

**EXTERNAL DEBT, INVESTMENT AND ECONOMIC GROWTH IN
GHANA**

BY

JOSEPH KWADWO TUFFOUR

Metric No. PG/SSC0816554

**UNIVERSITY OF BENIN
BENIN CITY, NIGERIA**

**A THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS
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DECLARATION

This thesis is produced by me, the under-signed, in the Department of Economics and Statistics and submitted to the School of Postgraduate Studies, University of Benin, Benin City, Nigeria in partial fulfillment of the requirement for the degree of Doctor of Philosophy in Economics. I declare that, no portion of this thesis has been previously submitted for another degree of this University or other institution of learning.

By

Joseph Kwadwo Tuffour

.....

Signature

.....

Date

CERTIFICATION

We certify that, this study was carried out by Mr. Joseph Kwadwo Tuffour in the Department of Economics and Statistics, University of Benin, Nigeria. It is in partial fulfillment of the requirement for the award of Doctor of Philosophy (Ph.D) degree in Economics.

Dr. Thompson O. Ekanem

.....

(Chief Supervisor)

.....

Date

Dr. Dickson Oriakhi

.....

(Co-supervisor)

.....

Date

Dr. Dickson Oriakhi

(Head of Department)

.....

Signature

.....

Date

DEDICATION

This thesis is dedicated to my lovely wife, Mercy Kyerewaa Tuffour and my children: Josephine Nana Abena Tuffour and Aaron Kofi Tuffour. My thanks go to my caring mother Veronica Akyeamaa, who suffered and struggled to cater for my education.

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ABSTRACT

The broad objective of this study is to empirically estimate the influence of external debt on economic growth and investment in Ghana. The specific objectives are to determine the: impact of external debt on GDP growth, the threshold level at which external debt becomes burdensome and the possible growth loss of exceeding external debt threshold and lastly to determine whether or not external debt crowds out investment. A macroeconomic framework of economic growth was developed with linkages to investment and external debt. This served as the methodological basis. The econometric model specifications entail equations explaining output and investment. The research used time series data over the period 1970 – 2009. Non-linear Least Squares and Two Stage Least Square estimation methods were used. In addition, summary statistics and graphical approaches were applied.

A non-linear relationship between external debt and output growth was established. The external debt threshold was estimated to be 46.2 percent, supporting the external debt Laffer curve hypothesis. The positive contribution of external debt (at lower levels up to the threshold) supports the notion that, a certain minimum requirement of external debt is necessary to support the growth process. On the other hand, beyond the threshold level of external debt accumulation, the impact of external debt on economic growth begins to fall.

The threshold level suggests that, Ghana encounters growth rate problems at a moderate external debt to GDP ratio. The research also reveals a cumulative economic growth loss of 12.28 percentage points (indicating the growth loss when the estimated external debt threshold is exceeded). This leads to an annual average growth loss of 0.31 percentage points, showing how high growth would have been if the external debt to GDP ratio had stayed at 46.2 percent. The research further shows that, beyond the threshold level, the positive impact of foreign debt on growth would begin to fall until the external debt to GDP ratio reaches 92

percent. Any foreign debt acquired further than the 92 percent of GDP would actually reduce output growth. In addition, the research unravels the existence of the debt overhang problem. This occurs in two ways through: crowding out effect on private investment, constraining public sector liquidity as well as discouraging private investment. Also, it was noted that, the accelerator effect applies in Ghana for the study period.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

One of the problems that low income countries including Sub-Saharan African (SSA) countries faces is high public external debt. This has been accumulated over the years partly due to both domestic and external factors. The debt situation has resulted in difficulties and problems associated with external debt acquisition, accumulation and repayment with their long term impact on capital for economic growth. Consequently, for the past three decades, mobilising domestic resources for economic development has been raised and received attention in developing countries. In this context, many developing countries including Ghana have placed emphasis on fiscal policy (particularly enhancing the tax system). The aim of this is to ensure financial stability and promote economic growth. In this perspective, taxation has been one of the major tools used to strengthen domestic resource mobilisation. This has culminated in ‘search for ways and means of expanding the tax base and also strengthening tax administration’ (Atta-Mills, 2002).

It has been postulated that, high levels of external debt and interest payment hinder the ability to grow, to achieve both domestic and world-wide development aspirations such as the Millennium Development Goals (MDGs), Poverty Reduction, etc (Osei, 1995). This is on the basis that, high debt service absorbs and diverts hitherto economic resources from public spending on infrastructural and human capital development.

Observably, even after the current Highly Indebted Poor Countries (HIPC) initiative, Ghana is seen to have started accumulating new external debt. This is occurring after the debt levels

were reduced to ‘acceptable’ sustainable levels (under HIPC initiative conditions). The aim of relieving countries’ resources was to enhance their economic growth. Contrary to this, economic growth is not accelerating as expected. This raises an important issue on – how has external debt impacted on output growth? An appropriate answer would offer laudable debt management strategy for Ghana.

The external debt level even after HIPC initiative completion point of Ghana was US\$ 2,177.24 million in 2006. It increased to US\$ 5,007.89 million in 2009. Now it is estimated to be about US\$ 6 billion (in April 2011) with debt service payments (US\$ 166.73 and US\$ 292.92 million in 2006 and 2009 respectively). This unfortunately does not signify relief from the problems of indebtedness. The structures of most SSA economies such as Ghana are weak, largely agricultural base while there is wide-spread poverty (Osei, 1995; Osei and Quartey, 2005).

The structural weaknesses that confront developing countries such as Ghana include, inability to diversify exports base (from the traditional exports of gold, diamond, cocoa, crude oil, coffee, timber, etc) to a more manufactured goods exports base. For instance, in Ghana the non-traditional exports contributed 20% of export earnings in 2009 (ISSER, 2010). The diversification of exports base is to ensure that, SSA countries like Ghana adjust to the changing demands of the world and deteriorating world market conditions against raw materials. These and other elements constrain many African countries from achieving high rates of economic growth and improved poverty reduction. Among the frequently quoted causes are the huge external debt and its related repayment problems.

1.2 Problem Statement

In the early 1980s, the International Monetary Fund (IMF) and the World Bank (WB) collaborated and supported many low income countries to implement Structural Adjustment Programme (SAP). These policies were to recover such economies from economic decline. One of the targets of the SAP was to reduce the debt burden to sustainable levels for those countries. A reduction of debt service would enhance public investment. Generally, the SAP has generated mixed results, as some initial improving outcomes worsened later in Ghana. On external debt, the question that arises is what has been the debt situation and impact on output of such countries that implemented SAP? There have been some studies on Ghana and those in which Ghana was included on the issues of external debt and economic growth. However, the impact of external debt on investment and economic growth has not been explicitly examined together by previous studies on Ghana, to the best of my knowledge.

Another recent international effort after SAP to assist low income countries to reduce debt, foster growth and reduce poverty is the HIPC initiative. Ever since the HIPC and Enhanced HIPC initiatives were launched by the IMF and the WB in 1996 and 1999 respectively, Ghana (qualified and joined in 2001) and other developing countries have received both bilateral and multilateral debt relief. This initiative is aimed at freeing resources through debt cancellation, rescheduling, swap, forgiveness, etc, both on bilateral and multilateral fronts. The extent of debt reduction and the corresponding effect on output merit analysis to ascertain the initiative's effectiveness.

Due to the high debt burden that low income countries were facing, the initiatives aimed at drastically reducing these external debt burdens with the purpose of enhancing economic growth and minimise poverty (MOFEP, 2009). This would free resources for investment. For

the number of years that these initiatives have been in existence, to what extent has debt relief recipient countries translated the 'new' resources into tangible investment and growth with higher standards of living? The problem is, what impact has external debt had on economic growth and investment, and how significant has the level of indebtedness influenced the drive to 'rapid and sustained growth' in Ghana? This problem needs to be studied as total indebtedness has started to rise gradually.

Also, for external indebtedness not to have any negative effect on economic growth, countries are required to maintain an acceptable level of external debt (also known as optimal external debt threshold). This optimal external debt stock defined as the level of external debt threshold below which the problems of debt overhang and crowding out effects do not apply. Such level of debt threshold level must be country specific and this is not known for Ghana. This is a problem that requires investigation. This research will fill this gap as well.

This notwithstanding, Ghana as a low income country, with a certain level of access to international financial markets, the external debt issue becomes significant because the influence of external debt on investment and economic growth in low income countries may differ across countries within this income group. Moreover, the mechanism through which external debt influences growth may also differ among countries. External debt and growth theory has shown that, excessive debt hinders capital formation and private investment growth, known as crowding out effect. Thus, through what channel does external debt influence output? How effective is the crowding out effect on Ghana? Specific country-study would be important, and this warrants a research on these issues on Ghana. This research considers whether such an external debt threshold point exists. It also examines the growth impact if the Ghanaian economy surpasses such a level. In specific terms, the study examines

the existence of foreign debt threshold and the growth loss of exceeding external debt threshold. This research is motivated by the recent upsurge in external debt even after the implementation of HIPC initiative in Ghana.

In summary, the gap that this research strives to fill is the specific impact of external debt on investment and economic growth in Ghana. This would entail whether external debt has a positive or negative effect on economic growth, the statistical level of debt threshold, the existence of debt overhang hypothesis and crowding out effects on investment in Ghana. This would be done by answering the following research questions:

- i. What is the impact of external debt on economic growth?
- ii. At what threshold would external debt accumulation tend to impact negatively on economic growth?
- iii. What has been the impact of external debt on investment?

1.3 Objectives of the Study

The broad aim of this study is to empirically estimate the impact of external debt on investment and economic growth in Ghana. The objectives are to:

- a. Determine the effect of external debt on economic growth,
- b. Determine the threshold level of debt at which external debt becomes burdensome and the possible growth loss of exceeding external debt threshold, and
- c. Determine whether or not external debt crowds out investment.

These objectives would highlight the significance of attracting external financial assistance towards enhancing economic growth. Also, they would provide economic intuition and understanding of the debt situation in Ghana so as to offer adequate and long-lasting external

debt management policies. Generally, this research is to explore in detail the implication of the external debt of Ghana for rapid and sustained economic growth. These make the study justifiable in various ways.

1.4 Justification of the Study

The accumulation of external debt over the years has raised concerns about their repayment abilities and attendant problems (Ajayi, 1991; Edo, 2002; Obadan, 2004; Caner *et al.*, 2010). The problem has not been eradicated and thus, literature as a matter of importance would continue to increase, purposely to update knowledge on the debt problem, to further investigate certain inadequate researched issues or understand new areas. It is in line with this that the study considers the problem, from the perspective of Ghana. This serves as an in-depth country study since most of the studies have been undertaken for groups of countries, (examples of such cross-country studies are stated above and in the literature review), which can only give general results. It is argued that ‘...debt thresholds are importantly country-specific and as such ... merit further sensitivity analysis’ (Reinhard and Rogoff, 2010, pp. 24).

The debt situation of Ghana has been studied in the past (Osei, 1995; Amoateng and Amoako-Adu, 1996; Elbadawe *et al.*, 1997; Iyoha, 1999; Fosu, 1996, 1999, 2008, Caner *et al.*, 2010). But most of these studies considered the impact of debt on the economy from the perspective of panel, Granger causality tests, simulation and descriptive analyses, of which Ghana was among some of the group of countries studied. However, the current trends of effective public sector debt management policies require the use of empirical evidence-based information, which this research provides.

The other justifications of the research are grouped into: theoretical, methodological and empirical results. These are to provide new knowledge from the perspective of Ghana. The justifications for the research are built around the gaps identified:

- i. Theoretical evidence from literature suggests a non-linear relationship between external debt and economic growth. For Ghana's case, we provide a theoretical structure illustrating how external debt influences economic growth within a production process framework. Also related to this, a Ghana specific GDP and external debt related macroeconomic linkages are developed.
- ii. Different methods have been used to estimate thresholds. However, for this research, quadratic method is employed to determine the threshold level. The quadratic method is superior since there is no pre-determined regime restriction and no large bootstrap test such as in the Histogram, Hansen's and TAR methods. These models arbitrarily set a range over which the search for the optimal debt threshold level is considered, unlike the quadratic approach.
- iii. Empirically, the study offers insight into the aftermath of the most recent and world-wide debt relief (HIPC) initiative that Ghana benefited. The empirical results to be obtained are expected to be better to previous studies as this research would take into consideration and use data after the most current debt relief initiative of the country. Previous studies have not included a major policy change that has occurred since year 2001. The contribution of this research is to analyse what impact the HIPC initiative has had on Ghana, from 2001 to 2009.

There are inadequate studies of the dynamics of external debt in Ghana, which leave some issues inadequately researched. One of these is the level of debt accumulation that hampers growth – threshold effect. There are studies on groups of countries (regional groupings) but no such study on the issue of threshold effect on Ghana. Previous studies did not estimate the possible threshold level of external debt. This research is also justified as it would serve as the first to provide statistical threshold level of external debt for Ghana. The merits of this gap when filled rest on the fact that, it would serve as a directive to policy-makers. It would also help to manage external debt and serves as a platform for action so as to avoid debt distress.

Moreover, literature on external debt abounds, but most of the studies have been undertaken on cross sectional and group of countries basis (Chowdhury, 1994; UNDP, 2004; UNCTAD, 2008; Presbitero, 2008; Caner *et al.*, 2010). For Africa, it has been on Sub-Saharan Africa (Lyakurwa, 1990; Amoateng and Amoaku-Adu, 1996; Iyoha, 1999; Anyanwu and Erhijapkor, 2005; Fosu, 1996, 1999, 2008, 2010), with minimal attention and concentration on individual country studies (Edo, 2002 for Nigeria and Morocco; Osei, 1995, Frimpong and Oteng-Abayie, 2003 for Ghana; Ayadi and Ayadi, 2008 for Nigeria and South Africa; Mbire, 1997 for Uganda; Were, 2001 for Kenya). Such studies are useful for identifying commonalities but are unable to identify country-specific factors. This makes country comparison difficult as the debt problem varies among groups of countries as well as countries within a particular group. This research tries to fill this gap by providing new evidence on Ghana. On the whole, the debt problem presents different facets to different countries (Edo, 2002). It is therefore important to

establish a better understanding of the effects of external indebtedness on growth through an in-depth analysis of the situation on individual countries. This would offer synopsis of the lessons and experiences from a particular country.

However, previous studies on the relationship between economic growth and external debt have been inconclusive as some suggest negative effects (Savvides, 1992; Afxentiou, 1993; Fosu, 1999; Karagol, 1999, 2002) while others indicate no effect of debt on growth (Bulow and Rogoff, 1990; Warner, 1992; Cohen, 1993; Afxentiou and Serletis, 1996). Such a problem hampers any generalisation of the relationship. This therefore, merits that a country case study is important and serves as a better solution. This is one of the gaps that this study fills.

This research has the ultimate aim of providing evidence-based policy and results-oriented recommendations for future growth process. The empirical results to be obtained are justifiably value-added and better, since after HIPC initiative implementation, what will happen with respect to external debt situation in the country has not been empirically examined to the best of my ability. These together with the objectives offer a basis for some hypotheses to be tested.

1.5 Hypotheses

In line with the stated objectives of the study as outlined in Sub-section 1.3, there can be a number of hypotheses that can be tested. From the overview of the history of Ghana and the literature review, the following null hypotheses are tested:

- i. External debt has significant negative effect on economic growth;
- ii. Ghana suffers significant growth loss from external debt accumulation; and

- iii. External debt and debt servicing crowds out investment.

The above hypotheses serve as a foundation to define the scope of the study.

1.6 Scope of the Study

The purpose of this research is to examine the implications of external debt on Ghana's investment and growth efforts. This is with a view to offer a better understanding of the causes of debt and its interrelationship with other vital growth-enhancing economic variables. The research spans across various policy frameworks of which Ghana has benefited, participated and/or is implementing. The scope of the study is limited to earlier stated objectives and is undertaken for the 1970 – 2009 period using annual data.

1.7 Contributions of the Study

The study has made contribution to knowledge in several ways:

1. The research uncovers a non-linear effect of external debt on real GDP growth. It is now known that, external debt does not positively contribute to economic growth all the time.
2. One of the striking and informative results obtained is the moderate external debt threshold. This is based on the results that, there is a non-linear effect of external debt on economic growth. In this respect, government can acquire external debt up to an appropriate percentage of GDP which would enhance economic growth.
3. The optimal external debt to GDP ratio of Ghana is estimated to be 46.2. This is the threshold that Ghana can maintain to obtain the maximum benefit from external debt accumulation, given the study period.

4. In addition, the research has created the awareness that, over an extended period, there is an average annual growth loss of 0.31 percentage points, all things being equal. This is based on a cumulative growth loss of 12.28 percentage points over the study period. In order to avoid such amount of growth loss, care should be taken to minimise foreign debt accumulation up to the threshold level.
5. Moreover, the research has indicated that, any foreign debt acquired further than 92 percent of GDP would actually have negative effect on output growth. This is the external debt–GDP ratio which has high tendency to initiate external debt crisis.
6. The research observed the existence of both crowding out and debt overhang effects. This indicates that, high external debt servicing reduces available export earnings to undertake investment projects which have major impact on economic growth. Debt overhang exists through its crowding out effect on private investment as well as its strong effect through depressing public investment by constraining finances. Also, it is revealed that, the huge debt and debt service raise future tax expectation and discourages the private sector from undertaking investment projects.
7. The results obtained lend support for the implementation of appropriate policies to deal with ‘near’ existence of debt trap. In respect of the moderate external debt threshold, policy-makers need to strengthen policies regarding the uses of foreign loans for public investments. Also, such policies should target sectors of the economy that have greater positive link and relationship with the private sector. These policies should be directed in two ways: those that pertain to stemming external debt accumulation and those relating to crowding out.

8. The research develops a new early warning system for external debt crisis. The results provide noticeable warning signals for policy-makers to act before external debt levels reach a critical value that heralds the arrival of full-blown external debt problem.

1.8 Organisation of the Study

The outline of the study is structured as follows: Chapter one contains the statement of the problem, research questions, objectives, justification of the study, scope of the study, contributions of the study and organisation of the study. Chapter two deals with the background, provides an overview and description of external debt issues in Ghana while Chapter three contains the literature review: theoretical, methodological and empirical review. The theoretical framework and models specification are in Chapter four. Data analysis and presentation of results are in Chapter five and Chapter six contains summary of findings, recommendations and conclusion.

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CHAPTER TWO

BACKGROUND OF THE STUDY

2.1 Introduction

To be able to better analyse the impact of external debt in the Ghanaian economy, it is important to describe the background information with respect to how the structure of the Ghanaian economy influences economic performance which in turn impacts on the level of foreign debt accumulation. This is because any proper debt analysis and management would require knowing the nature of the foreign debt and the domestic structure. This section describes the characteristics of external debt, such as size, type, sources, causes, structure, and their associated issues- *understanding external debt past*. Thus, the chapter describes the key features of the issues under consideration.

The importance of this is to inform theoretical framework and methodology for the study. It will inform what appropriate models are derivable from the theory, which would serve as the basis of the functional form of the models, expected signs, choice of variables, etc. Nevertheless, the literature review would also reflect the method to be used.

2.2 Historical Linkage from Structure of the Economy to Debt Accumulation

Prior to independence in 1957, the economy was booming as various mineral resources were extracted (gold, diamond, manganese, bauxite), while cocoa and timber outputs were high. Coupled with favourable world prices of these products, foreign reserves were high giving a middle-income status. But there was a turn around a few decades after independence particularly in the 1970s and early 1980s. While the average growth rate was around 2% per annum in the 1960s, the 1970s saw virtually negative growth rates (Figure 1).

