the development of those

sectors could help boost its foreign exchange earnings (Osei and Quartey, 2001). The

establishment of factories to process the raw cocoa and gold to secondary goods for export will

generate more foreign exchange than the raw materials export. Although taking an initiative to

establish processing plants for those products would have required some sort of borrowing at that

time, the future cashflows from those investments would have helped reduced the country's

consistent borrowing.

In summary, Ghana benefitted from the HIPC initiative because it made available

resources to fight against poverty and invest in other sectors of the economy such as healthcare.

However, it did not stop the country from future borrowing as debt levels surged in the post-

HIPC period. Ghana's revenue potential has always been overshadowed by a relatively higher

expenditure due to the ineffective tax collection mechanisms that has seen 80 percent in the

informal sector pay less or no tax.

THE TAX COLLECTION PROBLEM IN GHANA

Despite all the interventions by international financial institutions, the country's debt

stock has been on the rise (refer to *Figure 1.2*) and at an all-time high—GHS200 billion

(US$1=GHS5.57) as at August 2019 (Dogbevi, 2019) and GHS173 billion at the end of 2018

(Finance Ministry, 2018); and the IMF is already warning the country could be heading towards

another bailout, citing poor domestic revenue mobilization and off-budget spending as the main

reasons (Kessie, 2019). Indeed, the revenue mobilization problem is obvious in *Figure 1.2*

above, as revenue at all times (from 1980 to 2018) has been below total government expenditure

and the resulting gap is filled by borrowed funds.

As Ghana's population expanded, pressure intensified for increased government

expenditure. Demands from the public for social intervention programs, infrastructure, and

welfare programs are all currently rising in Ghana, but the proportion of the Ghanaian labor force

in the formal sector is 20 percent (Business and Financial Times, 2019). Ghana has an extremely

narrow tax net with the formal sector paying both direct and indirect taxes but with close to 100

percent of the informal sector paying no direct taxes at all (Armah, 2016). According to Business

and Financial Times (2019), the informal sector is worth GHS81 billion and grows 2.6 percent

annually, which is more than a quarter of Ghana's 2018 total GDP (GHS300.5 billion). The

difficulty for government to get taxes from the large informal sector makes it almost inevitable to

minimize the levels of state borrowing. So, it is not any surprise that the IMF predicts the

country could be heading for another bailout if it does not step up its revenue collection

mechanisms because the country has a relatively lower revenue base.

Unlike some of the eurozone and Latin American countries such as Greece, Brazil,

Argentina, and Portugal that witnessed poor growth at a time of increasing debt, Ghana grew 8.1

percent in 2017, and 6.1 percent in 2018 despite rising debt levels, according to Bloomberg

(2019). This leads to the question whether debt is a credible challenge to Ghana's economic

growth as the literature suggests in the case of the European and Latin American countries. As

Reinhart and Rogoff (2010) found, debt is negatively related to growth at a debt to GDP level

above 90 per cent. Below 90 per cent, the relationship positive. Therefore, the aim of this paper

is to investigate if Ghana's rising public debt is a credible challenge to its economic growth using

time series data from 1980 to 2018. It will also examine the level of debt at which growth is steady or subdued in the West African nation.

OBJECTIVES OF STUDY

- To investigate why Ghana's debt keep rising

- To determine whether Ghana's rising indebtedness is a credible threat to its growth?

- To investigate whether growth levels influence the level of government indebtedness in Ghana or vice versa.

- To provide a recommendation to policymakers on how to choose on debt-growth policies

RESEARCH QUESTIONS

- Is Ghana's rising debt a credible challenge to its economic growth?

- Do growth levels influence the level of government indebtedness in Ghana or vice versa.

- What is the optimal level of debt for sustainable growth?