Figure 1: Real GDP Growth Rates (%)

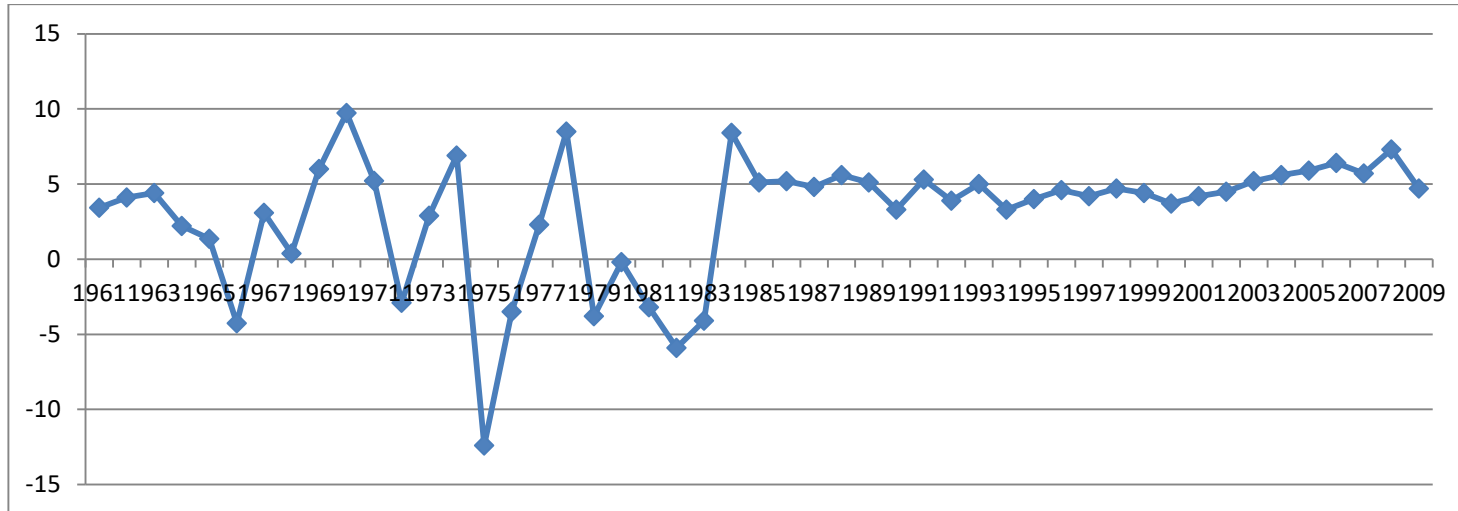
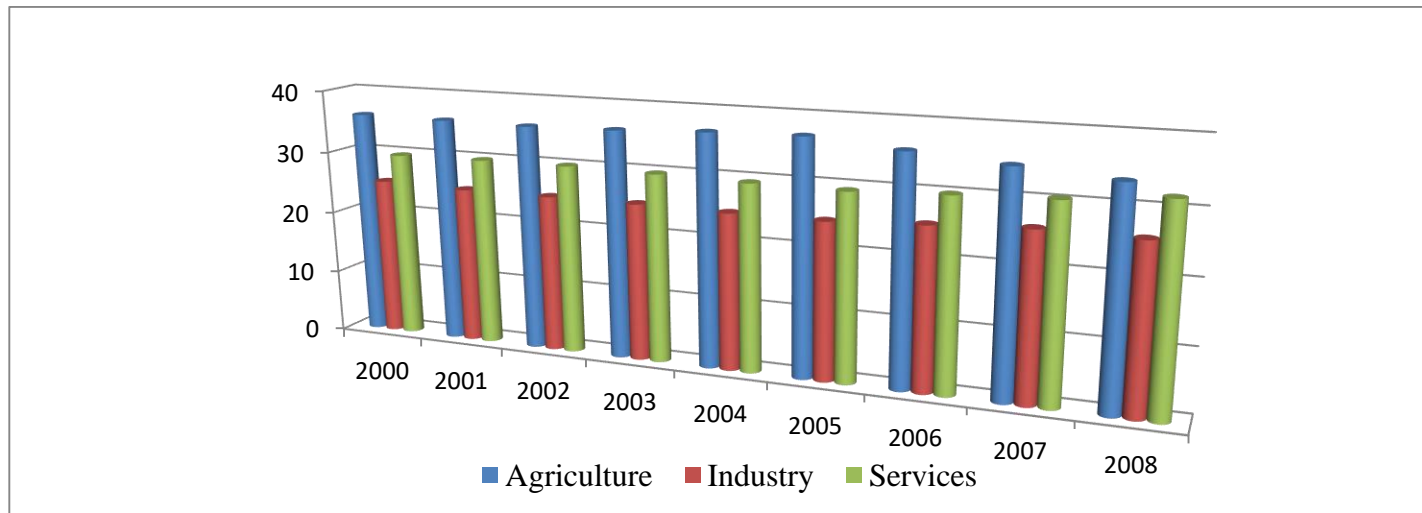


Figure 2: Sectoral Contribution to GDP (%)



Note: These are sectoral contributions to national output as percentage of total in 1993 constant prices (excluding indirect taxes)

The growth of GDP has been very irregular particularly from 1960 to 1983. Over this period, the highest growth rate of GDP occurred in 1970 at 9.72%, while the lowest rate was -12.4% in 1975. Other years in which GDP rates were relatively high included 1974 at 6.9% and at 8.5% in 1978. Remarkably, the worst growth rates preceded or coincided with various coup d'états in Ghana. The only year in the 1960s in which there was negative growth was in 1966 (-4.26%) which coincided with the overthrow of the first Ghanaian President, Dr. Kwame Nkrumah. Also, 1972 saw a GDP growth of -2.9% as well as military take over by General I. K. Acheampong. The reversal of the down-turn was short-lived as indicators became worse again culminating in the 1979¹ and 1982 military interventions by Ft. Lt. Jerry John Rawlings, with rates of -3.8 and -5.9 respectively.

The poor growth continued from 1979 to the emergence of the Economic Recovery Programme (ERP) in 1983. This programme shot up the GDP growth rates to 8.4% in 1984 and ever since, the rates have been positive, reaching a highest level of 7.3% in 2008 and lowest of 3.3% in both 1990 and 1994. On the average, the GDP rate in the 1990s has been 4.72% and 5.32% in the 2000s. Although the rates have been positive, there is more to be done if Ghana is to reach the expected middle income status in the medium term and also meet most of the millennium development goals by 2015. This will require Ghana achieving higher digits of GDP growth rates yearly over an extended period.

Through out the history of Ghana, agriculture dominates the economy's structure. Immediately after independence, industrialisation efforts dominated government attention in the economy. In the literature, this move has been attributed to what is called the *circular decline*

¹ The military government ruled for about three months and handed over to a democratic government

*hypotheses*². These, together with the urge to develop faster, led to the concentration on industrialisation as import substitution. Thus, the contribution of industry to GDP was 2% in 1957 but increased to 9% in 1969 (Osei, 1995). With this, manufactured exports grew in the early years of the industrialisation drive. The industrialisation drive neglected the agricultural sector. The concentration on industries without any effort to increase output from the agricultural sector to feed the industries led to a double loss in the economy. The industries had to rely heavily on imported raw materials. The foreign exchange requirement was inadequate since export products were basically obtained from the agricultural sector which had been neglected, contributing marginally to the foreign exchange requirement. The main foreign exchange earner then was cocoa, thus, its decline meant a decline in the rate of obtaining foreign exchange. Therefore, alternative sources of foreign exchange became important.

The alternative source of raw materials was to rely on foreign credit to purchase raw materials for the industries. On the other hand, volume and prices of exports were falling and ability to obtain enough foreign exchange to pay for the maturing credit was not forthcoming. Thus, soon after the industrialisation move, foreign debt accumulation ensued. This precarious situation - biased focus against agriculture, falling export volume of cocoa and externally falling price of commodities on the international market, worsened the debt burden of Ghana. Thus, from the independence period of almost no debt, the debt stock rose to about US\$ 600 million in 1965 (Figure 4).

² This included imports substitution drive, linkages effect hypothesis, terms of trade favouring manufactured goods view, unlimited supply of labour in agriculture hypothesis and the haste to catch up with the 'developed' world.

However, the economy of Ghana was still dominated by agriculture despite its neglect, while the industrial sector was not growing as expected (Tuffour, 2003). This continued until 1983 when the problem became severe. Macroeconomic variables were in bad conditions. For example, inflation rate was 122.8% in 1983, the worst in the history of Ghana, output growth average was 2.2% between 1960 – 1970 but fell to -6.9% in 1982. The three main sectors of the economy which has been agriculture, industry and services continued to deteriorate (Figure 2). It was observed that agriculture and industry which are directly and indirectly related to foreign exchange generation did not show any robust performance in the 1970s and early 1980s. This continued until the debt burden became a crisis³. Thus, the debt crises were resolved through various rescheduling arrangements (in 1966, 1968, 1970, 1974 and 2001) (Osei, 1995). The chronology of debt relief initiatives of the world is given in Box 1.

Also, the general decline in the economy hampered all sectors of the economy as foreign exchange constraints impacted on infrastructure provision and renovation, provision of essential services, etc. The average foreign capital inflow ranged from US\$50 to US\$100 million per annum over the 1966 – 1982 period.

³ This high debt level led the military government of 1972 to declare repudiation for the existing debt, in the local parlance as “yentua”.

Box 1: Chronology of Debt Relief Initiatives in the World

1969 – Pearson Report
1978 – Retroactive Terms Adjustment
1985 – Baker Plan
1987 – Special Programme of Assistance for Africa
1988 – Paris Club, Toronto Terms
1989 – Brady Plan
1989 – IDA Debt Reduction Facility
1990 – Paris Club, Houston Terms
1991 – Paris Club, London (Enhanced Toronto) Terms
1995 – Paris Club, Naples Terms
1996 – HIPC Initiative
1996 – Paris Club, Lyon Terms
1999 – Enhanced HIPC Initiative
1999 - Paris Club, Cologne Terms
2001 - New HIPC Initiative

Source: Adopted from Ann Pettifor and Romilly Greenhill (2002)

In a bid to recover the economy from this decline, the government of Ghana together with a sponsorship from the World Bank and IMF established the Economic Recovery Programme (ERP) in April 1983. The initial phase was 1983 – 1986 period of stabilisation while structural adjustment was implemented side by side after 1986. Among the various objectives of the ERP, was to enhance economic growth. This programme – ERP, also contributed to the upsurge of the debt accumulation, as the trend continued to increase (see Figures 4, 5 and 10). Although the programme marked the beginning of foreign capital inflow, in terms of easing the foreign exchange constraints, debt was piling up. Thus, external debt increased from US\$ 4,754.57 million in 1994, US\$ 6,021 million in 2000 to US\$ 5,007.89 million in 2009. The

renewed inflow of loans from the 1980s and 1990s can be said to have influenced the huge debt problem culminating in Ghana being classified as a HIPC initiative country in 2001. This led Ghana into another debt rescheduling arrangement.

2.3 External Debt Definitions and Measurement Issues

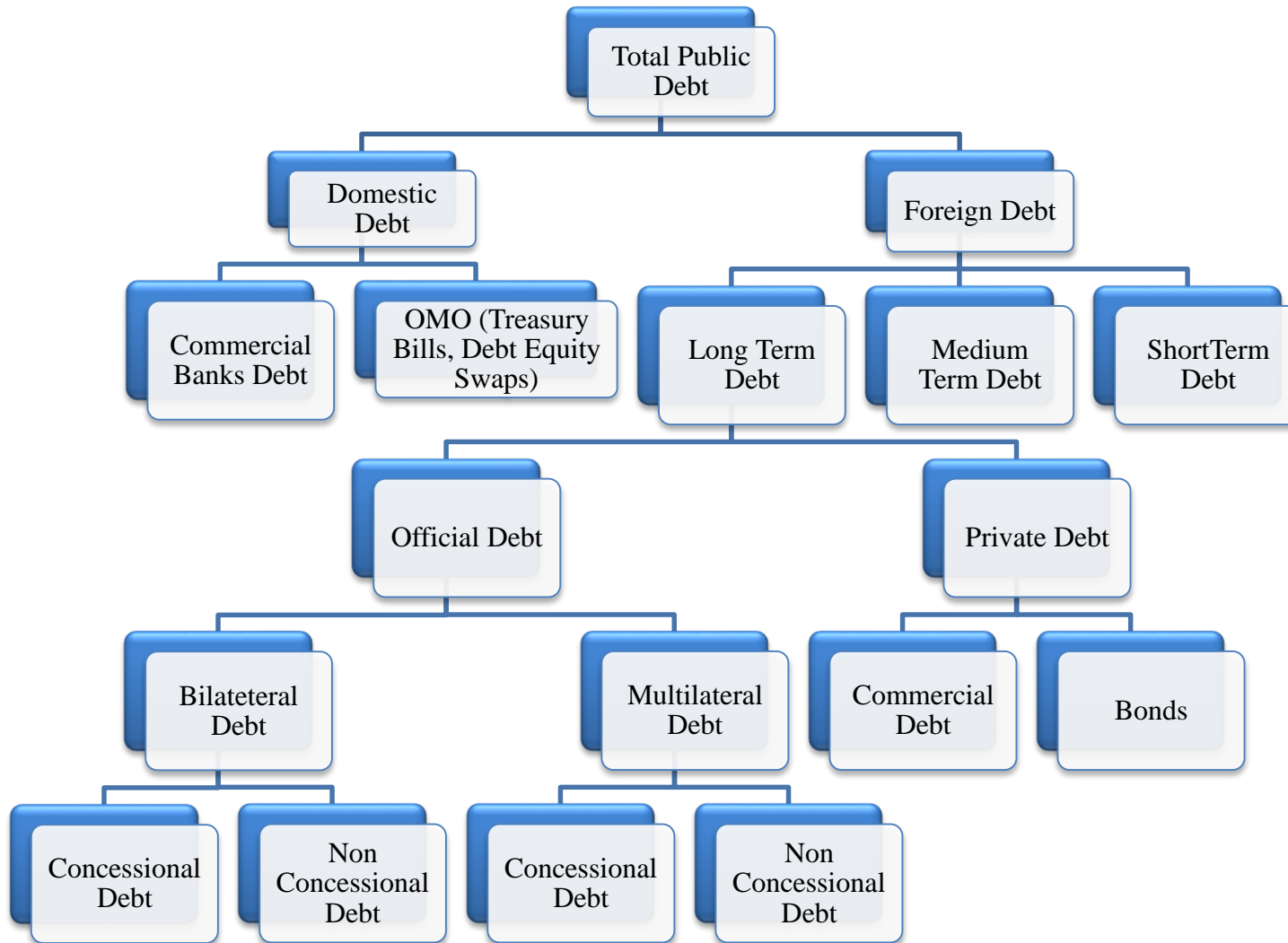
There seems to be both conceptual and practical problems of how to define as well as measure external debt. These problems include inconsistent data and unavailability of published external debt data. This is because the forms in which foreign capital can flow into an economy vary. The measurement of external debt is beset with problems in practice. Some of the contentious issues surrounding the concept and measurement of external debt include:

- i. Whether external debt should be measured in nominal or real terms. If it should be measured in real term, what deflator should be used?
- ii. Whether to limit external debt values/figures to public and publicly guaranteed debt or include all types of debt, that is, include private external debt;
- iii. How to treat Foreign Direct Investment (FDI). Since the element of repatriation of profit abroad require the same foreign exchange as principal and interest payment of external debt; and
- iv. How to treat military expenditure since it constitute a huge portion of public external debt but does not in any way directly produce output to service the debt.

Foreign loans can be defined or categorised in different concepts. Long term debt (see Figure 3) is a type of external debt with 12 years or more as maturity while short-term debt has duration of one year or less as maturity period. Debt with maturity periods between 1 year and 12 years are classified as medium term debt (Osei, 1995). Also, there are two forms of long-

term debt: public and publicly guaranteed debt which are debt acquired by the central government and its public institutions together with those debts acquired by the private sector but guaranteed by a public entity. On the other hand, private non-guaranteed debts are debt acquired by private organisations/institutions without any public entity as guarantor.

Figure 3: Hierarchical Composition of Total Public Debt



Source: Author

Figure 3 shows a schematic representation of total public debt (excluding guaranteed private sector debt). It indicates that, government can borrow from both domestic and foreign sources. The domestic sources mainly come from commercial banks and the general public. An example in Ghana is the government borrowing from Ghana Commercial Bank Limited for Tema Oil Refinery to import crude oil. This type of debt usually does not create much foreign currency problems as the debt is denominated in local currency.

On the other hand, foreign debt can be in three forms: long, medium and short term. Since the reforms and early debt rescheduling arrangements, short term debts were converted into medium term debt. Currently, most of the debts are long term. The average maturity period for Ghana is about 30 years while the grace/moratorium period is about 7 years (see Appendices 3 and 4). The long term debt is also divided into two main parts: official and private debt. The private debt may come from international commercial sources and bonds markets⁴. The official debt/credit is constituted by bilateral and multilateral sources. These are made up of individual countries and groups of countries or financial institutions respectively. In both cases, the loan can be given on concessional and non-concessional rates. For the purpose of this study, the total public external debt would be used.

2.4 Description of Total Debt of Ghana

As described in section 2.3, the total debt is composed of public debt as well as private guaranteed debt which include short, medium and long-term debt. The trends of debt stock in Ghana are presented in Figures 4 and 5. The trends show that, with the industrialisation effort

⁴ Obtained at commercial rates from the international capital market such as the sovereign bond of 2007

and neglect of agriculture sector, foreign debt was increasing in Ghana. Thus, loans have continued to increase since the ERP in 1983. The sharpest growth of debt occurred in the early years of the ERP. The continual rise in the growth rate of debt was attributed to both government's efforts to revamp the economy as well as international effort to support the government efforts. During the first stabilisation phase of 1983 – 1985, the growth rate of debt increased the highest. The programme relied on three pillars: stabilisation, privatisation and liberalisation, of which the first phase of stabilisation needed huge external inflow so that the economy could kick-start again. Therefore, it is observed that in the early years of ERP, growth of debt was radical.

The trend was clear again after another policy – HIPC initiative. It is also observed that the qualification of Ghana to benefit from the latest debt initiative in 2001 saw massive inflow of aid/grants. This reduced the amount of debt service and repayment brought about by debt cancellation and forgiveness. With international confidence in the economy, Ghana obtained for the first time a bond issue of US\$ 750 million in 2007. This caused a huge jump of the debt levels ever in the debt history of Ghana. Thus, from 2007, the total debt of the nation has been rising even after returning to sustainable levels during the peak of the HIPC initiative debt relief.