RELEVANCE AND JUSTIFICATION FOR THE STUDY

As indicated above, governments and policymakers need to comprehensively understand the pros and cons of government borrowing to make informed decisions on debt levels to maintain an uncompromised growth level. Multinational corporations also need to have a vivid idea of what high levels of public debt means, especially to the exchange rate and inflation in assessing potential host nations before making investment decisions. But the most important benefit of this study is that it seeks to identify debt thresholds and the behavior of economic

growth at each threshold. This is what makes this topic relevant to all these stakeholders and

their decision making in areas where public debt plays a crucial role.

CHAPTER 2: LITERATURE REVIEW

THEORETICAL LITERATURE

Following analysis of the neo-classical theory on production, Cunningham (1993) explained the relationship between GDP growth and the burden of public debt. He explained that the debt burden affects the productivity of labor and accumulation of capital. The neo-classical model posits that output (GDP growth) is a function of three factors: labor, capital, and technology. Shah and Pervin (2012) and Cunningham (1993) included the debt burden in the model to allow for the quantification of the effect of public debt on Economic growth. They found out that external debt stock has no relationship with growth, but it is rather the external debt servicing that is negatively related with economic growth. This could be the result of the disinvestment that public debt servicing comes with because external debt servicing ends up crowding out capital that could have been used to invest in certain areas of the economy to spur growth. Holding a similar view, Sachs and Williamson (1986) conclude that when indebted countries pay their debts or service them then real resources are transferred from private sector to public sector. It is important to note that it is not external debt servicing alone that is crowding out private capital but also internal debts too. This is established in Diamond (1965) when he examined the role of debt using the neoclassical theory. He concluded that internal debt results in a reduction in capital stock because it substitutes government debt for physical capital. In effect, both internal and external debts lead to the crowding out of capital. However, traditional neoclassical models predict that developing countries have limited capital stock levels at their initial stages of development and improved capital mobility (in the form of external debt) will spur economic growth (Chowdhury, 2001) if the borrowed funds are put into productive use

(Burnside & Dollar, 2000). This brings into the equation the competency and incorruptibility of governments and policymakers with respect to the use of borrowed funds.

One of the widely used theories in analyzing growth is the Ricardian equivalence theory—proposed by David Ricardo (1817). The theory describes the role of debt in economic growth in the classical growth model. According to his theory, whenever government borrows, it must repay this borrowing by raising taxes. As a result, the high taxation will disincentivize investment in the economy, hence a subdued growth potential. Feldstein (1986) corroborates the Ricardian equivalence by positing that governments need to impose taxes on private sector to finance debt obligations. This leads to the "problem of debt overhang" which asserts that if there is a probability that a country's future debt will be more than its repayment ability then anticipated costs of debt-servicing can suppress investment (Krugman, 1988). When people anticipate a rise in debt service in the future, they are more likely to defer spending and save towards a high-tax future. This results in sinking the returns on investment and leading to reduction in economic growth (Akram, 2015).

The Classical view only favors the supply side of the economy and advocates for less government involvement in economic activities. Highly critical and dismissive of the Classical debt theory was the Keynesian theory of public debt. Keynes (1982) argued that consistent imbalanced budgets and increasing public debt never subdued the financial stability of countries as Classical economists claimed. However, the Keynesians believed governments should be allowed to incur debt as much as they can to boost consumption and increase effective demand in the economy. The increased demand via consumption-driven borrowing should have the same effect on growth just as investment-driven borrowing (Keynes, 1982). The increased demand as

a result of increased spending will encourage firms to increase production, unemployment, and investment to meet growing demand.

Putting the Classical and the Keynesian theories together, Elmendorf and Mankiw (1999) proposed the "conventional view of public debt." They argued output is demand-driven in the short run excessive public spending or debt positively influence income levels, aggregate demand and output levels—exactly the Keynesian argument. However, in the long run, things are different if the Ricardian equivalence holds not. Elmendorf and Mankiw argued that public savings are reduced due to budget deficits and that decease cannot be fully compensated by increased private savings. Consequently, the national savings will decrease, investment levels will fall, and growth becomes subdued.