Figure 4: Current External Debt Stock of Ghana (US\$ Million)

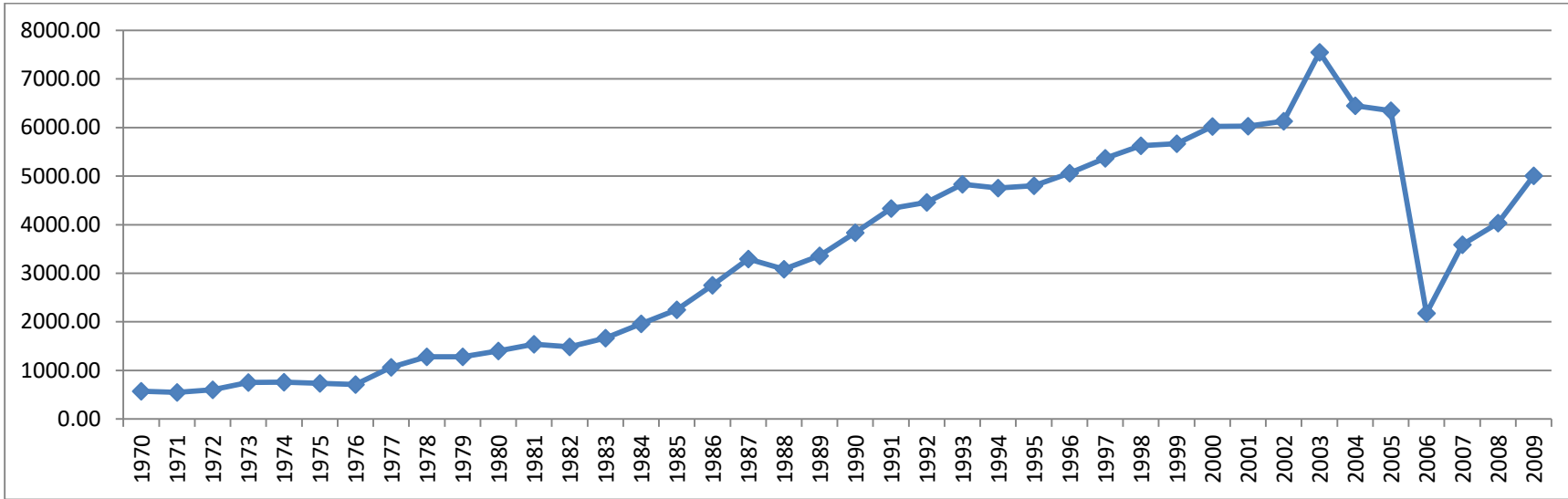
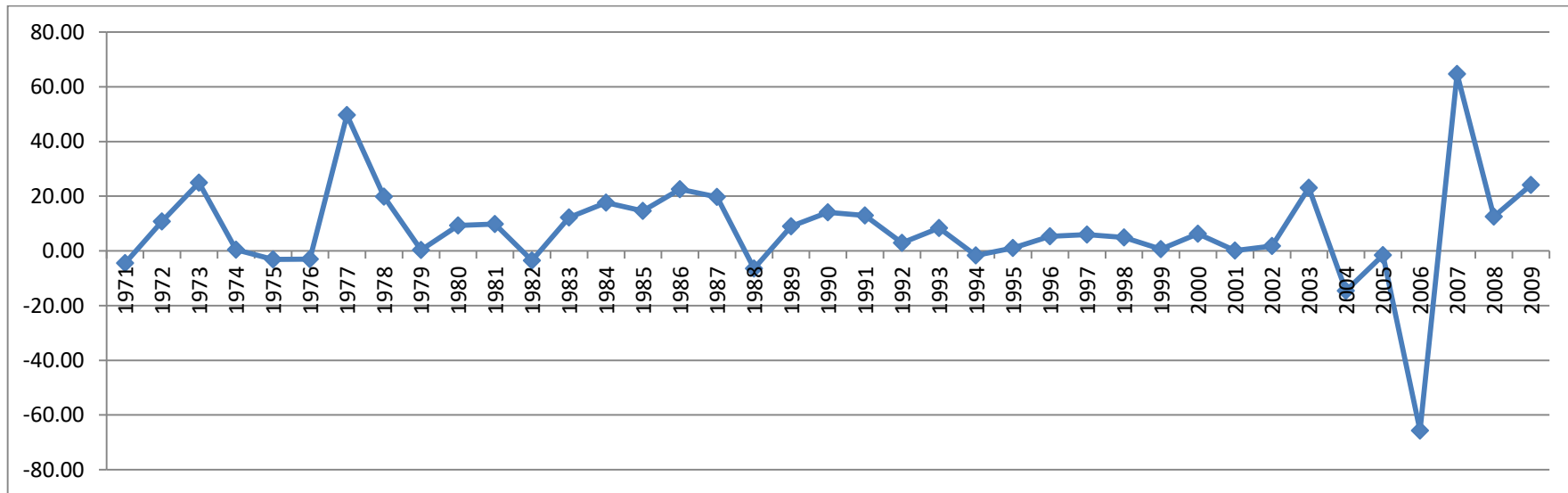


Figure 5: Growth Rate of External Debt Stock (Percentages)



2.5 Characteristics of External Debt: Source, Composition and Type

The structure or composition of debt during the early phase of the ERP was biased in favour of medium term loans, while long-term loans fell. This can be attributed to the emphasis of the ERP, to revamp the economy within the short to medium term. Also, this was a partial condition for countries that were undertaking adjustment programmes. Medium term loans have high tendency to increase debt repayment rates as there is quick maturity period for loans. However, the trend changed after 1986 when short term debts were converted into long term debt. This made long-term debt occupy a larger share of total debt. This solved the fast maturing external debt problems of Ghana partially.

As stated in Figure 3 on the constituents of long term debt, most of the debt stock is made up of long term, public and publicly guaranteed debt (Figure 12). A significant proportion of debt is government contracted with minimal private sector involvement. Thus, the private sector has played a minor role in the acquisition of loans for socio-economic development over the years. This shows the dominance of the public sector in enhancing welfare. On the other hand, it can be attributed to the undeveloped private sector and/or lack of credit worthiness for private sector borrowing activities. With the notion that the private sector is the engine of growth, effort should be made to enhance the ability of the private sector to attract loans to supplement government/public sector efforts.

Ghana receives loans from both private and official creditors. But the dominant sources have been official, particularly after the ERP (Figure 13). This can be attributed to efforts to minimise interest payments since commercial rates are always higher than official rates. Again, the initiatives were sponsored mainly by IMF and WB who are both official sources of loans. Thus,

this serves as basis to continue to seek and use official sources since there is high tendency to obtain low interest rate and long maturity period than what pertains in the international private/commercial markets.

With official debt, it is observed that multilateral debt dominates official debt. This can be attributed to increased involvement of multilateral organisations such as the IMF, WB, AfDB, etc since 1983. This has caused changes in the terms of debt. For instance, the average maturity period was 30 years and 3 months in the 1970s but reduced marginally to 30 years and 1 month in the 1980s. Also, interest on loans has fallen from a high level of 5.9% in 1982 to a low level of 1% in 2004 but increased again to 2.3% in 2007. However, the grace period ranges from 4 to 9 years throughout the study period.

It is obvious that, as the total debt increase, the rate of debt service obligation will also increase. Within this period (after 1983), real GDP growth has also seen steady growth. This coincided with increase in debt repayment. The ERP period presented double standard as more loans were contracted to improve the economy. IMF conditions also required Ghana to clear accumulated arrears in time to continue to receive IMF support.

2.6 Trend Analysis of Related Economic Issues

It is argued that, external debt has been accumulated over the years partly due to both domestic and external factors. Also, the fact that there is an external financing component of annual budgets of Ghana means domestic resources are not adequate to meet present developmental expenditure needs. For instance, in 2008, Multi-Donor Budget Support constituted about 26% of total donor inflows to Ghana (MOFEP, 2009). In addition, foreign exchange generation-export

earnings have lagged behind imports, particularly since the early 1990s (Figure 6). The total public expenditure over the years has generally been higher than total government domestic revenue (as observed from Figures 7 and 8).

After independence, the export orientation drive was short lived as raw material imports to feed machines were difficult to come by while exports earnings were falling. The lower returns from export created a gap between exports revenue and imports payments. For instance, in 1995 the gap between exports and imports was US\$ 256.58 million deficit. This worsened to US\$ 499.88 million deficit in 2008. This led to a continual current account deficit. Also, Ghana has been depending on traditional exports (cocoa, timber, minerals of which gold has been the major component). The export products saw downturn with the inception of the debt crises of late 1970s to early 1980s. But still, there exist a lower real export values relative to exports values as the real world price of these primary products have been falling. Cocoa and minerals have been the major export earners of Ghana. In 2005, cocoa and minerals contributed 32.4% and 36.9% of the total export earnings respectively. These changed to 24.4% and 44.7% respectively in 2009. Relating this to the state of fiscal/current account deficit, it is seen that, when the world prices are higher, there is surplus/lower deficit, while the year(s) of world crude oil crises, there are huge deficits-fiscal and current account. In order for Ghana to overcome the problems of dependence on few traditional exports product, Ghana has to improve on the export of non-traditional exports (NTE) product since the share of NTE contributed only 20% of total exports earnings in 2009.

Figure 6: Exports and Imports (Gh¢ Million)

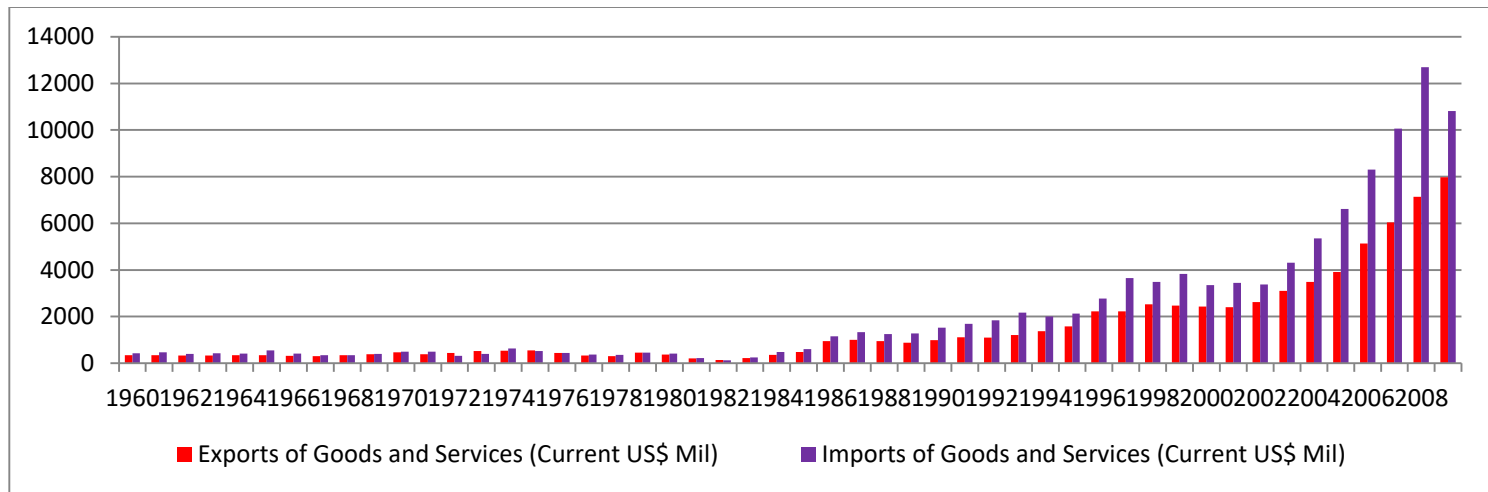
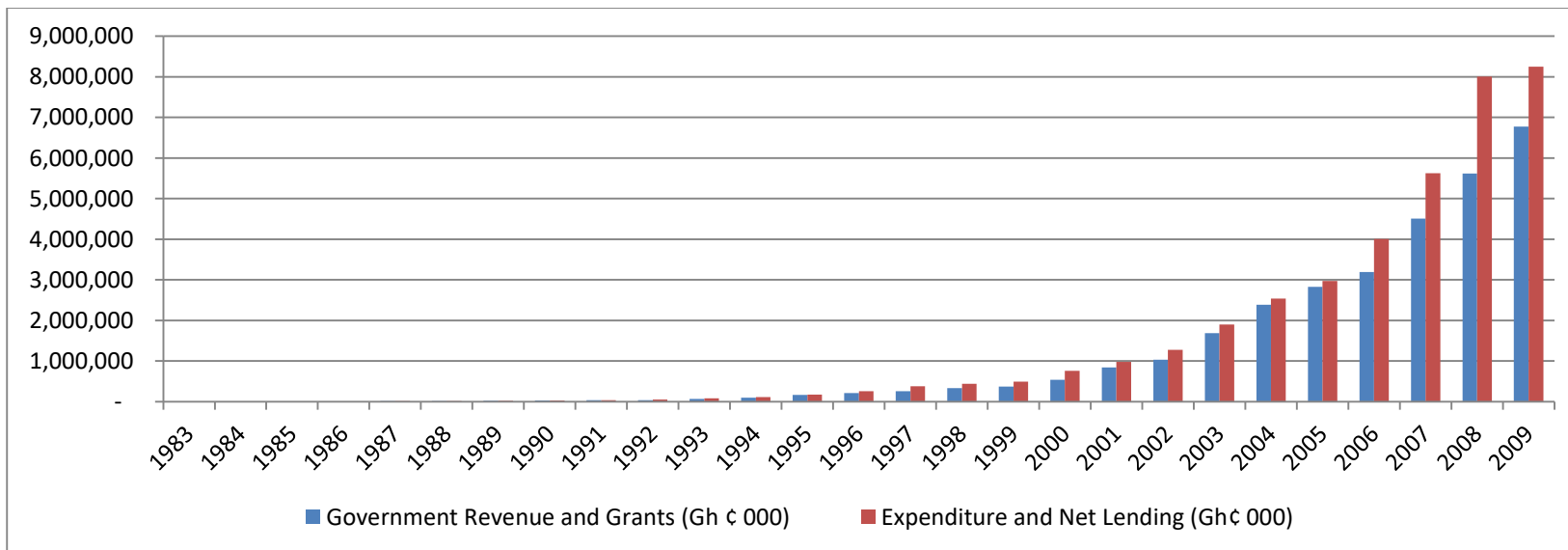


Figure 7: Government Revenue and Expenditure (Gh¢ 000)



Since independence, Ghana has been a beneficiary of the official development assistance (ODA). There was an average annual receipt of US\$ 300 million between 1960 and 2003 (MOFEP, 2009). The latter part of this period saw much improvement in the inflows. During the period of the SAP, from 1984 to about 2000, the average yearly inflow was about US\$ 581 million relative to an average of about US\$ 72 million over the period 1960–1983. The greater inflow of development assistance (loans and grants) from the SAP period was as a result of the international support for the SAP and ERP at the latter part of the 1980s and 1990s.

The SAP/ERP initially produced the requisite macroeconomic outcomes commensurate with development such as GDP and income improved. Other countries like Nigeria failed to undergo sufficient reforms to achieve results during the SAP period (Iyoha and Oriakhi, 2008) while public expenditure was not related to economic growth (Ighodaro and Oriakhi, 2010). However, later some of the economic indicators deteriorated (Tuffour, 2010). For instance, the total public debt to GDP ratio rose from 75.2% in 1998 to 152.7% in 2000. There was a mismatch between growth of debt and exports (Figures 8) indicating the level of unsustainable borrowing (Figure 9). With this and other indicators of debt sustainability, Ghana qualified and joined the HIPC initiative. Ghana reached the “decision point” in 2002. In April 2004, Ghana reached the “completion point” of HIPC and thus between 2004 and 2007, an average of US\$ 990 million was received through various forms of debt relief and assistance (MOFEP, 2009).

A number of factors may have contributed to the massive inflow of external finances in the 2000s. Some of these include improved donor confidence which resulted from improved

macroeconomic performance, improved policy stance and partly due to the introduction of Multi-Donor Budget Support (MDBS) framework established in 2003. The MDBS, to some extent, has improved the timelines of aid⁵ inflows and streamlined aid usage, avoiding duplication of work and enhanced management of aid funds. Another outcome of the somewhat improved macroeconomic performance over a decade ago is Ghana's entry into the international capital market in 2007 to raise US\$ 750 million (MOFEP, 2009) through the issue of sovereign bond⁶. Thus, Ghana has secured both domestic and external debt in various amounts (Figure 10). It is observed that until recently, 2001, domestic debt was significantly lower.

⁵ Aid comes in the forms of financial (loans, grants) and technical assistance.

⁶ The amount was over subscribed as the initial plan was US\$ 500 million.

Figure 8: Growth Rates of Total Debt and Exports

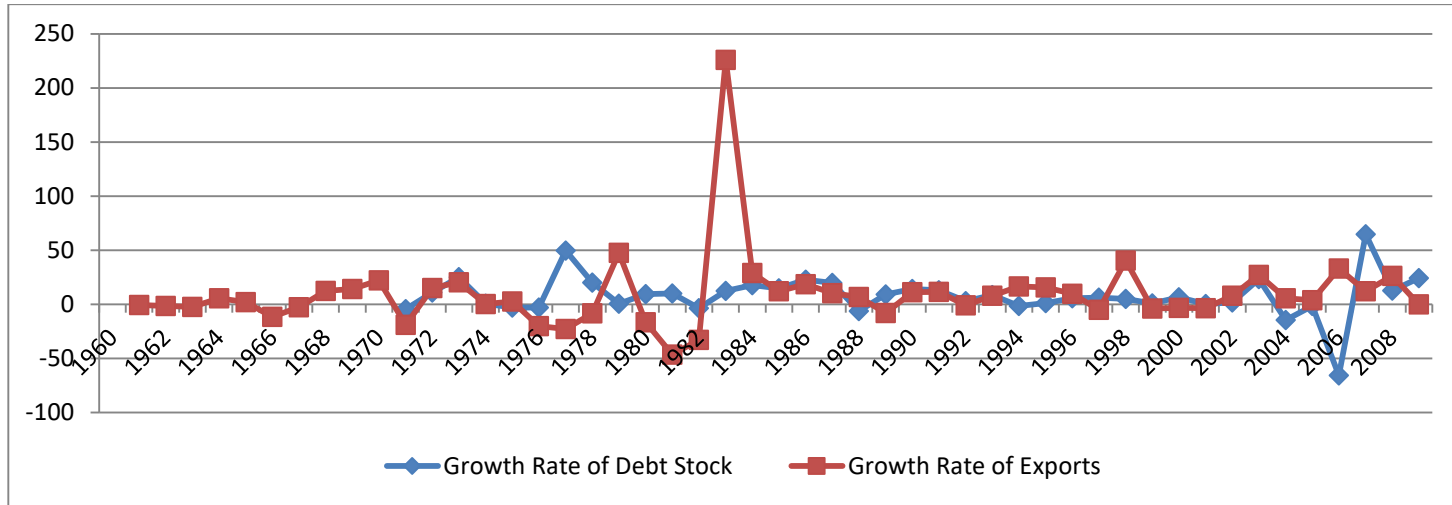
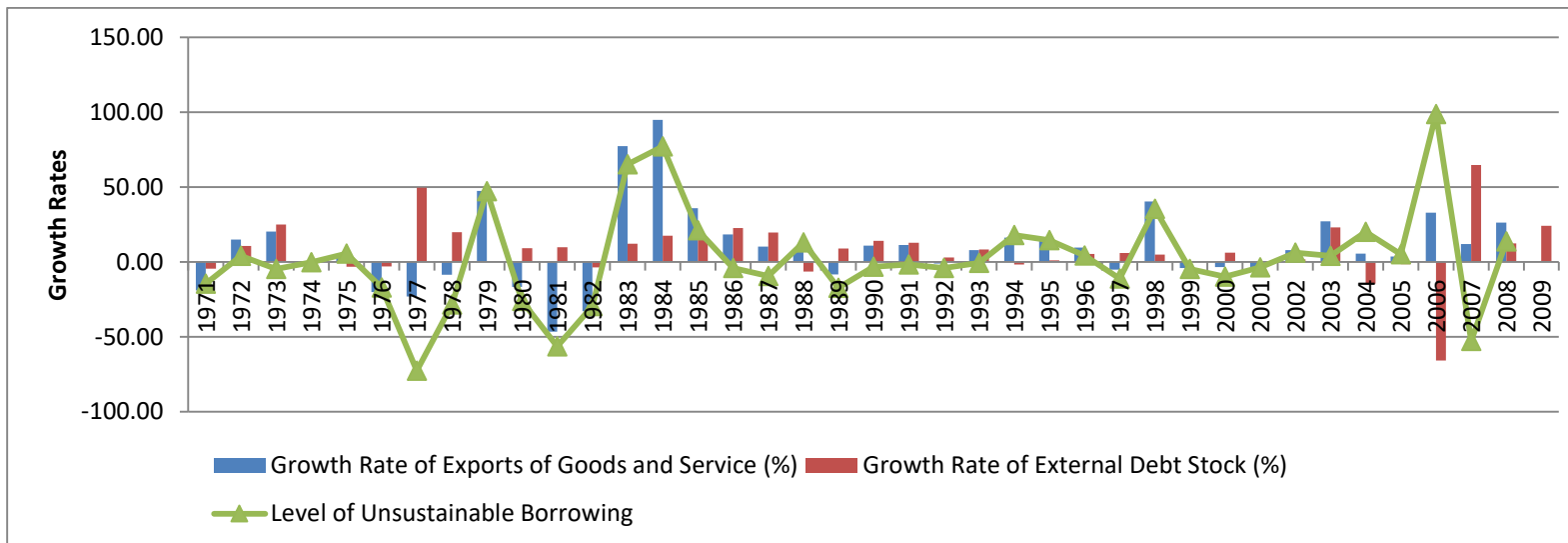


Figure 9: Level of Unsustainable Borrowing of Ghana (1970-2009)



Note: Unsustainable borrowing is defined as the difference between exports and external debt growth rates

Figure 10: Domestic and External Debt of Ghana (US\$ Million)

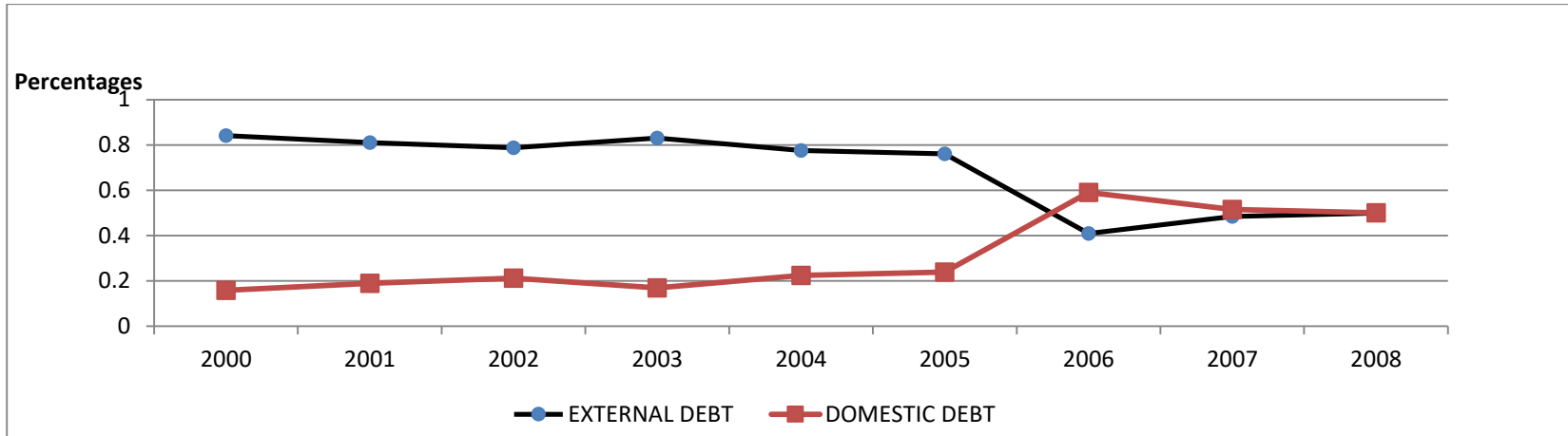
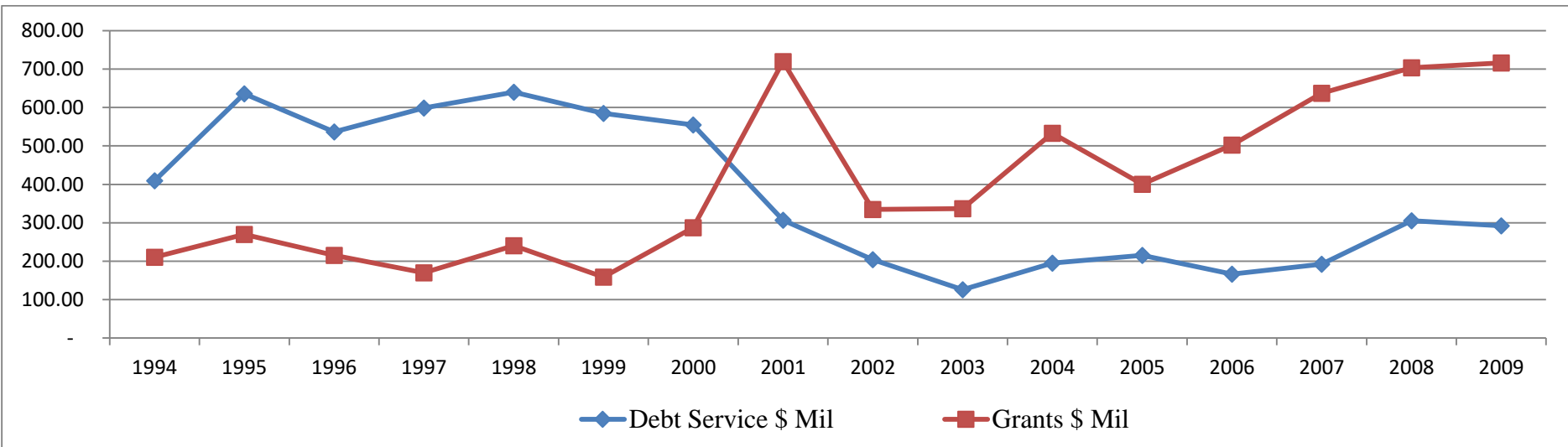


Figure 11: Trend of Debt Service and Grants in Ghana (US\$ Million)



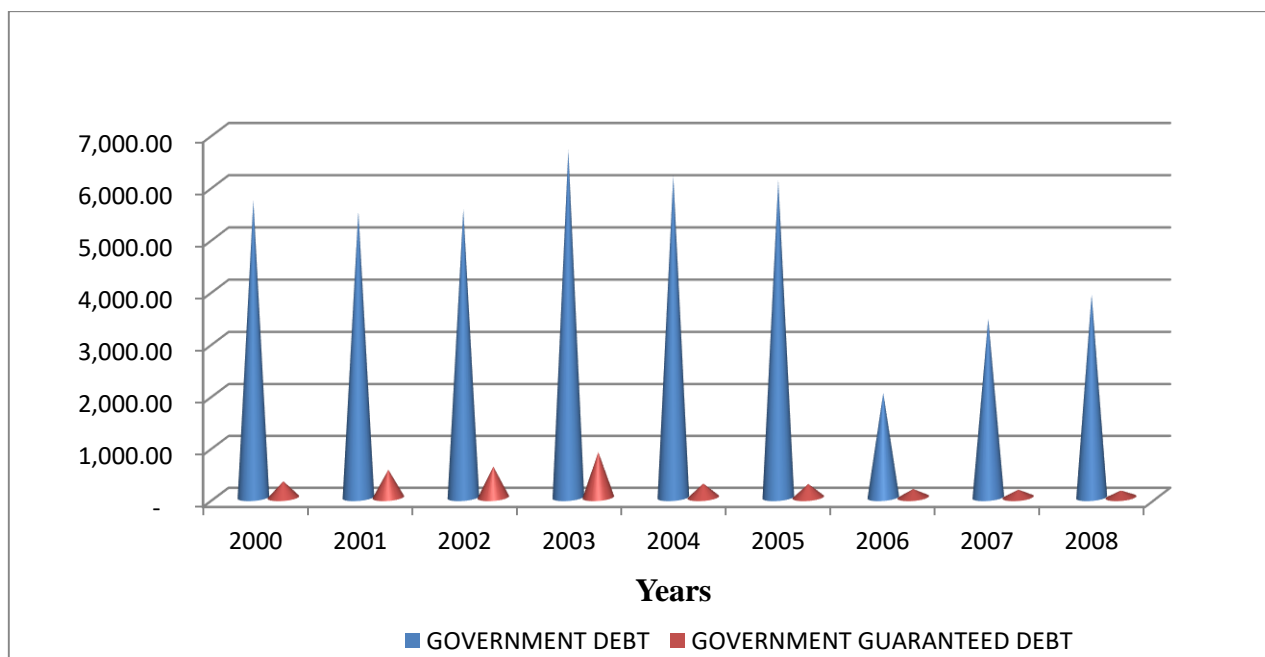
Foreign financing has been an important source of budget support in Ghana. This has contributed to domestic government's objective of poverty reduction, economic growth and development. As a consequence, between 2001 and 2007, average aid inflow in support of annual budget amounted to 25 percent of budget finances and about 6 percent of GDP (MOFEP, 2009). This points to the fact that, a continual receipt of aid is dependent on enhanced transparency and better coordination of aid inflows. Although Ghana receives grants, it has also contracted a considerable amount of loans over the years. The loans and their repayment have led to severe indebtedness. But the grants have not been significant to offset the annual debt service.

From Figure 11 the trend of debt service and grants show that, indeed Ghana was paying more than it was receiving as grants. The graph shows that, until the institution of HIPC initiative, debt service was far higher than grants. Thus, the net effect was negative as capital was transferred to service debt. After the HIPC initiative, the trends changed as the level of grant (from 2001) was higher than debt service due to cancellation of debt, conversion of debt service to HIPC grants.

The severity of the indebtedness is observed from the perspective of the bigger external debt service payment in relation to exports and total income, particularly tax yield. Loans have averaged around US\$ 375 million per annum representing about 48 percent on average of external finance flow between 2001 and 2007 (MOFEP, 2009). Figures 12 and 13 indicate government and government guaranteed debt as well as annual flow of external finances from official and private sources respectively.

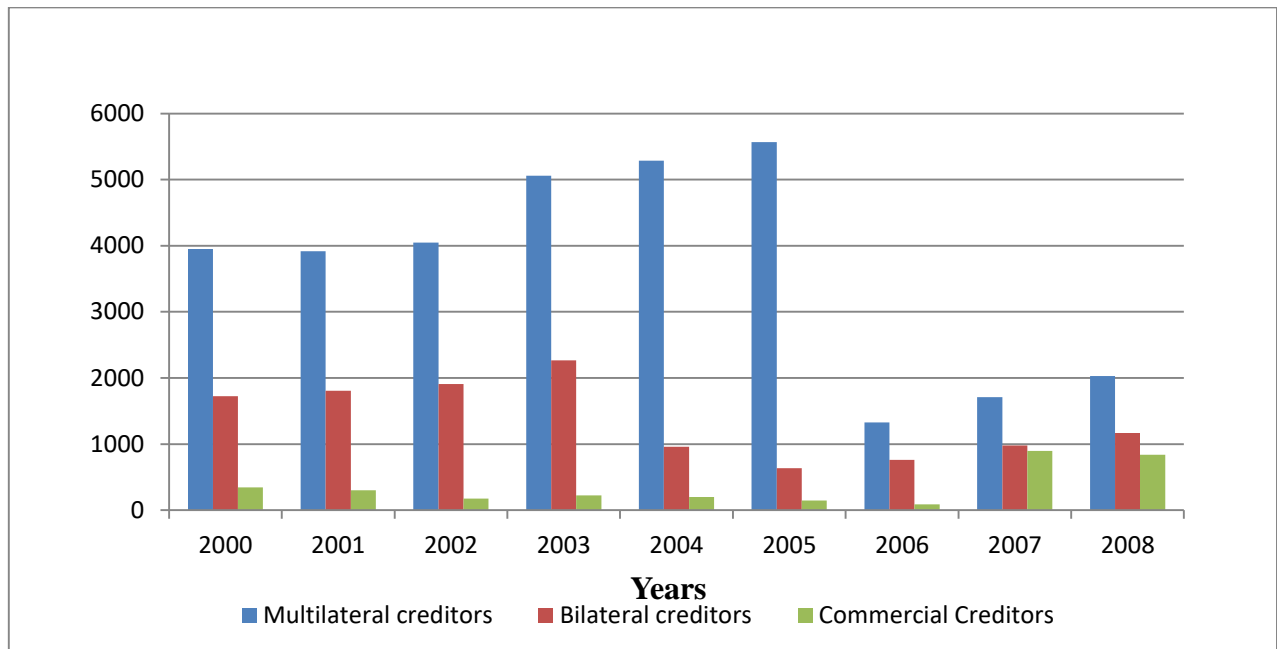
Also, Figures 12 and 13 show that, Ghana accumulated large external public debt with minimal public guaranteed debt. This is the case because it has not been the policy of the government to be directly involved in the acquisition of foreign funding for private sector activities. In the 2000s, government public external debt reached its highest level of over US\$ 6,000 million (Figure 4) in 2003. During this period, government guaranteed debt has not gone beyond US\$ 1,000 million. Also, in recent years, the government public debt has been concentrated in multilateral debt basically due to low interest rate, longer grace and maturity periods, among others.

Figure 12: Government and Government Guaranteed Debt (US\$ Million, 2000-2008)



Source: Author

Figure 13: Official (Bilateral and Multilateral) and Private Sources of External Debt (US\$ Million, 2000-2008)



Source: Author

This indebtedness has the capacity to cause capital flight to service debt, thereby reducing the ability to import, improve foreign reserves, enhance exchange rate, provide resources for poverty reduction and infrastructure development. This has reflected in the rate of investment which has seen a gradual increase over the years (Figure 14). Also, the breakdown of investment into public and private investment has followed a similar trend (Figure 15) with marked improvement in the 2000s. The trends do not show a radical growth of investment which has great impact on output and employment. These have implications on how Ghana could deal with her debt service.

Figure 14: Gross Capital Formation (% of GDP)

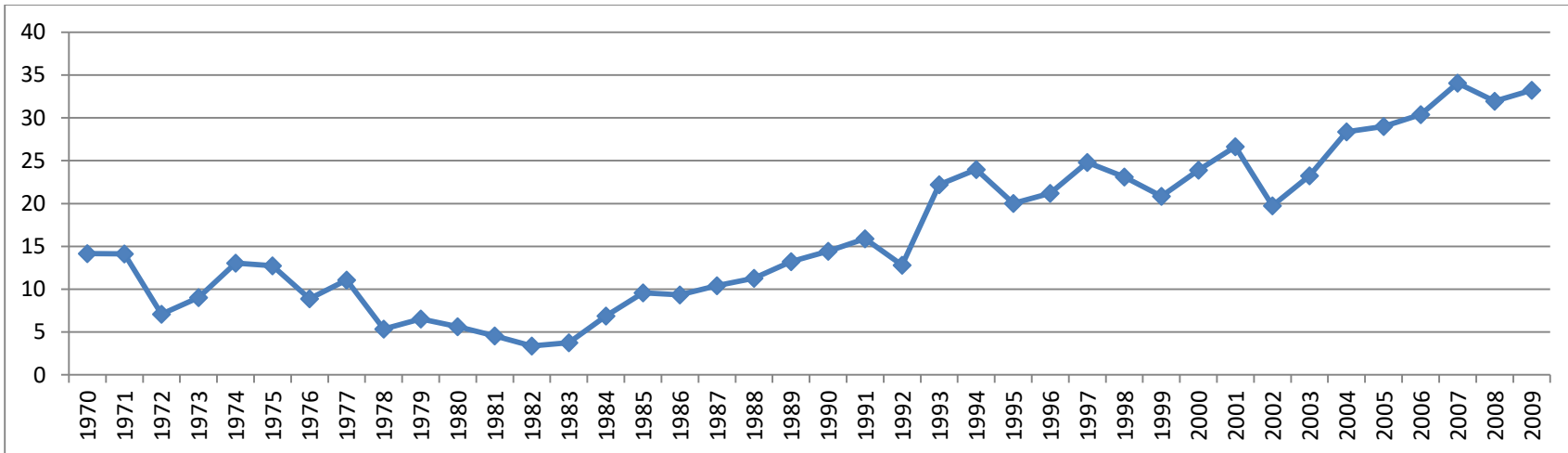
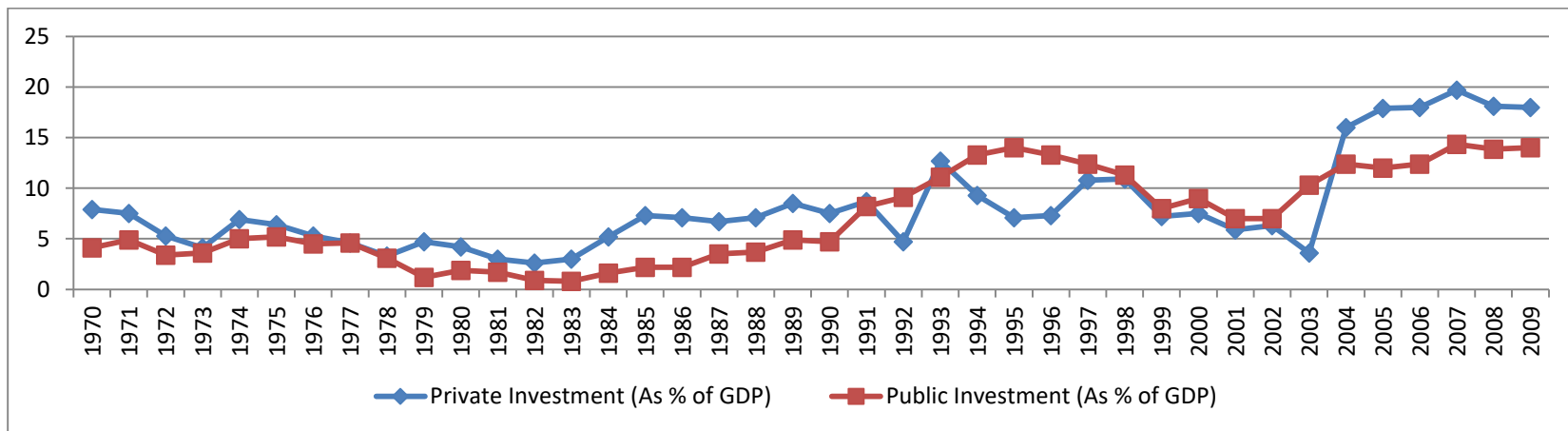


Figure 15: Trend of Private and Public Investment (As % of GDP)



2.7 Reason for Inadequate Revenue Collection in Ghana

One of the reasons for a country to borrow is insufficient domestic revenue mobilisation. Thus, it is important to review and analyse the domestic aspects of why Ghana contracts loans. Observably, the tax agencies in Ghana have consistently met their annual targets amounts, which are increasing each year indicating that more can be done to raise domestic revenue. Also, the fact that there is an external financing component of annual budgets, means domestic resources are not adequate to meet present developmental expenditure needs. Thus, low tax effort and yield indicate that tax revenue collection and other sources of domestic revenue are inadequate. These low efforts have reflected from the weak tax system and administration, leading to Ghana avoiding to implement productive taxes that need little sophisticated tax administration (TA). Easy to administer taxes have led to distortions, and regressive outcomes, and the implementation of taxes which are easy to administer even with low revenue yields. Such weak tax administration constrains tax options (Owusu-Afriyie, 2009). It is observed that, there are low tax efforts, average of about 18% of GDP in developing countries while it averages 34% in industrialised countries (UN, 1992).

The inability of tax administrators to collect adequate taxes stems from three broad categories: a) efficiency of the TA which indicates the level of performance of the TA activities in terms of cost and productivity; b) effectiveness of the level of tax payers compliance; and c) nature of the tax system (tax rates, bases, policy, etc). When TA and system are both efficient and effective, there are advantages derived including:

- i. Generates more revenue for growth oriented activities;
- ii. Facilitates the elimination of higher and burdensome taxes without necessarily reducing revenue yields;

- iii. Facilitates the use and adoption of simple tax laws, reducing non-compliance among citizens; and
- iv. Enhances the ability to effectively boost taxes with potential high revenue yields.

One of the reasons for low performance of the tax system has been the narrow base of the tax system in Ghana. This has been the case because the majority of people and economic activities are in the informal sector, without appropriate records keeping and operating unregistered enterprises. Thus, the tax authorities are not able to a) levy the appropriate tax rates; and b) collect the stipulated tax amounts.

Another reason why the Ghana tax system is unable to collect adequate tax revenue is the low level of tax education. While old taxes are not known and not being publicised, the formulation of new ones do not involve citizens in the process so that they can comply. The formulation of tax policy is mainly limited to the legislators (parliament).

Also, there is a lot of physical human presence interaction between tax payers and collectors. This facilitates issues from under and over invoicing to conniving to evading tax by not demanding official VAT receipts for example. 'Corruption' results as tax revenues due the government end up as income in the pockets of state tax collectors and auditors. There is inadequate use of technology in the tax collection as well. In the same vein citizens and organisations spend quite some time, energy, resources to even remit tax revenue, this increases their tax burden and so constraint their willingness to pay taxes.

Another reason for the low tax revenue in Ghana is the frequent changes that usually occur in the annual budgets. These include introduction of new measures and procedures, amendments and cancellation of existing ones. These create confusion and complication for the tax system as well as the tax payer. This makes it extremely difficult for citizens / tax payers to know which taxes are operational at a point in time so as to pay the appropriate taxes.

There are some unclear tax systems as well. There exist over-lapping and contradictory taxes, so that a single good may be subject to a number of taxes, for example intermediate goods, in which the VAT law provides a refund if it is used for further production, in which the final good produced is taxed. In addition, they are also imposed at different rates, taxed at different tax bases with different payment times, different returns, etc.

The tax system in Ghana is also faced with obsolete taxes yielding small tax revenues or nothing at all. In spite of these, they are still part of the tax system, complicating and making the tax system ineffective. Moreover, Ghana has many tax laws which are difficult to find (inaccessible to the tax payer). Some are imbedded in laws, regulations, policies, decrees, which are far into the past, jumbled together with various amendments. Some of these tax laws are, Casino Revenue Tax Decree 1973 (NRCD 200) and Stamp Act 1965 (Act 311) which many of the citizens do not know about with the exception of the new laws (particularly those that came under the 4th Republic starting from 1993). Such tax laws have neither been abolished nor reviewed.