EMPIRICAL LITERATURE

Reinhart and Rogoff (2010,2011) were the first to extensively examine the relationship between public debt and economic growth in the twenty-first century. In Reinhart and Rogoff (2009), they concluded that public debt has a growth-reducing effect on an economy. However, in Reinhart and Rogoff (2010), further discovery by the authors suggests that the relationship between the variables is nonlinear; it is a convex curve. Below a debt to GDP ratio threshold of ninety percent (90 percent), debt has a growth enhancing effects on an economy; whiles above the 90% threshold, debt has a growth reducing effect on an economy.

However, the findings of Reinhart and Rogoff (2010) were criticized by Herndon et al. (2013) and they found that there were certain coding errors and selective exclusion of available data and if these issues were corrected, GDP growth at debt/GDP ratios over 90 per cent is not significantly different from when debt/GDP ratios are lower. The existence of GDP/debt thresholds above or below which there is a certain growth response has been re-echoed by other researchers, although with differing views on the exact level of such thresholds. For example,

Cecchetti et al. (2011) found that once public debt moves above a debt/GDP threshold level of 85 per cent, economic growth begins to fall whiles Blayy (2006) even finds a much lower threshold, 21 percent. Blavy concludes that the optimal debt/GDP is 21 per cent and that doubling public debt would reduce productivity growth by about 1.5 per cent. This quite converges at Baseerit (2005)'s submission that the earlier stage of borrowing is usually marked with enhanced growth resulting from modest debt levels whiles the later stage of borrowing leads to subdued growth. This is quite understandable because the later stage of borrowing is more likely to be characterized by the debt overhang which potentially crowds out investment for the time being in anticipation of tax increments.

So far, the paper has looked at general conclusions of the literature on the debt-growth nexus. But the variables exhibit different forms of relationship in different parts of the world.

For example, Amartya Sen studied the variables in Latin America and Asia in 2007 and concluded that due to severe debt overhang effect; economic growth in Latin American economies slows down. However, debt overhang does not exist in Asian countries (Sen et al., 2007). Cohen (1993) also showed that in highly indebted developing countries, level of external debt does not have any role in subduing growth. Meanwhile, Panizza and Prebistero (2013) concludes that there is little evidence in advanced economies that public debt will depress economic growth. However, in the case of developing countries a significant fraction of debt is external, so the debt overhang argument needs greater attention there.

THE LITERATURE ON GHANA

Anning et al. (2018) examined the variables by running Ordinary Least Squares (OLS) regression using time series data spanning from 1990 to 2015 (26 years). They focused on external debt, domestic debt, investment spending, imports, inflation, government expenditure and national savings as their independent variables.

In effect, they regressed economic growth on external and internal debt to find the relationship between the variables. They found that there is a negative relationship between debt (domestic and external) and growth in the economy of Ghana. Just as the previous researchers discussed earlier, Anning et al. (2018) concluded that there are certain debt/GDP thresholds for sustainable and steady growth, but they failed to show it in their submission. As Burnside and Dollar (2000) proposed, Anning et al. (2018) also concluded that the benefits of debt could be maximized if borrowed funds are put into productive uses and corruption is minimized.

Another study on Ghana by Owusu-Nantwi and Erickson (2016) using time series data from 1980 to 2012 on seven macroeconomic variables yielded an interesting result. They found out, without reference to a particular debt/GDP threshold, that the empirical results reveal a positive and significant long-run relationship between economic growth and public debt. However, in the short run, there is a bidirectional relationship between public debt and economic growth.

Matuka and Asafo (2018) employed Johansen co-integration test and the Vector Error Correction Model (VECM) to analyze the relationship between the variables using time series data from 1970 to 2017. They concluded that external debt stimulates growth both in the long run and the short run in Ghana and that, external debt servicing crowds out investment capital. The negative debt servicing effect, as explained by the authors, is due to the commitment of receipts to the payment of debts instead of investing in growth enhancing sectors of the economy. The authors reiterated the existence of a nonlinear relationship between the variables but also failed to specify the debt thresholds and the associated growth patterns.