Also, Ghana has administrative and judicial procedures which are not reviewed with reference to new taxes, for example failure to remit VAT collections by a registered organisation after the last

day of the proceeding month attracts a penalty amount. This is so insignificant compared with the benefit that such a defaulting organisation gains from withholding that tax revenue for any number of days.

Another social concern that citizens dislike is about some uses of tax revenue collected, thereby reduces their willingness to pay taxes or facilitate the collection process of taxes. The outcry about unnecessary public spending by and on public officials as well as on projects that citizens oppose, but get implemented creates apathy to tax payment.

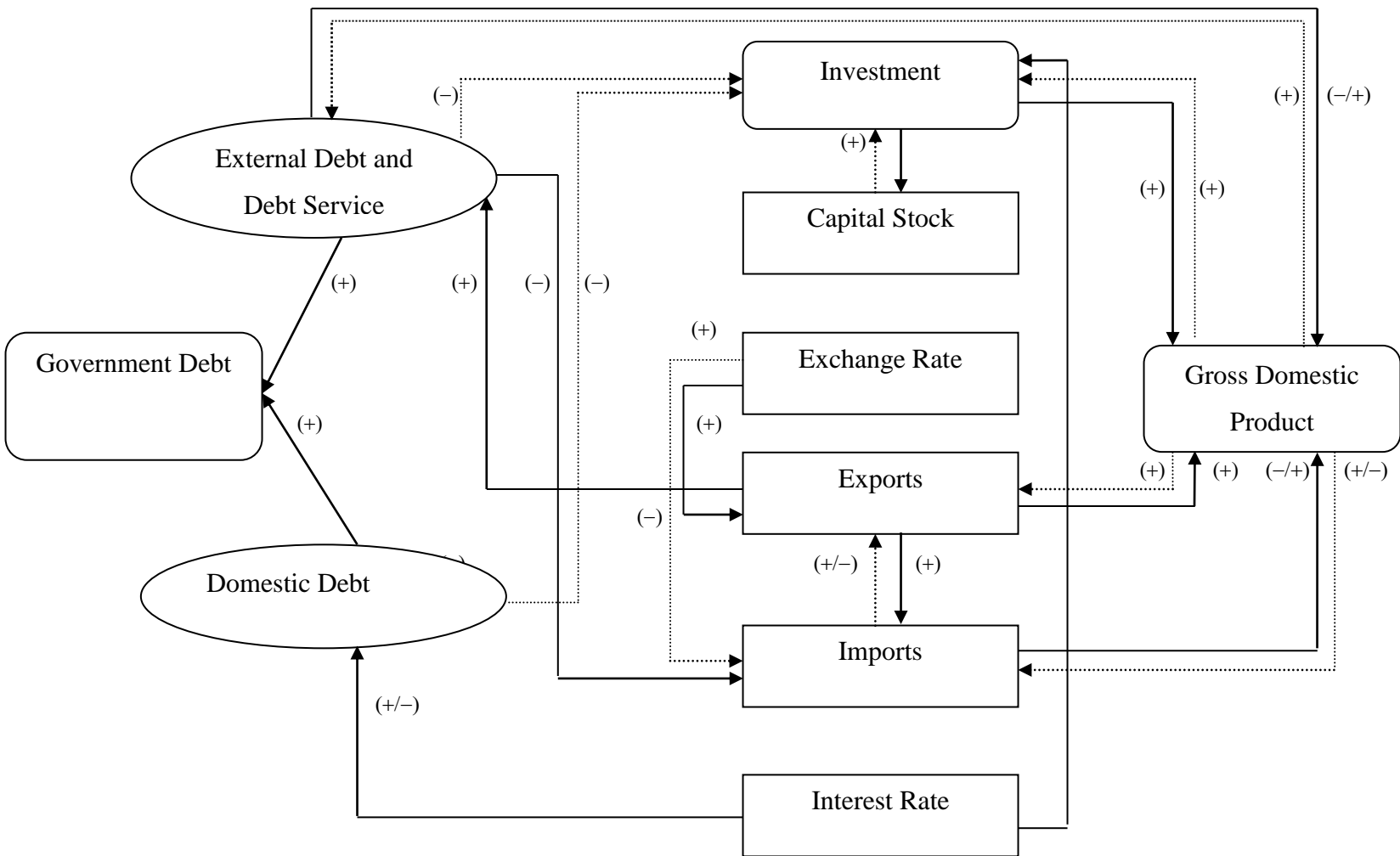
2.8 Economic Growth and Debt Related Macroeconomic Variables of Ghana

In order to appreciate the linkages between debt related macroeconomic variables and how they influence GDP, I have constructed a new chart relating GDP and debt, and the possible links through which they affect each other. To keep the growth-debt theory in focus, we specify three endogenous variables (debt, investment and GDP) in this customised structure. The chart is constructed to show how variables are linked to others with and without a lag, and direction of influence, either positive or negative. This relates to both external and domestic debt of the government.

The issues presented (Figure 16) show interesting links and relationships among some macroeconomic variables. Specifically for Ghana, external debt and GDP are strongly linked by investment. On the other hand, domestic debt influences GDP through interest rate. In addition, these endogenous variables are related by some intermediary variables such as exchange rate, imports and exports of goods and services, and capital stock.

Figure 16: Flow Chart of GDP and Debt Related Macroeconomic Variables for Ghana

Note: : Polar Ends, Endogenous Variables \longrightarrow : Direction of Influence
 : Influence With a Time Lag; —— Influence Without a Time Lag; (+/-) : Hypothesis



Source: Author

CHAPTER TWO REFERENCES

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CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This section reviews existing theoretical, methodological and empirical studies on foreign debt and economic growth relationship. In most LDCs, the low growth and abysmal performance of investment is frequently attributed partly to external debt. This economic situation is referred to as debt overhang problem. Debt overhang is defined as a situation in which huge external debt and debt service reduce output growth through crowding out of private investment and reducing public expenditure on necessary socio-economic infrastructure. However, previous studies are inconclusive as some suggest negative while others indicate no effect of debt on growth. This hampers any generalisation of the relationship. This therefore, warrants that, a country case study be done. This forms one of the bases of this study.

The existing studies can be divided into two forms; those that look at the relationship between them (with and without other variables) and those that consider the causality between the two elements. We therefore review the literature along these lines together with threshold studies, on the objective of whether foreign debt affects economic growth. But we first present the theoretical underpinnings of debt accumulation.

3.2 Excess Income, Government Ponzi Game and External Debt Accumulation

A 'Ponzi game is a scheme in which someone issues debt and rolls it over for ever' (Romer, 2006, pp. 52). The play of Ponzi game becomes possible when debt trap sets in. In this case, countries find it difficult to offset loans and interest payments. Thus, to continue to undertake economic and social activities, governments have two options: either to borrow new external

loans to implement expenditure programmes or accumulate arrears. This results when available domestic revenue cannot service debt, with a sizeable amount remaining for developmental activities. This more or less eventually leads to government rolling over debt – a Ponzi game scenario.

In reference to the possibility of Ponzi game (Romer, 2006), the government of a county can secure and obtain external funding when the finite horizon of external public and private sectors' budget constraints are not satisfied with equality. This happens when domestic revenue (of any other country-entity) is less than government spending. For the case of external borrowing, there should be at least one household or individual (country, International Financial Institutions, etc) abroad that is not optimising. This is where current consumption of that other entity is less than after tax income or present value of consumption [from period 0 to date] is less than the present value of after tax income. In this case, the entity has not reached a saturated point, not yet optimising. The excess disposable income (when consumption is lagging behind after tax income) may be due to economic factors such as low prices of goods and services, higher incomes or profits, behavioral attitude like thrift and socio-cultural aspect of small family/household size. This makes it possible for a government to borrow from abroad, when the borrowing government has kept a budget deficit. Thus, the present value of a borrowing government's debt will be strictly positive. Given this, the budget constraint has been violated. This allows a government to play a Ponzi game where the government rolls over external debt in the case where the present value of government expenditure is greater than the present value of government revenue (domestic and external grants).

For such a Ponzi game to hold, the sum of external entity's private (and public⁷ sector) expenditure should be lower than the sum of its private and public sectors incomes at any point in time. Thus, a developing country can continue to borrow continuously. When the growth rate of output and exports are greater than the real interest on loans, then the debt to GDP ratio will be falling, for such a country to get out of debt.

3.3 Theoretical Review of Public External Debt and Economic Growth Relationship

A review of the literature shows that, the theories of external debt and economic growth relationship can be grouped into two main strands: *Direct Effect of Debt* and *Indirect Effect of Debt or Debt Overhang Theories*. The indirect effects include Stimulus View, Liquidity Constraints Hypothesis, Crowding Out Effect and Investment Discouragement View. These are in turn reviewed.

3.3.1 The Direct Effect of External Debt Theory

The Direct Effect of External Debt Theory (DEEDT) propose that, debt may adversely influence economic growth even if it has little effect on investment. In this case, the effect is channeled directly through deterioration of the productivity of capital (Fosu, 1996; Iyoha, 1999). That is, a reduction of marginal productivity of capital. Externally borrowed money can be used for current and future consumption. But using loans for current consumption does not alter capital formation greatly. On the other hand, for loans to have impact on future consumption, it requires productive investment, particularly long term. This changes investment mix. Again, if borrowed money is used to service existing debt or to finance current account deficits, then investment funds are necessary reduced due to the foreign exchange constraint. This type of constraints would lead to investment in short-term projects (to be able

⁷ On the assumption that, a country borrows from both bilateral and multilateral partners at both concessional and commercial rates.

to pay off the debt quickly) such as short term export generating goods and services rather than long-term improvement in infrastructure.

As such, large debt in the face of relatively low ability to pay may be limited by low productive investment mix. It is noted that, the overall productivity can fall, since the uncertainty on future government actions to meet burdensome debt obligations might push investors to prefer short-term and low-risk investment to long-term and risky projects (Presbitero, 2010). In this case, even if savings and investment are not reduced, when debt exists, adverse changes in investment mix will influence output. The DEEDT suggest that, even if debt overhang exists, and liquidity constraints bind in the short run, the DEEDT could still hold. Apart from the direct effect, there can be indirect effect of debt on output as well.

3.3.2 Indirect Effect of External Debt Theory

Indirect Effect of External Debt Theory (IEEDT) focuses on the effects of debt on growth through investment. The theory states that “higher indebtedness acts as a tax on future output and hence reduces the incentive to save and invest” (Fosu, 1996 pp. 97). The influence of external debt on output is explained through the debt overhang theory (Krugman, 1988 and Sachs, 1989). This theory postulates linkage from external debt to output level. The theory shows that, given an initial capital requirement, accumulation of external debt beyond a certain level may hinder economic growth. The theory accordingly proposes that, the difference between the rate of debt repayment obligation and ability to repay debt influences output. If a country’s debt obligations exceed the country’s ability to pay, expected future growth rate is likely to fall. Thus, expected debt service is likely to be an increasing function of the country’s output level (Karagol, 2002). All things being equal, this can be stated as:

$$\text{Economic Growth} \left. \begin{array}{l} > \\ = \\ < \end{array} \right\} = 0 \text{ iff Debt Repayment Rate} \left. \begin{array}{l} < \\ = \\ > \end{array} \right\} = \text{Ability to Pay}$$

The debt overhang theory presents three scenarios:

- The case of positive (increasing) effect of foreign debt on output;
- The case of maximum effect of foreign debt on output-optimal threshold; and
- The case of negative (decreasing) effect of foreign debt on growth.

These cases present an inverted U-shape curve called a *Debt Laffer curve* (Figure 17). The non-linear relationship has been studied (Elbadawe *et al.*, 1997; Pattillo *et al.*, 2001; Meghyereh *et al.*, 2003). The approaches through which these scenarios occur are clear. Each of these is further explained.

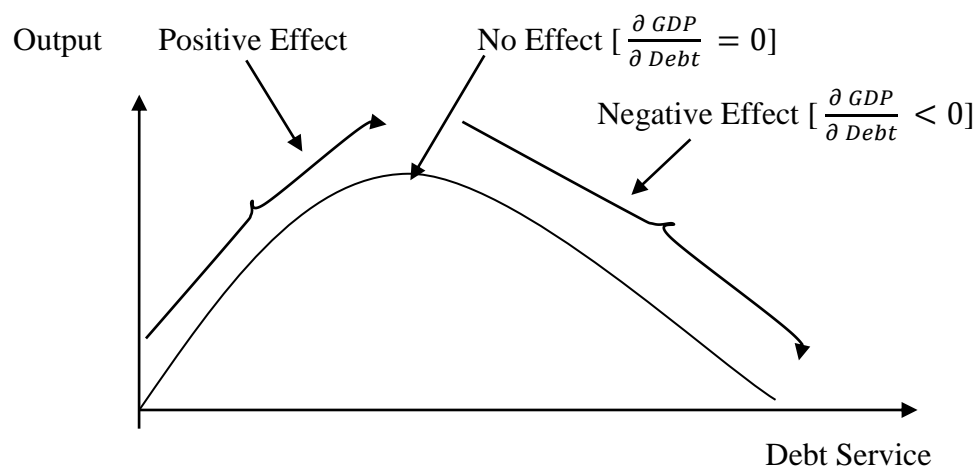


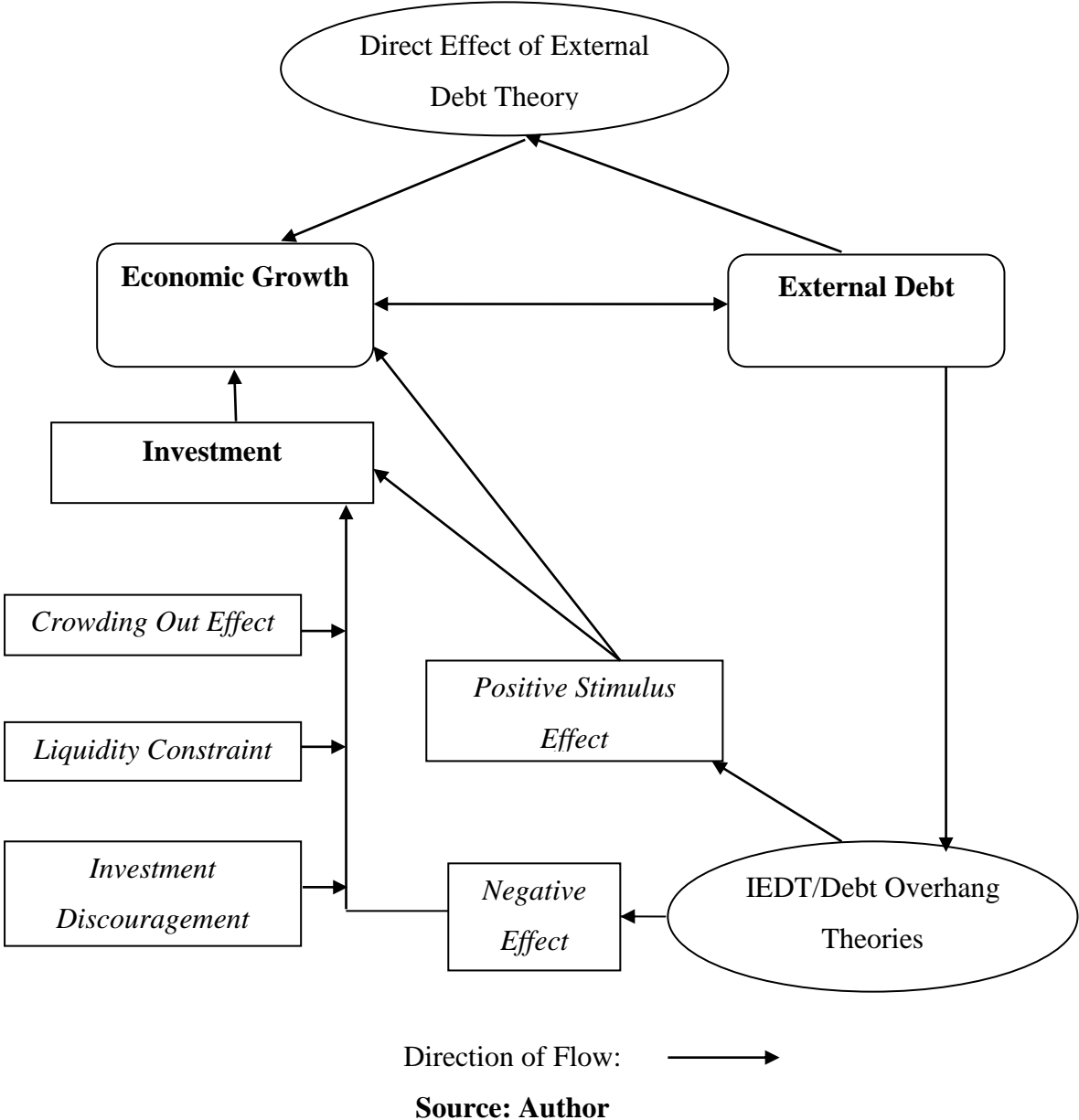
Figure 17: Graph of Debt Laffer Curve

There is a general need for an initial foreign capital to supplement domestic savings and revenue. Thus, in theory, below a certain debt threshold, acquisition of foreign capital is a spur to growth. We refer to this as the *Stimulus View*. It argues that with correct levels of deficits and debt, employment, investment, consumption and economic growth would be stimulated. Also, in the absence of Foreign Direct Investment (FDI) and foreign grants, the probable financial option to complement domestic revenue for public investment tends towards foreign borrowing, both bilateral and multilateral. It is assumed that this level of accumulation is helpful and serves as a catalyst to growth.

This positive relationship between debt and growth works as follows: The new foreign capital affords the recipient country the ability to import critical capital goods to enhance growth. Also, at the worst situations, such funds can be used to import consumable goods and other intermediate inputs which have the tendency to improve standard of living of citizens and increase output respectively. Moreover, foreign funds can facilitate the implementation of infrastructure programmes necessary to speed up the growth process in the recipient's economy. All these show that, the expected rate of return from the foreign capital exceeds the debt repayment responsibility. As such, there will be excess of these returns which adds to output or the net effect is positive on output. This is an element of increasing returns of debt on output.

The second dimension which makes the effect of debt on growth important to economists is the likely decreasing effect of debt on growth (Elbadawi *et al.*, 1997). This *Debt Overhang Theory* maintains that, higher debt causes interest rates to rise, lower investment and capital formation leading to a reduction in economic growth. This is the case when the optimal debt threshold has been exceeded. In this case, the flow of debt service supersedes the returns from capital acquisition. This is the level of debt stock that has accumulated over a long period of time and which saps away vital developmental funds to foreign creditors. This presents diminishing returns of debt on output as shown by negative slope portion of the output-debt curve of Figure 17. The related links of debt, output and investment are presented in figure 18 below.

Figure 18: Theoretical Scheme of External Debt and Economic Growth Relationship



The channels through which this can occur are apparent. This occurs in about three forms. First is the fact that foreign exchange (from exports) has to be retained to pay off debt. This is the *Liquidity Constraints Theory*. This theory states that the requirement to service debt reduces amount of foreign exchange available for government investment. This binding constraint of debt service impact negatively on investment and presumably output. Such investments include technology acquisition and human capital development. These have long term effect on output

expansion. Technology, according to human capital usefulness of endogenous growth models (Romer, 2006), spur growth particularly overtime.

Secondly, it works through government intention to raise domestic resources to replace the lost amount due to debt service-*Investment Discouragement View*. The fact that foreign exchange generated is shared between domestic public investment and meeting debt servicing obligation indicates that governments have to beef-up domestic resource mobilisation. This usually comes by instituting new taxes and/or raising tax rates, instituting other non-tax revenue generation policies and these serve as an indication of higher expected tax rates to private investors as well. Thus, the expected higher tax discourages private investment—both FDI and indigenous private investment in a country (Metwally and Tamaschke, 1994; Karagol, 2002). In this situation, the debtor country effectively loses investment. This leads to slow growth of the economy. Under such scenario, external debt and output are negatively related as debt creates an adverse incentive effect on output growth in the long term.

The third channel through which huge debt service can negatively affect economic growth is defined as *Crowding Out Effect*. As the government of a debtor nation resorts to domestic borrowing due to loss of credit worthiness, strict conditions of credit, high interest rate of loan on the international commercial market, etc, domestic demand for loanable funds rises. This pushes up domestic interest rate. With high domestic interest rate, domestic private investment is adversely affected. This leads to a general fall in output as investment falls (Cohen, 1993). These, together with expected higher taxes and lower returns on investment, combine to reduce output through a fall in investment. To be able to construct an appropriate framework deriving from the theories, it is important to review the theoretical foundations of investment to complete the system.

3.4 Theories of Investment

Several theories of investment have been propounded, but two of the dominant models⁸ are the neoclassical theory which originated from Jorgensen (1963) and 'q' theory proposed by Tobin (1969). The Tobin's q is essentially an improvement of the initial model since it (initial model) was not able to answer some questions on investment (as has been articulated below).

3.4.1 Neoclassical Theory of Investment

The neoclassical model is based on the principle of desired capital stock and user cost of capital. The theory is based on a risk neutral firm which maximises present value of profits, and is a price taker if in a competitive firm. It sets out equations and derives demand for flow of investment from demand for desired capital stock. Based on these assumptions, then labour receives its share—marginal product of labour, $MPL = w$ (real wage) and capital, marginal product of capital which is the user cost in this case given as: $c_t = P_t (r + \delta - \Delta P_t/P_t)$ is the appropriate price of a capital good that is owned and used by a firm, where: P_t = real price of capital good; r = real interest rate; δ = depreciation rate; and $\Delta p_t/p_t$ = rate of appreciation of capital goods relative to market price of the same type of capital. This model makes strides in terms of analysing effects of changes of key variables but with some problems (see Appendix 1).

3.4.2 Tobin's q Theory of Investment

James Tobin (1969) introduced the ratio of the market value of a firm to the replacement cost of its capital stock, a ratio called "q" to measure the incentive to invest in capital. Tobin's q, as it has become known, is the empirical implementation of the notion that, capital investment

⁸ Other theories include aggregate theory of investment

becomes more attractive as the value of capital increases relative to the cost of acquiring the capital.

Tobin (1969) was of the view that, share prices can be thought of as market's best estimate of the value of present and future profits, so they capture future expectations. Also, stock markets are forward looking, ignoring "irrational exuberance". Tobin suggested that the rate of investment is related to q , with $q = 1$ as equilibrium condition. In addition, q should take account of uncertainty, growth in future demand, tax effects, etc (see Appendix 2).

3.4.3 The Accelerator and Flexible Accelerator Models

The basic accelerator model is built around output in the economy. In this model, investment is determined to be a linear proportion of the changes in total output. This ignores other variables such as level of profitability of the investment, investor expectations and cost of capital (Asante, 2000). The theory proposes that, there is a fixed level of output that translates into investment. At the same time, the level of targeted output can be determined when the incremental capital output ratio is known. This model's assumptions pose some problems such as fixed desired capital stock to output ratio and the fact that desired and actual capital stocks are the same when there is adequate investment.

These problems led to the flexible accelerator model, a modification of the basic model. The new model considers the difference between the desired and actual/existing capital stock, as investment responds to this difference. Thus, new investment would depend on the adjustment factor, which show how fast or slow investors prefer to invest in each period. This can be represented simply as $I = \delta (K^* - K_{t-1})$ where I is net investment, K^* is desired capital stock, K_{t-1} is last period's capital stock while δ is the partial adjustment parameter. Since adjustment is not expected to be instantaneous and the entire gap closed, then $0 < \delta < 1$. Within this modified

form, the problems of the accelerator model is taken care of such as the determinants of K^* including cost of capital, output, internal funds, etc.

3.4.4 *Neoliberal Models*

The Mckinnon (1973) and Shaw (1973) models emphasize a more liberal approach to investment. Their models consider financial issues in developing countries where there is financial repression. These include interest rate controls and other limitations of the financial sector. It was anticipated that if these are removed, savings, loanable funds, investment, employment and output would improve. This is based on the notion that, interest rate and investment are positively related⁹. To them, the positive relationship postulates that, an increase in interest rate encourages savings, leading to high accumulation of investible/loanable funds. This is based on the argument that, although high interest rate may discourage investment, high volume of savings would eventually lead to actual investment rise, given that demand for money is greater than supply (exhibiting a disequilibrium in the financial/capital market).

3.4.5 *Uncertainty Investment Models*

Pindyck (1991) and Rodrik (1991) have proposed uncertainty investment theories. Pindyck's uncertainty was about irreversibility of investment. This is because capital goods of firms are usually firm specific and thus disinvestment is difficult. The cost of re-sale may be high or there may be low value for re-sale, in the event of unfavourable market conditions. This renders the net present value rule inappropriate to incorporate the irreversibility cost element of investment.

⁹ This is in contrast to the Neoclassical theory of investment

Rodrik (1991) on the other hand introduced policy uncertainty. Investors do not respond fully to new policy introduction. This is because any new policy introduced about investment is taken with caution. Such uncertainty include possibility of reversing to the old policy or conditions when the economic expectations are not met, political support for the new policy may be short-lived or the policy may rather worsen private sector's investment decision. For a rational firm decision, investors would normally delay the investment actions to observe and be assured of the non existence of possible uncertainties that may result from the new investment policy.

3.5 Review of Debt Threshold and Related Issues

The recent world economic crises has raised renewed concerns about whether external debt has gotten to or is close to the limit where it might negatively affect economic growth (Collins, 1999; Caner *et al.*, 2010). In recent times, several emerging and developed economies experienced currency crises: Mexico in 1994, Asia (Korea, Thailand and Indonesia) in 1997-98, Russia in 1998, Brazil in 1999, Turkey in 2000-2001, Argentina in 2001, and Greece and Ireland in April and November 2010 respectively and Portugal in April 2011. In this respect, Caner *et al.* (2010) examined the issue in developing and developed countries in which Ghana was included for the 1980 to 2008 period. The debt to GDP ratio threshold level was estimated to be 77.1 percent for 79 developed countries while it was 64 percent for 55 developing countries.

In another recent study by Reinhart and Rogoff (2010), by using histogram method for 20 industrial countries, they concluded that, there was a regime switch at 90% of debt to GDP ratio. Here, central government debt was used instead of general government debt as in Caner *et al.* (2010). Using panel threshold regression, Chang and Chiang (2005) estimated a threshold

level of 66.63% for OECD countries. Also, these studies did not estimate the growth cost of exceeding the debt threshold for Ghana. This gap is filled for Ghana in this study.

The possible existence of a debt threshold indicates there is non-linear relationship between external debt and economic growth irrespective of the income level. Pattillo *et al.* (2004) established that, at an external debt level ranging between 5 and 50%, the Net Present Value (NPV) of debt in developing countries tends to be negative. However, this according to them depends on the methodology used. For this study, quadratic method is employed to determine the threshold level¹⁰. The quadratic method is superior since there is no pre-determined regime restriction and derivation of probability densities such as in the Hansen's and TAR methods. These models arbitrary set a range over which search for the optimal debt threshold level is considered, unlike the quadratic approach.

The use of groups of countries seems to provide different threshold levels. In order to overcome some of these issues, Cordella *et al.* (2005) and Imbs and Rancier (2005) brought in innovative variables of institutional quality and market access. In this as well, Cordella *et al.* (2005) confirmed that there is evidence of debt overhang for intermediate debt levels, but countries with improved institutions, policies and higher market access have better threshold levels than those without these qualities. Imbs and Rancier on the other hand used a non parametric kernel method, but also estimated that the debt threshold level/overhang sets in around 40 percent of the NPV of external debt to GDP.

In another study Clements *et al.* (2003) considered only low income countries and estimated that, the NPV of debt to GDP ratio was about 20 – 25 percent. This according to them is the turning point of the Debt Laffer curve. In another variant of the threshold estimation to

¹⁰ Threshold Autoregressive model (TAR); nested TAR and Hansen (2000) methods are other approaches

ascertain “whether and to what extent institutions and policies affect the debt-growth nexus” Presbitero (2008, pp. 4) results show that, institutional quality and policy determine the extent and significance of debt overhang. Thus, debt overhang loses its statistical value in countries with weak institutions. It was concluded that, the debt–growth nexus would be based on country specific institutional framework.

On country studies, there have been specific debt–GDP threshold levels. These include 53% for Jordan (Meghyereh *et al.*, 2003), 60-65% for India (Topalova & Nyberg, 2010), and 35-42% for Indonesia (Mati, 2005). This suggests that, the debt–growth nexus would be based on country specific institutional framework.

The variety of threshold levels warrants country studies for specific policy-making. The literature suggests that, irrespective of income level, institutions, etc, debt has a non-linear effect on growth to some extent. On the whole, a high debt service leads to a fall in public investment. Therefore, the debt overhang theory shows that external debt, beyond a certain level, causes a negative impact on investment which in turn reduces output over time. These linkages are worth estimating and these, therefore offer theoretical framework and methodological basis for estimation.

3.6 Methodological Review

Previous studies applied mostly OLS without investment (Geiger, 1990; Savvides, 1992; Cohen, 1993; Fosu, 1999); Granger Causality tests (Afxentiou, 1993; Afxentiou and Serletis, 1996; Amoateng and Amoako-Adu, 1996); OLS (Anyanwu and Erhijakpor; 2005); 2SLS (Karagol, 2002) and panel estimation (Cunningham, 1993; Deshpande, 1997; Cordella *et al.*, 2005; Pattillo *et al.*, 2004; Caner *et al.*, 2010). We include this key variable, investment on two

grounds: first from theoretical perspective and secondly, from the background of the study-Ghana, in which investment plays an important role.

In addition to the above, other studies utilised cross-sectional/country panel analyses. These studies aggregated groups of countries or developing countries together. But each of these countries has its unique differences. Panel data analyses of debt and output misses out on peculiar country characteristics. This therefore, means that the 'effect of debt burden may vary across these countries' (Karagol, 2002).

A country specific study would offer better results than cross country research results. Cross country studies limit implications for a particular country and thus the application of time series studies for a particular debtor country has the tendency to provide better estimates, for Ghana in view of the implementation of HIPC initiative.

3.7 Empirical Review of External Debt and Economic Growth Relationship

The relationship between foreign debt and economic growth has been studied by a number of authors. This became apparent after the world-wide crude oil crisis of 1979. The crisis led to a recession, particularly in low income countries which peaked in the early 1980s. This was compounded by low prices of primary commodities on the international market. Thus, many low income countries experienced severe debt and debt servicing problems. The crisis and its attendant problems coincided with low output growth, thus necessitating research into the relationship between output and debt.

These studies have considered various aspects which are discussed below. In spite of these, there are new data, new socio-economic debt issues, new debt management policy and new

data analyses methods that warrant country specific research of which this study does for Ghana.

3.7.1 Review of Impact of External Debt on Economic Growth

Chowdhury (1994) examined a panel data for seven selected Asian and Pacific countries: Bangladesh, Indonesia, Malaysia, Philippines, South Korea, Sri Lanka and Thailand. Using data from 1970 to 1980, the investigation of direct, indirect and full effect of external debt on output showed that there is minimal effect of foreign debt on output in the selected countries. Also, from the simultaneous equations, it was concluded that external debt cannot be considered as the main cause of low growth as the overhang hypothesis was also not supported.

In another 2SLS for each of 3 North Africa countries (Algeria, Egypt and Morocco) using 1975 – 1992, Metwally and Tamasckhe (1994) investigated the relationship among debt servicing, capital inflow and economic growth. By using 2SLS and OLS, they concluded that, one-way link cannot be used to explain the causal relationship between debt and growth. On the other hand, a simultaneous model is ideal considering the multi-relationship among the three variables. Their results indicate that debt servicing has the tendency to harm output growth. Also, it was noted that capital flow tendered to be significant in influencing debt - growth relationship. In this case, FDI causes output to grow and provides income to purchase needed domestic and imported inputs. This would reduce the extent of borrowing. Can this be said of Ghana? This needs to be investigated for Ghana.

Accordingly, Olgun *et al.* (1998) looked at the inter-relationship among capital inflows, foreign debt stock, economic growth and investment for Turkey using data from 1965 to 1997. The time series data was analysed with 2SLS and 3SLS. The differences between this study and that of Metwally and Tamaschka (1994) were the choice of exogenous variables. This study also

confirms the two-way relationship between debt stock and debt services. Thus, an increase in debt service obligation worsens debt stock, while the existence of large debt stock also increases debt services. On the other hand, it was found that, economic growth is not influenced by the level of debt service.

By using panel data for the period 1970 – 1988, Levy and Chowdhury (1993) examined how output (GNP), capital stock, and external debt (private and publicly guaranteed) are related. A number of results were found for the 36 highly indebted countries (categorised into Latin America, Asia-Pacific and Sub-Saharan Africa). They indicated that, a country's indebtedness may have several links to influence output. While the country becomes vulnerable to financial distress, it also faces limited foreign exchange. Again, the high level of debt discourages FDI as well as crowding out domestic investment if government resorts to borrowing from the domestic financial market. One of the ways out of indebtedness of government is to raise taxes to pay off debt (and debt services). This, according to Savvides (1992) raises the cost of capital for production, reducing the net returns to invested capital. Again, to ascertain Bullows and Rogoff (1990) assertion that external debt does not primarily cause low growth rate, they confirmed the notion and also postulated that, for Latin America, there is a negative direct effect of public external debt on GNP. This raise the question of what actually is the case of an individual country.

A study on Argentina by Morisset (1991) investigated direct and indirect interactions among external debt, investment and economic growth. Morisset estimated a 3SLS with simulation analysis. The drastic reduction in private domestic investment was argued to have resulted from credit rationing. This reduced the production capacity as investment falls. In addition to this domestic disincentive effect, there is also expectation of high taxes, by foreign investors. These

combine to reduce the incentive to invest. While this study considered the investment linkage, it failed to estimate at what level of debt does it negatively affects output.

To Presbitero (2010) 'results on a panel of low and middle-income countries over the period 1990 – 2007 show that public debt has a negative impact on output growth up to a threshold of 90 percent of GDP, beyond which its effect becomes irrelevant. This non-linear effect can be explained by country-specific factors since debt overhang is a growth constraint only in countries with sound macroeconomic policies and stable institutions'. This indicates how and the extent to which external debt threshold should be country specific.

In their contribution to the debt literature, Abbas and Christensen (2010) showed that, in a panel of low-income countries and emerging markets, at moderate levels, domestic debt has a positive contribution to GDP growth. However, as long as the stock of domestic debt becomes large (above 35 percent), its contribution to economic growth turns negative, due to inflationary pressures and the crowding out of private investment. In another cross-country analysis, Arnone and Presbitero (2010) supported a negative correlation between domestic debt and economic growth in a sample of developing countries.

Safdari and Mehrizi (2011) research showed that, external debt had a negative effect on gross domestic product and private investment in Iran for 1974 – 2007 period. It was noted that, public investment had a positive relation with private investment. Michael *et al.* (2010) maintained that greater ratios of foreign debt to total debt are associated with increased risks of currency and debt crises, although the strength of the association depends crucially on the size of a country's reserve base and its policy credibility. In addition, they were of the view that, financial crisis, driven by exposure to foreign currency, resulted in significant permanent output

losses for the 45 countries studied.

Caner *et al.* (2010) estimate a public debt threshold at 77% of GDP. The indicative non-linear effect of debt on economic growth means that for moderate debt levels, an increase in the public debt–GDP ratio helps in expanding public investment, which translates into growth. But above the threshold level, any additional debt acquired reduces output growth (Abbas and Christensen, 2010; Presbitero, 2010).

3.7.2 Empirical Review of Causality Analysis Between Foreign Public Debt and Economic Growth

In a study of twenty middle–income countries, Afxentiou (1993) investigated the effect of external debt on growth using Granger causality test. The test indicates that, the debt service rates (total debt services and total interest payment to export of goods and services ratios) serve as a significant factor that hinders growth. This led to the conclusion that debt overhang effect is strong for the study period of 1971–1988. This problem was attributed to domestic mismanagement of acquired foreign resources.

In another study of group of 55 countries¹¹, in the frame work of Granger causality test, Afxentiou and Serletis, (1996a) applied six measures of indebtedness for the period 1970 – 1980. This was in a bid to test the theory that if foreign debt acquired is converted into productive uses (capital and other related inputs), then growth would be enhanced. On the contrary, they found that the Granger casualty tests did not show that debt causes economic growth for the study period. This also signifies that the debt overhang hypothesis does not exist

¹¹ The countries were draw from World Bank classification: 19 were severely indebted low income countries, 12 were severely indebted middle income countries, 10 were moderately indebted low income countries and 14 were moderately indebted middle income countries.

for the 55 countries. On the basis of these, they concluded that borrowing countries can use foreign debt to enhance growth if they can convert such resources into productive usage.

In another group of countries study, Amoateng and Amoako-Adu (1996) concluded that there exists a unidirectional causal effect from foreign debt service to output growth. This was the case when the study excluded exports revenue. The study was conducted for 35 African countries¹² for the period 1983–1990, using time series and cross sectional data. Likewise, when middle income countries were examined for 1971 to 1990 period, the same results (as above) were obtained. They found that debt service obligation has causal relationship with GDP. Foreign debt service obligations negatively affected output growth for 1983 – 1990 data for middle income countries. The same negative effect of debt service on output was also found for 1971– 1982 for low income sub-group of African countries.

The negative relationship observed from 1983 – 1990 shows that foreign loans had positive impact on GDP growth before the debt crises. But there has been another debt crises (at later part of 1990s) leading to the formation of HIPC Initiative. To what extent has the debt situation impacted on current and future growth potential? We intend to investigate this and other related issues for Ghana. However, for 1983 to 1990, excluding exports earnings, the study found a bi-directional causality between foreign debt service and GDP growth. Also, on the trivariate analysis, it was noted that, the three variables have joint feedback effect on each other for the 35 countries. But what is the case for each of the 35 countries in which Ghana was included? It is important to know.

¹² The countries were sub-divided into 31-south of the Sahara, 24-low income countries, 11-middle income countries

In another causality test, Karagol (2002) found that debt service negatively affect economic growth in the long run. There is a unidirectional causality from debt to growth. This study was conducted for Turkey, using data from 1956 – 1996, by utilising standard production function and vector auto regressive methodology.

Chowdhury (1994) rejected Bullock and Rogoff (1990) assertion that external debt does not cause low output growth. Rather, Chowdhury’s study shows a feedback relationship between external debt and output growth for Malaysia and Philippines. Other countries in the study were Bangladesh, Indonesia, South Korea, Sri Lanka and Thailand for the 1970-1988 period.

For Ogunmuyiwa (2011), empirical results reveal that causality does not exist between external debt and economic growth as causation between debt and growth was found to be weak and insignificant in Nigeria. This result contradicts causality results of Frimpong and Oteng-Abayie (2003) for Ghana and Amoateng and Amoako-Adu (1996) for African countries.

For the past three decades, a number of studies have analysed the correlation, relationship, causality and linkages between external debt and economic growth in both panel and ordinary least squares for groups of, and individual countries. Among the estimations, there have been those that used single and 2SLS methodology. A summary of the empirical literature along these lines, and other forms of methodology is shown in Table 1.