CHAPTER 3: METHODOLOGY

CHOICE AND JUSTIFICATION OF THE EMPIRICAL MODEL

Throughout the summary of the literature, majority of studies revealed various relationships between public debt and economic growth and the various thresholds at which those relationships exist. To tackle the numerous problems that public debt comes with, knowledge of the relationship between the variables is not enough to make informed decisions debt levels.

The debt/GDP threshold is necessary to inform policymakers on the level of debt needed for sustainable growth. This study aims at filling the debt/GDP threshold gap left by the literature on the Ghanaian economy.

Following Matuka and Asafo (2018) and Anning et al. (2016), the study adopted an Ordinary Least Squares regression model with capital investment, government expenditure, public debt, inflation rate, and exports being a function of GDP growth. The OLS model is specified as follows:

$$gdP = B_o + B_1 Inv + B_2 \text{Inf} + B_3 gx + B_4 xp + B_5 dr + \varepsilon$$

Where;

gdp……………… real GDP growth

Inv…………………… capital investment (percent of GDP)

Inf …………………… inflation

Gx…………………………. government expenditure (percent of GDP)

Xp…………………………. Exports of goods and services (percent of GDP)

dr…………………………. total debt (percent of GDP)

captures the unobserved factors affecting economic growth

The variables included in the model were informed by Robert Barro (1996's) study on a panel of 100 countries from 1960 to 1990 to examine factors that influenced growth. Growth rate of real per capita GDP was found to be positively related with maintenance of the rule of law, lower government spending, higher life expectancy, higher investment levels, advanced level of democracy, low inflation rate, and trade openness.

Kavoussi (1994) also concluded, albeit not surprising, that increased growth levels are highly and significantly related with increased levels of export.

Due to missing data on life expectancy, democracy, rule of law, and informed by the OLS model deployed by Anning et al. (2016) and Matuka and Asafo (2018), the study limited the independent variables to debt-GDP ratio, exports, government expenditure, inflation, and capital investment. Due to serial correlation, trade openness and imports were dropped from the model.

FREQUENCY, RANGE AND SOURCES OF DATA

The GDP growth rate (annual) and annual inflation rate from 1970 to 2018 for Ghana were retrieved from the World bank's World Development Indicators (WDI) whiles total debt (percent of GDP), exports of goods and services (percent of GDP), capital investment (percent of GDP) and government expenditure (percent of GDP) for the same period were retrieved from the IMF's World Economic Outlook (WEO). Missing data for an indicator in a particular year(s) from one of these two sources will be filled using data from the other source since these are credible and guarantees the reliability of the data.

DESCRIPTION OF DATA PREPARATION, COLLATION AND ANALYSIS PROCEDURES

As used by Reinhart and Rogoff (2010), debt-to-GDP ratio at different levels will be used to examine how growth reacts to those debt thresholds in the Ghanaian economy. The study will look at four debt-GDP thresholds as in Reinhart and Rogoff (2010) as follows: years when

debt/GDP ratio was below 25 percent, years when debt/GDP ratio was between 25 and 45 percent, years when the ratio was between 45 and 60 per cent, and years when it was above the 60 percent threshold.

Data will be subjected to the Breusch-Pagan test of heteroscedasticity to ensure the data meets the unconditional variance assumption for a Multiple Linear Regression model. If data is heteroskedastic, the Robust Least Squares regression approach would be adopted to neutralize the effect of skewness on the values of the coefficients.

To avoid serial correlation, the study carefully used only "percent of GDP" values for the independent variables.