Table 1: Summary of Literature on External Debt and Economic Growth Relationship

Date	Author	Model Characteristics	Period and Country Features	Study Results
1990	Geiger	OLS, A Distributed Lag Model	1974-1986; 9 South African Countries	There is a statistically significant inverse relationship between the debt burden and economic growth

1992	Savvides	OLS Method	1980-1986 period for 43 Severely Indebted Countries	Debt overhang and decreasing foreign capital inflow have a significant negative effect on investment rates
1993	Cohan	OLS Method	1965-1987, 81 Developing Countries.	External debt does not affect GNP growth rates
1993	Afxentiou	Granger Causality Tests	1971-1988, 20 Middle Income Developing Countries	There is a negative relationship between indebtedness and GDP growth rate
1933	Cunningham	Pooled, Cross Section and Time Series.	1971-1979, and 1980-1987; 16 Heavily Indebted Countries	A strong negative relationship between economic growth and debt burden for 1971-1979
1994	Chowdhury	Causality Test, Time Series Analysis	1970-1988, 8 Developing countries	External debt does not affect GNP growth rate
1994	Rockerbie	OLS method; Nested and non-Nested Tests	1965-1990; 13 Les Developed Countries	Debt service obligation had a significant negative effect on economic growth
1995	Smyth and Hsing	OLS Method	1960-1981, USA	During 1980's and early 1990's federal debt financing stimulated economic growth but during 1986 and 1993 debt ratio expected to hurt economic growth
1996	Afxentiou and Serletis	OLS method	1970-1990, 55 Developing Countries	For the period of 1970-1980, external debt does not affect growth negatively, in 1980 - 1990 the relationship is negative and for 1970-1990 period, reduced importance of debt overhang was realised.
1996(a)	Afxentiou and Serletis	Granger Causality, OLS	1970-1980 for 55 Less Developed Countries (LDCs)	There is no casual relationship between debt and income
1996	Amoateng and Amoako-Adu	Granger Causality Test	1971-1982 and 1983-1990 period, 35 Less Developed Countries.	There is positive causality between GDP growth rate and foreign debt service
1996	Fosu	OLS Method	1970-1986; Sub-Saharan African Countries.	The debt overhang is important than the direct effect of debt hypothesis. It means that debt service payment reduce output growth directly by reducing productivity
1997	Deshpande	OLS Estimate for Panel Data	1971-1991, 13 Severely Indebted Countries	The relationship between external debt and investment is negative
1999	Fosu	OLS Estimation	1980-1990, For 35 Sub-Saharan	Outstanding debt had a negative impact on economic

			Countries	growth
2002	Karagol	Causality	1965-2001, Turkey	Debt service is negatively related to economic growth in the long- run
2005	Cordella, Ricci and Ruiz-Arranz	Panel Analysis	Developing Countries	Negative marginal relationship between debt and growth at intermediate levels of debt
2008	Fosu	Seemingly Unrelated Regression	1975-1994, 35 African Countries	Implied debt service burden adversely affects the share of public spending in the social sector
2008	Presbitero	Panel Analysis	1980-2004, 114 Developing (Low and Middle-Income) Countries	Debt-Growth nexus depends on institutions and policies
2008	Hameed, Ashraf and Chaudhary	Granger Causality	1970-2003, Pakistan	Results points to the existence of short and long-run causal relationship running from debt service to GDP
2009	Sousa, Rocha, and Oreiro	Dynamic Panel	1980-2000, 73 Emerging Countries	“Excessive” external indebtedness can result in a stagnant growth
2010	Caner; Grennes and Hoehler-Geib	Hansen LS Threshold Method	1980-2008; 101 Developing and Developed Countries	If a threshold of 77 percent public debt to GDP ratio is exceeded, each additional percentage point costs 0.017 percentage point of annual real growth
2010	Reinhart, and Rogoff	Histogram Method	20 Industrial Countries	There is a regime shift at 90% threshold debt to GDP ratio
2011 (Feb)	Ogunmuyiwa	Time Series	1970-2007; Nigeria	Weak and insignificant causality between external debt and growth
2011	Safdari and Mehrizi	Time Series	1974-2007; Iran	External debt had a negative effect on gross domestic product and private investment

Source: Author

In spite of the contributions made by these studies, there were some issues that were not considered adequately (to the best of my ability) in previous studies including:

- Few country specific studies;
- Few studies considered the interrelationship among the three key theoretically-related macroeconomic variables;
- Most studies on Ghana (and in which Ghana was included) did not estimate the level of debt beyond which debt becomes growth inhibiting;

- Most studies on Ghana and in which Ghana was included did not estimate the growth cost of debt;
- Studies on Ghana did not consider the extent of debt overhang and crowding out; and
- Different results were reached for different regions even for the same study. On the basis of these, we estimate both threshold and crowding out effects for Ghana.

These issues inform gaps in literature and the choice of methodology for the Ghana study.

3.8 The Socio-Economic Burden of Debt

The impact of external debt can be numerous. This is looked at from the perspective of current and future generations. Accordingly, there are about four views on how current and future generations share the burden of debt (Rosen and Gayer, 2008). Here, debt include both domestic and external debts and depends on how government decides to finance any debt whether through taxes and other domestic forms or from foreign borrowing.

The first view, *Lerner*, accordingly states that, domestic debt creates no future burden for next generation. Thus, consumption levels of future generations are no worse off, as consumption levels would be what it would have been. For external debt, it is argued that if the amount is used to finance current consumption goods, then future generations would suffer as they would have to pay for the ‘sins’ they did not commit. Their consumption would be reduced by an equal amount of the debt and interest to be paid. On the other hand, if the loan is used to purchase/finance capital investment which boost output, then the impact of the burden of the debt would depend on the relative magnitude of the rates of interest and productivity from the loan’s investment. Thus, if the returns from investment from the loan exceed the rate of debt

obligation, then future generations would be better off, otherwise future generations would be worse off.

The second view is that of the *overlapping generations* model. This model is based on three different generations: new/young, middle and old. With respect to type of financing of debt, there would be no difference between current and future generations welfare regarding the use of taxes. On the other hand, the use of foreign borrowing will impact on different generations differently. The old generation that 'benefited' from the use of the debt would exit (die off by the time the debt needs to be repaid) the model and would not pay for the amount of the welfare they enjoyed from the debt. The category of people who were young when the loan was contracted would have been in the middle generation at the time of repayment of debt. Thus, they would experience a reduction in consumption/welfare as they would have to contribute to pay for the debt in one way or the other such as taxes or reduction of investment. As the old generation dies off, a new one comes on board. This new generation would also bear a part of the debt burden as they would suffer from its consequences in terms of repayment. Thus, the amount of taxes that this generation would pay (or amount of welfare loss) is at least equal to the amount of the debt the old generation enjoyed and has died with it, without paying anything.

The third is the *neoclassical* view. This view holds that either taxes or debt finance of deficit affects capital formation. This view holds that when government use taxes to finance debt, current generation's consumption falls, savings may also fall which may affect work habits. Labour may reduce participation which would affect output. Again, tax financing reduces resources available to the private sector. Also, assuming there are no taxes, when governments borrow or debt finance particularly from the domestic economy, it crowds out private investment. This leaves future generations with a smaller capital *ceteris paribus*, affecting

capital formation. Thus, future generation's capital falls. They would have smaller real income and become less productive all other things being equal. On the whole, debt finance imposes some burden on future generations. This works through its effect on capital. But total capital stock would increase when there is productive use of the capital extracted from the debt finance.

The fourth view- *Ricardian* model is a variant of the overlapping generations model. It says that the old generation that enjoys a higher welfare as a result of the increased investment by using debt, they (old) generation will save an equal amount for their heirs to repay the debt so that the new generation can use this saved amount plus interest to offset the future tax burden of the new generation. In effect, consumption/welfare level of each generation is intact as each enjoys the same level of welfare. In this view, individuals try to undo the government's financing option. Thus, whether the government uses tax or debt to finance debt service, social welfare remains the same.

3.9 Causes of External Debt Accumulation in Ghana

The original source of external debt problem is within a country. It starts from an imbalance between annual domestic resource mobilisation and planned public expenditure. When fiscal revenue falls short of government current spending, there is fiscal deficit¹³. This sets in motion the practice of seeking for other commercial domestic and external financial assistance to close the gap if the government insists on increasing resources to match up with expenditure. This implies that one of the options of getting revenue, that is, to tax domestically is inadequate due to domestic tax structure, tax administration problems and structure of the economy. This is the case when availability of external grants and domestic borrowing (from private sector-

¹³ This can be measured in terms of (i) cash basis, which is the difference between total flow of government expenditure and fiscal revenue or (ii) accrual (or payment order) basis involving income and spending flows regardless of whether they involved cash or not

commercial banks and through the issues of bonds and other open market operations) are assumed.

A number of domestic factors have been raised as the causative agents of developing countries external debt accumulation. Among the frequently quoted factors are fiscal irresponsibility (Krugman, 1988); wrong exchange rate regime, poor savings caused by low or negative real interest rate and financing long term projects with short term loans, unfavourable terms of trade, sometimes rising loans' interest rates and particularly conditions attached to loan agreements.

The urge to solve this domestic problem calls for foreign capital in various forms, either at a cost or free. When it costs, then it must come from loans of various types, assuming away all administrative and transaction costs. These costs (administrative and transaction) usually does not present a problem for borrower countries, but the amount borrowed to fill the fiscal gap and the cost of the amount-interest payments. On the other hand, the amount borrowed to some extent is influenced by the level of the domestic revenue shortfall, which in turn is determined by the level of fiscal deficit.

As stated earlier, domestic fiscal deficit serves as the root cause of seeking external funding of any type. The extent of the fiscal deficit also depends on how the fiscal stance is calculated. The causes of fiscal deficits in countries may arise from various factors. However, the domestic causes of fiscal deficit in Ghana can be categorised into three main groups: first are those that relate to growth in government expenditure; second, those arising from poor revenue performance and third, inappropriate budgeting process.

3.9.1 Growth in Government Expenditure

From the theories of expenditure (Developmental theory, Wagner's Law-industrialisation process, and Peacock and Wiseman theory, etc), over time, public expenditure will increase relative to per capita income. The need to speed up the development of many low income countries has prompted their governments to expand their expenditure outlay, particularly in social services. For instance, in Ghana, there has been an upward trend of government expenditure as seen in Figure 7. Areas of government activities in Ghana that cause growth in public expenditure include the following:

- i. Political ideology-socialism (free education, health, water, etc);
- ii. Public sector expansion particularly through bureaucratic process and large public sector administrative cost;
- iii. Existence of 'white elephant projects', infrastructural projects which are not completed and thus cannot be used. Thus, the cost of constructing to that stage becomes wasteful since there cannot be any benefit derived from such projects;
- iv. Existence of 'ghost' workers' names on the payroll;
- v. Fictitious payment for goods and services not supplied at all (corruption).

Expenditure might be increasing which might be good for the nation but it ignores one fundamental issue, which is external debt repayment. In most of SSA countries, the share of total expenditure allocated to debt repayment has been growing dramatically (Figure 11). Debt repayment expenditure does not provide any domestic service, employment, infrastructure, etc.

3.9.2 Poor Revenue Performance

One of the two determining factors of domestic fiscal deficit (which leads governments to borrow) is government revenue. High revenue performance-tax yield commensurate with

expenditure would eliminate any possible deviation from total expenditure. For Ghana to have a good tax performance, the following factors need to be corrected:

- i. Lack of appropriate tax policy and ambiguous tax legislation;
- ii. Complex tax structure and multiplicity of high tax rates;
- iii. Existence of many generous exceptions (either statutory, discretionary or both) and
- iv. Low revenue productivity.

3.9.3 Inappropriate Budgeting Process

Inappropriate budgeting processes in Ghana have effect on budget deficit. Some of these processes include the following:

- i. Lack of aggregate fiscal discipline, particularly the use of *soft budget constraints*¹⁴, where the expenditure constraints can be exceeded. This usually happens when there is the possibility of supplementary budget; and
- ii. Poor fiscal management. When appropriate supervisory agencies are not performing as required, the planned expenditure outlay may be exceeded. This will lead to inclusion and implementation of unbudgeted expenditure items.

3.9.4 Other Domestic Factors

When there is a gap between government expenditure and revenue, fiscal deficit results. Although there are many ways government can offset deficit, if she decides to use external borrowing, then it is expected that the investment from the use of such funds will yield returns that are higher than the repayment responsibility (interest payment). When this fails, because of policy, misuse of funds or any other domestic factor, it sets in a cycle of debt trap. In this case, the objective of securing the loan is defeated and becomes a long term economic problem.

¹⁴ The opposite is hard budget constraints. In this case, the government cannot exceed the budget constraint

The level of benefit of borrowed funds depends on the returns rate of investment from such funds and the interest rate of the loans. It is normally expected that economic growth rate and development would improve as the returns should be relatively higher. On the contrary, in Ghana's case, funds are usually used for capital and infrastructure activities which usually have long maturity/gestation period. Thus, such projects require huge funds to the extent that, inability to secure long term loans for them creates problems. This has resulted in abandonment of projects midway while interest has to be paid. From Appendix 4, the trend of annual interest on loans has been hovering around 1.6% in the 2000s. On the other hand, the average rate of returns on investment from loans is estimated to be in the range of 0.8% – 1.1% (Osei, 1995). This difference indicates that, Ghana needs to invest external loans in short yielding but productive projects that can payoff in terms of higher output, higher exports promotion and employment creation.

Poor savings rate is a combination of several institutional and national policies that provide a wedge between deposit and lending rates. Since the institution of the Monetary Policy Committee of the Bank of Ghana in 2002, the lending rate has relatively stabilised than before. In addition, the gross domestic saving (as % of GDP) has not seen massive improvement. In Ghana, the low savings rate may have been due to a combination of factors: low remuneration, high prices of goods and services, low interest on deposits (i.e. the higher gap between lending and deposit rates) and general low savings culture.

Closely related to this is the low investment to GDP ratio. It is seen that, private (domestic) investment has lagged behind public investment occasionally until 2004 (Figure 15). This is not extraordinary in developing countries as certain major institutional facilities are expected to exist or provided by government to complement or facilitate smooth running of the private sector. In addition, major private investment in Ghana has come by way of FDI, in principally

few areas; financial sector (banking mainly), mining and construction sectors. For Ghana to benefit immensely from general investment, fast and high exports yielding investment should be encouraged to generate faster rate of returns than debt repayment.

Another management issue is the financing type of projects in developing countries. Inappropriate planning and mismanagement of loans can also lead to huge losses of loans. When long term projects are financed with short term loans, there is high probability that more loans would have to be contracted. These would speed up the repayment rates which would compound the economy's problems. This is because, such projects would either not get completed or the returns would be far into the future, with debt repayment occurring early in the life of the project.

3.9.5 External Factors

The causes of external debt accumulation are without foreign contribution. Developing countries' economies oftentimes have been destabilised by various exogenous international factors. One of the foreign factors is the world crude oil price shock, particularly in the 1979 and 2008. Crude oil price hike is one of the most important international factors. Over the years, crude oil prices have contributed to world's economy instability. Such price rise have thrown over board country's budgets and increased imports beyond expectation.

Unfavourable terms of trade particularly for developing countries have also underpinned debt accumulation. The export prices of primary product of which some developing countries exports are low relative to imported processed goods. Thus, the volumes of export from such countries like Ghana keep increasing, but the export value does not increase in the same proportion. In this case, such developing countries would have to obtain extra funding to supplement their export earnings, leading to debt accumulation.

Another factor is the interest rate on loans. Generally, the difference between the repayment responsibility and exports growth rate determine how fast a country can either reduce debt stock or not incur debt at all. With the nature of the world financial market, countries have sometimes resulted to obtaining loan from the international private commercial market. These rates are always higher than the concessional rate from official credits. Although, Ghana's debt stock has tilted towards official sources, there is some level of private external debt.

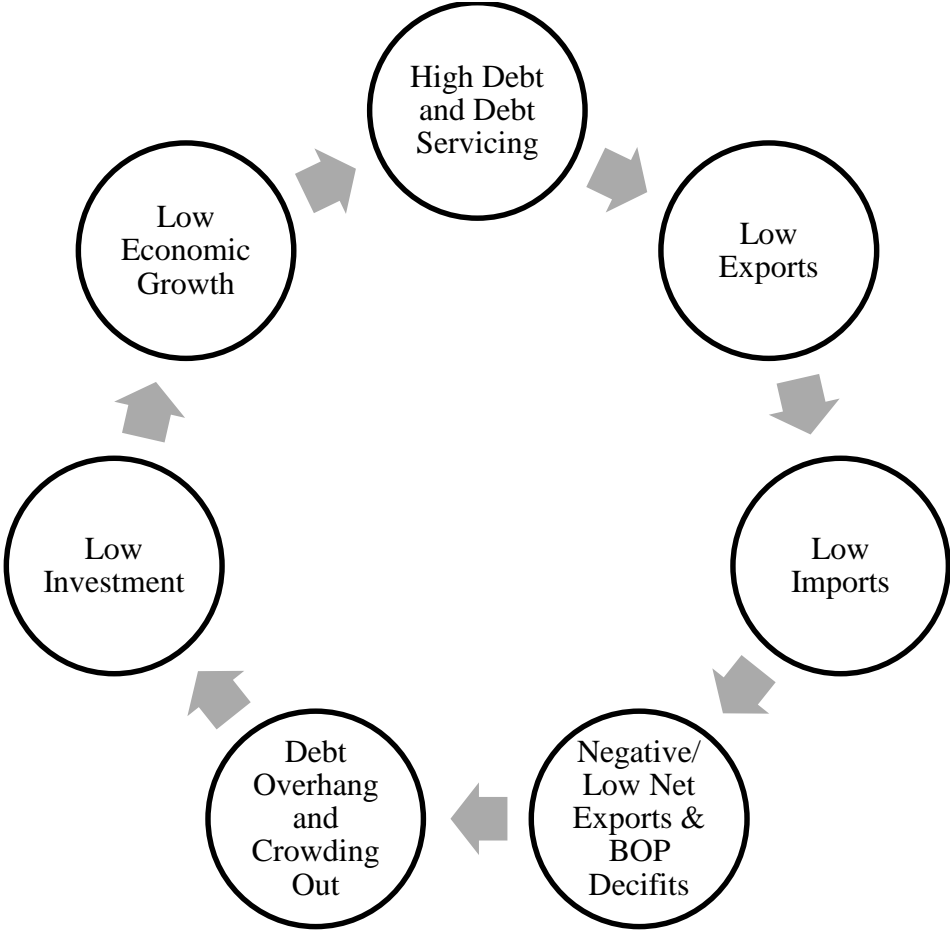
Moreover, the liberal lending facility on the world financing market has also been raised. Despite the fact that countries have huge debt stock, such countries continue to receive loans irrespective of their inability to pay previous or existing debt. The precarious state of debtor countries is sometimes overlooked.

Generally, these can be presented in a vicious cycle of debt as in Figure 19. Irrespective of the initial cause of the external debt, whether from the domestic or external sectors, a high debt and debt servicing reduce the achievement of the full benefit of export revenue. To meet debt servicing obligations, a certain proportion of export revenue would be retained to pay for arrears and debt service due. This will eventually reduce the availability of imports, especially essential capital goods and also minimise the implementation of infrastructure projects.

These developments result in negative or low net exports and balance of payments deficits, perpetuating the debt problem. In this case, debt overhang and crowding out effect set in to influence total public and private investment. With low investment, employment, income and resources would be low. The resulting condition is low economic growth. This low output and economic growth lead to low income, compounding external debt situation as countries would continue to incur more debt to implement expenditure programmes or maintain arrears and

worsen interest payments in the future. This cycle goes on and on and can be termed as vicious cycle of debt trap as illustrated below.

Figure 19: Vicious Cycle of External Debt (Debt Trap)



Direction of Flow: \Rightarrow

Source: Author

Generally, whether a country will be able to service her debt or not will depend on a number of factors: Size of the existing debt stock; trends in the country’s deficits; existing financing mix between loans and grants; and domestic country’s repayment capacity (that is, GDP growth, exports, other government revenue).

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CHAPTER FOUR

METHODOLOGICAL FRAMEWORK AND MODELS SPECIFICATION

4.1 Introduction

Various studies have used different methodologies for analysing the relationship between external debt and economic growth. These methods include OLS for both linear and non-linear effects, Granger causality, panel methods and cross sectional methodology (Table 1). For Ghana specific studies, Osei (1995) used simulation approach while Frimpong and Oteng-Abayie (2003) used Granger causality to establish the correlation between them. A number of other studies considered group of countries of which Ghana was included, used panel regression. On the basis of these and availability of new data, current debt relief initiative that Ghana has gone through, this research utilises both linear and non-linear methodologies to examine the impact of external debt on economic growth and investment. This has the advantage of providing holistic results commensurate with reasons offered earlier.

Foreign debt accumulation and lack of accelerated growth have been raised recently in Ghana. Indeed such debt and its service serve as a source of ‘debt vicious circle’ or ‘debt trap’¹⁵. In many low income countries, debt and debt servicing coupled with low foreign exchange earnings (low exports earnings) lead to severe import constraints. Import constraints or negative net exports reduce resources for economic growth as import constraints could limit export growth. The resulting crowding out depresses domestic investment and leads to debt overhang. Declining domestic investment together with such critical constraints lead to a decline in output level. Also, the falling real output and deteriorating balance of payments deficits may lead to debt accumulation, and rising debt service payment obligations (see Figure 16 for various linkages).