CHAPTER 4: DATA ANALYSIS

4.1 Empirical Method and Results

Following the multiple regression module specified above, regressing the GDP growth

(gdp) on the regressors using the least squares method returned spurious results as in Table

1.0 for obvious reasons. The zero-conditional variance assumption of homoskedasticity has

been violated by the data and this is confirmed by the significance of the F-statistic of the

Breusch-Pagan-Godfrey test for heteroskedasticity in Table 1.8.

However, to ensure the robustness of the data so that outliers and little variations in

the data do not affect the outcome of the parameters (coefficients), this study opted for the

Robust Least Squares MM-Regression which controls for outliers or little variations in

both the regressors and the regressand. Once again, the paper seeks to investigate the

association between Ghana's public debt and economic growth. So, the robust least

squares regression seeks to quantify the effect of debt (dr) on GDP growth (gdp).

From Table 1.6, the coefficient of the debt (dr) is not significant and a subsequent

Wald's test restricting the debt co-efficient to zero turned highly insignificant as evidenced

by the insignificance of the Wald Test's t-statistic and F-statistic in Table 1.9, thereby

failing to reject the null hypothesis that the coefficient of the debt rate is zero.

As Reinhart and Rogoff (2012, 2013) discovered, there could be a nonlinear

relationship between the variables, thereby making the use of linear regression models

inappropriate in capturing the partial effect of the debt rate on growth.

To test for non-linear relationship between public debt and economic growth, the

study opted for a discrete threshold regression with up to four intervals. The results (in

Table 1.5) showed that indeed the relationship between debt and growth is nonlinear and exhibit a normal u-shaped curve, surprisingly opposite of Reinhart and Rogoff (2012's) conclusion of a u-shaped relationship. It is worth noting that the sample size of the data is important in establishing a relationship. Reinhart and Rogoff used data for over 200 countries in their study.

The threshold regression results indicate that when debt is less than 25 percent of GDP, a 10 percent increase in debt leads to 13.15% reduction in economic growth. However, when debt is between 25 percent and 45 percent of GDP, there appears no relationship between the variables. The no-relationship is judged from the insignificance of the t-statistic at 95% confidence level for that debt range. The study further subjected the coefficient of the growth between 25 and 45 percent debt-GDP ratio to the Wald Test to confirm if indeed there is no relationship at that range of debt between the variables. The Wald test statistics (in Table 1.7) all proved insignificant, leading to a failure to reject the null hypothesis that the growth at debt levels between 25 and 45 percent of GDP is zero. So, we conclude that there is no relationship between growth and debt at debt levels between 25 and 45 percent of GDP.

The third debt threshold is between 45 percent and 60 percent of GDP where growth is positive and highly significant. Also, when debt surpasses 60 percent of GDP, economic growth seems to be responding positively stronger.

4.1.1 The Granger Causality Test of the module.

The Granger test for causality is a hypothesis test used to establish whether a particular time series data is useful in predicting the values of another variable. In this study, we test whether economic growth granger-causes the level of public debt, public debt granger-causes growth, or there exists a bidirectional relationship between the variables.

The Granger test results for one lag of the data in Figure 1.1 shows that public debt

significantly granger-causes growth, whiles growth is insignificant in predicting debt.

Further testing of the data at two, three, and four lags indicates that debt levels significantly

influence growth in the long run up to three years (refer to Table 1.2 and 1.3). The fourth lag

proved insignificant for both directions of causation (refer to Table 1.4).

CHAPTER 5: CONCLUSION AND RECOMMENDATION

This study examined the relationship between Ghana's public debt and economic growth using time series data from 1970 to 2018. The study employed Robust Least Squares regression, Discrete threshold regression, and the Granger Test of causality to investigate the relationship between the variables in a linear regression model.

The Granger test results for one lag of the data in Table 1.1 shows that public debt significantly granger-causes growth, whiles growth is insignificant in predicting debt. Further testing of the data at two, three, and four lags indicates that debt levels significantly influence growth in the long run up to three years (refer to Table 1.2, 1.3, 1.4).

In short, public debt causes economic growth, but economic growth does not cause debt. This is understandable because there is evidence of increased borrowing in times of higher economic growth in Ghana. A good example is the remarkable performance of Ghana's growth in the last three years (2017 - 2019) and the corresponding remarkable increase in borrowing by the government in that period (World bank, 2019; Bloomberg, 2020). Part of the justification for this could be the large informal sector suffocating the government of tax revenue even in times of growth. Growth includes the informal sector, but government revenue does not necessarily increase with growth in an economy where the informal sector dominates, hence government's continuous demand for borrowing even in times of remarkable growth.

A look at the Robust Least Squares regression shows that public debt is insignificant in explaining economic growth. Attention must be paid to the fact that Least Squares regressors are linear in the parameters and hence will not be useful in estimating

coefficients with non-linear relationships. This prompted the use of discrete threshold regression analysis to estimate the relationship at different debt thresholds.

From the threshold regression analysis, at debt-to-GDP ratio below 25 percent, growth is negative (-1.348). Growth is insignificant at debt threshold between 25 percent and 45 percent. However, when debt is above 45 percent of GDP, growth is significantly positive. Between 45 and 60 percent of GDP, growth is 3.21 percent, whiles when debt supersedes 60 percent of GDP growth is significantly around 6 percent.

Considering the nature of the thresholds exhibited by the data, the data assumes a normal u-shape pattern—it exhibits a negative relationship at debt levels below 25 percent of GDP, attains a minimum point at debts levels between 25 and 45 percent of GDP, and then begins to rise thereafter. So, the Ghanaian case is the opposite of inverted u-shape propositions by researchers such as Reinhart and Rogoff (2010, 2011).

The nature of the non-linear relationship could be attributed to the revenue expenditure gap discussed in chapter 2 of this study. Given that the government strives to meet the rising needs of Ghanaians using inadequate internally generated funds, it must resort to borrowing to meet the needs of the Ghanaian people and to invest in the economy to spur growth. This means that low levels of debt could be insufficient in meeting the demands of Ghanaians while at same time investing in key sectors of the economy to spur growth, hence the negative relationship at lower levels of debt (below 25 percent). But higher debt levels mean more funds to meet the needs of Ghanaians and invest to spur growth, hence the positive relationship at higher debt levels (above 45 percent).

Developing countries lack investment capital at their initial stages of growth (Chowdhury, 2001), and Ghana is not an exception. To inject enough investment capital

into the economy to spur growth, the study recommends that government keeps its debt

level well above 45 percent of GDP. But as Burnside and Dollar (2006) suggest, borrowing

is only prudent with minimal corruption levels and identifying and investing the borrowed

funds in the growth enhancing sectors of the economy to spur growth. The huge informal

sector also cripples governments efforts to raise tax revenue for investment spending. So,

the study recommends that government initiate policies to formalize, at least, parts of the

informal sector to boost revenue generation, going forward.

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Tables

Table 1.0: OLS regression Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.048034	0.026780	-1.793604	0.0799
INV	-0.026679	0.131146	-0.20343	0.8398
XP	0.113592	0.092628	1.226322	0.2268
GX	0.057580	0.314801	0.182909	0.8557
DR	-0.001094	0.048780	-0.02243	0.9822
C	2.473721	4.028376	0.614074	0.5424
R-squared	0.227248			
Adjusted R-squared	0.137393			
F-statistic	2.529050			
Prob (F-statistic)	0.043009			

Source: World Bank's WDIs (2020)

Table 1.1: Pairwise Granger Causality Test (1 lag)

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause DEBT	48	0.15323	0.6973
DEBT does not Granger Cause GDP		4.09816	0.0489

Source: World Bank's WDIs (2020), IMF's WEOs (2020)

Table 1.2: Pairwise Granger Causality Tests (2 lags)

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause DEBT	47	0.40940	0.6667

DEBT does not Granger Cause GDP		4.54341	0.0164

Source: World Bank's WDIs (2020), IMF's WEOs (2020)

Table 1.3: Pairwise Granger Causality Tests (3 lags)

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause DEBT	46	0.73668	0.5365
DEBT does not Granger Cause GDP		2.96916	0.0435

Source: World Bank's WDIs (2020), IMF's WEOs (2020)

Table 1.4: Pairwise Granger Causality Tests (4 lags)

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause DEBT	45	0.47809	0.7515
DEBT does not Granger Cause GDP		1.90079	0.1315

Source: World Bank's WDIs (2020), IMF's WEOs (2020)

Table 1.5: Discrete Threshold Regression Output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
	DR < 25.22294 -- 7 obs			
GDP	-1.314617	0.566673	-2.319887	0.0254
	25.22294 <= DR < 44.49114 -- 23 obs			
GDP	-0.177239	0.282173	-0.628122	0.5334
	44.49114 <= DR < 57.869999 -- 12 obs			
GDP	3.214704	0.523526	6.140481	0.0000
	57.869999 <= DR -- 7 obs			
GDP	5.984984	0.720861	8.302555	0.0000
	Non-Threshold Variables			
GX	1.132205	0.332472	3.405414	0.0015
XP	0.244415	0.169524	1.441774	0.0070
INF	0.175363	0.042451	4.130986	0.0002
INV	0.637302	0.244611	2.605365	0.0127
R-squared	0.781549	Mean dependent var		40.74551

Source: World Bank's WDIs (2020), IMF's WEOs (2020)

Table 1.6: Robust Least Squares Regression output

Variable	Coefficient	Std. Error	z-Statistic	Prob.	R-squared
INF	-0.060565	0.017241	-3.512787	0.0004	0.496970
INV	-0.179410	0.088504	-2.027148	0.0426	
XP	0.140325	0.062302	2.252352	0.0243	
GX	0.57641	0.125330	4.59918	0.0000	
DR	-0.007304	0.030083	-0.242809	0.8082	

Source: World Bank's WDIs (2020), IMF's WEOs (2020)

Table 1.7: Wald Test of Coefficient Restriction

Test Statistic	Value	df	Probability
t-statistic	-0.628122	41	0.5334
F-statistic	0.394537	(1, 41)	0.5334
Chi-square	0.394537	1	0.5299

Null Hypothesis: C(2)=0

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2) -0.177239		0.282173

Restrictions are linear in coefficients.

Source: World Bank's WDIs (2020), IMF's WEOs (2020)

Table 1.8: Output for Breuch-Pagan-Godfrey Test for heteroskedasticity

Null hypothesis: Homoskedasticity

F-statistic	1.235249	Prob. F (5,43)		0.0094
Obs*R-squared	6.154111	Prob. Chi-Square (5)		0.02915
Scaled explained SS	14.99431	Prob. Chi-Square (5)		0.0104

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	21.45362	37.53761	0.571523	0.5706
XP	0.020659	0.863139	0.023935	0.9810
GX	3.423303	2.933413	1.167003	0.2496
INF	-0.121854	0.249549	-0.488299	0.6278

INV	-1.774395	1.222057	-1.451974	0.1538
DR	-0.242543	0.454544	-0.533597	0.5964
F-statistic	11.235249			
Prob (F- statistic)	0.009396			

Source: World Bank's WDIs (2020), IMF's WEOs (2020)

Table 1.9: Wald Test of Coefficient Restriction

Test Statistic	Value	df	Probability
t-statistic	-0.628122	41	0.5334
F-statistic	0.394537	(1, 41)	0.5334
Chi-square	0.394537	1	0.5299

Null Hypothesis: C(2) = 0

Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-0.177239	0.282173

Restrictions are linear in coefficients.

Source: World Bank's WDIs (2020), IMF's WEOs (2020)