¹⁵ See Figure 19

On the basis of the structural weakness of the Ghanaian economy, there is likely to be a potentially slower economic growth and socio-economic development. It has been recognised by both domestic actors and international stakeholders that, without accelerated levels of investment, exports, etc, output growth will remain stagnant. Thus, rapid economic growth would not accelerate so long as the debt burden (debt and debt servicing) remain unsustainable¹⁶. Through the debt burden, a sizeable proportion of resources are transferred abroad to service debt. It is clear that, there is no way in which many SSA countries can service their debt and still have adequate resources left for development finance (Iyoha, 1999, pg. 7). This situation has become the concern of many development analysts, stressing that dealing with debt is a necessary and sufficient condition if enhanced economic growth can occur. Therefore, the interrelationship among external debt, investment and economic growth need to be considered together. This serves as methodological base. The econometric specification entails equations explaining output and investment.

4.2 Theoretical Framework

This section presents a framework indicating the linkages among external debt, investment and economic growth. The relationship between external debt and economic growth is analysed by using an open macroeconomic model. This draws from Ajayi (1991), Degefe (1992) and Obadan (2004). The model starts with a growth function, (Y), and how it relates to external debt and investment.

Goods and services, Y , in this economy are assumed to be produced from capital inputs (K), labour¹⁷ (L) and human capital development (H) in a particular period. This can be formulated in functional form as:

¹⁶ Simply defined as inability to return and use a sizeable portion of foreign earnings from exports of goods and services due to huge external debt servicing obligations

¹⁷ Two types of labour (skilled and unskilled) are required for aggregate production. But given that the unemployment rate is high, it is assumed that the supply of unskilled labour is perfectly elastic, leaving skilled

$$Y = f(K, L, H) \quad (1)^{18}$$

in which output changes with respect to marginal productivities of the inputs. Also, the sum of capital flow is obtained from domestic sources, K_d with a fraction $(1 - \alpha)$ and the rest K_m , with fraction (α) as imported. Thus, K becomes:

$$K = K_d + K_m = (1-\alpha) K_d + \alpha K_m \quad (2)$$

We assume that the continual accumulation of external debt presupposes that domestic revenue follows a steady trend suggesting that, it can be taken as given. On the basis of this, the emphasis is placed on how high growth would be when externally borrowed funds are used to supplement domestic revenue.

The total imported capital can be obtained in two forms: loanable funds, αK_i , and intermediate inputs, whose proportion of output is θ . In addition, these are supplemented with foreign public (and private) transfer payments, (T) .

Thus, equation (2) becomes the total capital resources for production, specified as

$$K = K_m = \alpha K_i + \theta Y + T ; 1 > \alpha > 0 \text{ but } \alpha < 1 - \alpha \quad (3)$$

As K is used to produce, then it is equivalent to total debt as

$$\alpha K_i + \theta Y + rD \quad (3a)$$

which in the next period would be paid for by the amount of foreign exchange earned from exports of goods and services (X) , whose proportion of output is given by π , (πY) , transfer payments and current external borrowing (B) :

$$(\pi Y) + T + B \quad (3b)$$

Thus, for equivalence, the sum of resources should be equal to debt accumulation. This relation can be written as $K \equiv (\pi Y) + T + B = \alpha K_i + \theta Y + rD$ (4)

where $\theta, \pi, > 0$; r is interest rate on foreign debt and D is foreign debt stock.

labour as the relevant factor to enter the production function. This is valid given that, the productivity of skilled labour is expected to be higher relative to unskilled labour a priori.

¹⁸ In conformity with neoclassical and endogenous growth theories (Romer, 2006)

Rewriting equation (4)

$$-(B+T) = \pi Y - \theta Y - \alpha K_i - rD \quad (4a)$$

In order to derive a common measure of growth when external debt exists, equation (4a) is divided by Y, to become

$$-\left(\frac{B}{Y} + \frac{T}{Y}\right) = \frac{\pi Y}{Y} - \frac{\theta Y}{Y} - \frac{K_i}{Y} \alpha - \frac{rD}{Y} \quad (5)$$

For simplification purposes, let $t = T/Y$ and $d = D/Y$ represent transfer payment and debt respectively. By substitution, these lead to equation (6).

$$-\left(\frac{B}{Y} + t\right) = \pi - \theta - \frac{K_i}{Y} \alpha - rd \quad (6)$$

B is the amount by which the debt stock changes annually, thus, $\frac{B}{Y} = \mathbf{g} \cdot \mathbf{d}^{19}$, and $\frac{K_i}{Y}$ can be capital-output ratio, λ , where $\lambda > 0$ but it is assumed to be relatively smaller since Ghana has higher labour intensive relative to capital intensive method of production. Solving for \mathbf{g} in (6) gives

$$-(gd + t) = \pi - \theta - \lambda \alpha - rd \quad (7)$$

$$-gd = \pi + t - \theta - \lambda \alpha - rd \quad \text{simplifying} \quad (8a)$$

$$g = \frac{\pi + t - \theta - \lambda \alpha - rd}{-d} \quad (8b)$$

From equation (1) taking partial derivatives with respect to L and H to obtain the marginal products, the expression describing the effect of these variables becomes

$$\frac{\partial \mathbf{g}}{\partial L} > 0 ; \frac{\partial \mathbf{g}}{\partial H} > 0 \quad (9a)$$

and the relationship between output and external debt can be estimated by taking a partial derivative²⁰ of \mathbf{g} with respect to \mathbf{d} from equation 8b, leading to

¹⁹ Since $d = D/Y$ and $g = B/D$, then $gd = (D/Y) \cdot (B/D)$. To maintain a stable debt stock and avoid a Ponzi game, it is assumed that, the growth rate of external debt is the same as g , the growth rate of output, GDP

²⁰ Using the quotient rule

$$\frac{\partial g}{\partial d} = \frac{[\pi + t - \theta - \alpha\lambda]}{[d]^2} > 0 \quad (10)$$

It is noted that²¹, $\pi > \theta$ and $\alpha < 1 - \alpha$, since the proportion of total domestic financing has been larger than external debt generally. Thus, $\alpha\lambda$ would be smaller relatively, making $\frac{\partial g}{\partial d} > 0$.

Given that the denominator of (10) is positive, then $\frac{\partial^2 g}{\partial d^2} < 0$ (11)

The second derivative indicates that, beyond the turning point, the relationship between debt and growth is negative. In other words, the contribution of debt to growth begins to fall after the turning point.

From equation (10), $\frac{\delta g}{\delta d} > 0$, although the impact would be positive, the extent of the impact would be relatively higher provided that:

- a. Share of exports in GDP (π) is high;
- b. Transfer payment as proportion of GDP (t) is high;
- c. Imports of intermediate inputs (θ) is low;
- d. Proportion of imported capital/foreign borrowing (α) is small; and
- e. Incremental capital-output ratio (λ) is small (i.e., capital is used efficiently).

These conditions are plausible given that, external funds do not work in isolation but have to interact with institutional, economic and policy environment to yield greater output response. Given that these conditions hold, then any initial level of debt would most likely generate better impact on growth. The opposite of these conditions would serve to retard the contribution of external debt to growth.

In similar fashion of open macroeconomy, external debt growth can be framed. Following Obadan (2004), the growth of external debt can be constructed formally as follows: let r_t

²¹ r , interest rate on loans cancels out through the partial derivative process but it is taken care off in the empirical section (See Appendix 12)

represent the average interest rate on external debt in period t and D_t represent the total stock of debt at time t , then the amount of interest on foreign debt can be given as $r_t \cdot D_{t-1}$. Given the above, the change in foreign debt at the current year can be written as

$$D_t - D_{t-1} = r_t \cdot D_{t-1} + (M_t - X_t) \quad (12)$$

where M_t is annual imports of goods and services; X_t is annual exports of goods and services and $(M_t - X_t)$ is current account deficit. Dividing equation (12) by D_{t-1} to obtain growth of external debt, g_d , it follows that

$$g_d = \frac{D_t - D_{t-1}}{D_{t-1}} = r_t + \frac{(M_t - X_t)}{D_{t-1}} \quad (13)$$

To relate the growth of debt to growth of output, multiplying and dividing the last term of equation (13) by Y , and dropping the $t-1$ for simplicity leads to

$$g_d = r_t + \frac{Y_t}{D_t} \left(\frac{M_t}{Y_t} - \frac{X_t}{Y_t} \right) \quad (14)$$

Equations (13) and (14) show the growth of debt is determined by interest rate on debt, non-interest current account deficit and output relative to stock of debt. Thus, g_d will be higher when there is higher borrowing interest rate and higher current account deficit relative to the stock of debt of previous period. Alternatively, g_d grows (is high) when r is high, imports constitute a higher share of GDP relative exports and D become large relative to Y .

The formulations in equations (13) and (14) take into consideration only the foreign exchange gap. Reformulation of these to take care of the other two financial gaps would give g_d as

$$g_d = (I - S) + rD \quad \text{Savings Gap} \quad (15a)$$

$$g_d = (G - T) + rD \quad \text{Fiscal Gap} \quad (15b)$$

To capture the savings and fiscal gaps into the model in another form, the identity relating the demand for final goods to uses of income is of importance: $Y = C + I + G + X - M = C + S + T$ which can be written as

$$(M - X) = (I - S) + (G - T) \quad (16)$$

Substituting equation (16) into (14) yield another growth rate of foreign debt in terms of the domestic gaps (savings and fiscal) as

$$g_d = r_t + \frac{Y_t}{D_t} \left(\frac{I_t - S_t}{Y_t} + \frac{G_t - T_t}{Y_t} \right) \quad (17)$$

From equations (14) and (17), it presupposes that higher ratios (values) of X/Y , S/Y and T/Y would reduce the growth of external debt. Also, g_d can be reduced when r is less than growth rate of exports, taxes, savings and income.

The system above can be reformulated to capture how output and debt stock affect investment. This draws from Ajayi (1991). Redefining Output, Y , as $Y_t = \lambda K_t$ (it implies $Y_{t-1} = \lambda K_{t-1}$) where K_t is capital stock and λ is the reciprocal of the incremental capital-output ratio²². If we define $\Delta Y = \lambda(\Delta K)$ and change in capital stock as $\Delta K_t = I_t - \delta K_{t-1}$, where δ is depreciation rate of capital and I is investment

then $\Delta Y = \lambda (I_t - \delta K_{t-1}) = \lambda I_t - \lambda \delta K_{t-1}$; substituting for λK_{t-1} , and given that $\Delta Y_t = Y_t - Y_{t-1}$

then $Y_t - Y_{t-1} = \lambda I_t - \delta Y_{t-1}$; simplifying

$$Y_t = \lambda I_t + (1 - \delta)Y_{t-1} \quad (18)$$

Given the income identity without government sector, $C_t + I_t + X_t - M_t = Y_t = C_t + S + rD_{t-1}$ where national income is consumed, saved and/or used to service debt, and from the foreign exchange gap

$$I_t = (M_t - X_t) + rD_{t-1} + S_t = g_d + S_t \quad (19)$$

But total savings is a proportion of national income, Y , less debt service, rD_{t-1} ; $S_t = s (Y_t - rD_{t-1})$ where s is the savings rate.

Using equation 18 and substituting into I , equation 19

$$I_t = s (Y_t - rD_{t-1}) + (M_t - X_t) + rD_{t-1} \quad (20)$$

²² This means that $\lambda = Y/K$

$$I_t = s [\lambda I + (1 - \delta)Y_{t-1}] - s r D_{t-1} + M_t - X + rD_{t-1} \quad (20a)$$

$$I_t - s\lambda I_t = s(1 - \delta)Y_{t-1} - s r D_{t-1} + g_d \quad \text{making } I_t \text{ the subject} \quad (20b)$$

$$I_t = \frac{s(1 - \delta)}{1 - s\lambda} Y_{t-1} - \frac{sr}{1 - s\lambda} D_{t-1} + \frac{1}{1 - s\lambda} g_d \quad (21)$$

From equation (21), given that each of the parameters (s , r , λ , δ and the denominators are positive) is less than unity, investment depends on GDP level, debt stock and the growth of debt. Taking a partial derivative of I with respect to Y , D and g_d , (if we drop the lags for simplicity) investment is postulated to be positively related to income (GDP), as the accelerator effect suggests. On the other hand, debt stock is expected to have a negative effect on gross investment. But the growth of debt may or may not decrease investment as it will depend on the direction of change. The above framework serves as a basis to specify the models. Equations (10), (14) and (21) show the linkages between the theoretical framework and models specification.

4.3 Specification of Empirical Equations

The above (from Chapters 2 and 3) points to the fact that, there is interdependence between external debt stock and investment which links with output. First, this has come about due to the fact that, the level of economic growth influences debt servicing capacity of a country. Second, there may be a close relationship between total debt stock and debt servicing. Third, any form of external funds, depending on their characteristics and domestic economy's status, may to an extent influence economic growth. Fourth, domestic government's monetary and fiscal policies of interest rate, exchange rate and balance of payments may also affect external debt which in turn would also affect output. Fifth, economic growth would also limit flow of foreign debt. Last, the interactions among economic variables through specific policies

affecting exports, domestic savings and revenue mobilisation may be directly or indirectly related.

The literature review undertaken in Chapter 3 portrays that, the relationship that exists between economic growth and foreign debt in a country may be complex. The links through which debt affects output are clear. Ghana and other SSA have and continue to experience a sizeable portion of foreign resources from exports being used to service external debt (see Figures 8, 9 and 12). This can be a disadvantage to such countries as exports earnings are used to service debt instead of enhancing growth. The benefits of multiplier effects are lost, perpetuating a continual dependence on foreign financial assistance, leading to external debt as indicated by Metwally and Tamaschke (1994). When the debt service begins to rise, it leads to other negative implications and consequently affects the overall development state.

The threshold effect has its roots in the theories of debt and growth, that is, direct and indirect (overhang and crowing out) effects (Section 3.3). Generally, they propose that, overtime, accumulation of external debt will in the future grow faster than the ability to pay, as expected debt service will discourage both domestic and foreign investment and thus hamper output growth. They suggest a non-linear relationship between external debt and economic growth in the long run (Figures 16 and 17).

The threshold effect suggests that at an initial stage, developing countries require a certain minimum level of debt (external financing). This is basically to fill the gaps of savings and foreign exchange. Thus, investment increases as a result of availability of funds leading to higher level of growth. This growth further improves ability of a country to reduce debt, enhance debt services and avoid debt accumulation, enhance foreign direct investment as expectation of future tax is low.

Literature on the impact of debt on economic growth is few particularly on individual country case. For Ghana, we extend insights from literature on the debt issue while using a different methodology for the analysis. By using more recent data and longer period, we estimate three main models of Ghana from 1970 to 2009.

4.3.1 Economic Growth Model

The empirical model is derived from the theoretical framework. The implied formulations in equations (9a), (10) and (11) lead to a specification as

$$\dot{y} = f(L, H, \pi, t, \theta, \alpha, \lambda) \quad (22)$$

Thus, the growth function becomes:

$$\dot{y} = f(LF, GCF, EE, D, D^2, OP, F) \quad (23)$$

which translates into a regression model:

$$\dot{y}_t = \alpha_0 + \alpha_1 (LF)_t + \alpha_2 (GCF)_t + \alpha_3 (EE)_t + \alpha_4 (D)_t + \alpha_5 (D)_t^2 + \alpha_6 (OP)_t + \alpha_7 (FIS)_t + \alpha_8 Dum_t + \alpha_9 \dot{y}_{-1t} + \varepsilon \quad (24)$$

Labour and human capital enter into the model on three bases. First from the earlier assertion of equation (1), second, from the conventional basis in literature and third, is the emphasis on human capital development in new growth theories.

Equation (24), which specifies the economic growth model, depicts economic growth rate, \dot{y} , as being determined by investment capital–gross capital formation²³ as percentage of GDP (GCF) and total foreign debt to GDP ratio (D). The square of external debt to GPD ratio is use to take care of non-linearity, that is a quadratic specification. In addition to these, literature suggests some control variables. These conventional and control variables applicable for the

²³ For simplicity, λ and K_d are assumed to be subsumed and imbedded in GCF and D

study include labour force growth rate (LF), human capital development which has received considerable emphasis in explaining differences in long term growth across regions/countries, represented by public educational expenditure²⁴ as percentage of GDP (EE); level of openness, proxied²⁵ by sum of exports and imports to GDP ratio (OP), and macroeconomic stability, which has been shown to affect growth is captured by fiscal balance as percentage of GDP, (FIS).

It is expected that, the coefficients α_1 , α_2 and α_3 would be positive. In other words, all traditional factors of production are expected to stimulate economic growth. Whenever domestic and international absorption increase leading to increased aggregate demand, labour and capital usage would also increase. Particularly, higher return to capital and more profit would result in increased usage of capital and investment as a consequence would rise²⁶. The capital obtained from abroad may have many effects, in the short and long runs. Such multiplier effects would further improve output ($\alpha_4 > 0$). This notwithstanding, debt servicing is a drag on growth, thus a negative sign is expected ($\alpha_5 < 0$). By implication, exports are expected to have a positive effect on output while interest rate on loans, debt service would have a negative impact on output. In this case, even if output rises, the responsibility to remit part of it to service debt reduces the amount of resource available to enhance growth and development.

Generally, higher exports earnings and efficient use of imported inputs would accelerate growth ($\alpha_6 > 0$) as they would improve the productive economic resources capacity of any country. Also, on the basis that domestic revenue generation is not growth inhibiting and growth enhancing public expenditures are undertaken, then fiscal policy is expected to improve

²⁴ This is used due to lack of data on school enrolment

²⁵ To capture π and θ

²⁶ In respect of the Tobin's q proposition

output ($\alpha_7 > 0$). These would minimise dependence on external loans which eventually avoids the likely negative effect of debt service obligation on an economy.

In an effort to find reasons why there are wide gaps in growth patterns, institutional factors have been raised in developing countries. Within this new paradigm of explaining the growth differences among countries, various institutional factors have been proposed and used²⁷ in the literature for various reasons. In view of this, we incorporate the form of governance, represented by a dummy (dum). The dummy takes the value of 1 for all years in which there were democratically elected government and the value of zero for any other year. The impact of democratic governance is likely to affect output in about two ways. First, by establishing consensus through agencies such as parliament on the proper procedures for the use of contracted loans, is likely to enhance the yield from loans. However, this does not rule out the fact that loans have been secured under military/dictatorship regimes. Second, the values of accountability enshrined in democracy serves as a pivot to ensure that, economic activities are coordinated and planned well to achieve results. Thus, α_8 is not known a priori ($\alpha_8 > / < 0$).

The level of previous income was included to capture the idea that, past income may influence the level of economic activities and serves to capture the market potential. Generally, a higher accumulated income has a tendency to improve the growth rate of present output. Thus, it is expected that, the contribution of accumulated income would improve future output ($\alpha_9 > 0$).

²⁷ Such as the World Bank's Country Policy and Institutional Assessment (CPIA) in World Development Indicators

4.3.2 Investment Model

4.3.21 Private Investment Model

As explained in section 3.3, the impact of external debt on output has been theorised to pass through its impact on investment²⁸. These overhang effects, caused by crowding out of debt on investment and other indirect constraints have been hypothesized to be negatively related to private and public investment (Sachs, 1989; Krugman, 1988). Other studies have confirmed the crowding out and overhang effects such as Iyoha (1999), Anyanwu and Erhijakpor (2005) and Ayadi and Ayadi (2008) for groups of countries.

Following such studies as mentioned above, theoretical review of debt and output relationship on one hand and review of investment theories on the other, and Ghana's specific case, a private investment demand function is specified. Also, an allowance is made for the potential existence of crowding out and overhang effects of external debt as well as the investment accelerator effect, policy and institutional uncertainties. As specified in equation (25), it takes account of the new issues of importance.

The private investment model (based on the neoclassical model) is given by equation 25.

$$PI_t = \theta_0 + \theta_1 \dot{y}_t + \theta_2 D_t + \theta_3 E_t + \theta_4 Int_t + \theta_5 DSX_t + \theta_6 DC_t + \theta_7 CT_t + \theta_8 PUI_t + \varphi_t \quad (25)$$

Where PI is private investment to GDP ratio, \dot{y} is GDP growth, to reflect the 'investment accelerator effect' and market potential, D is the ratio of external debt to output, expected to measure overhang hypothesis, E is the rate of exchange (defined to reflect the fact that, an increase in the value represents a depreciation), Int is commercial interest rate (lending rate), DSX is the ratio of debt service to exports, expected to capture the crowding out effect, domestic credit to GDP ratio (DC), to reflect the effect of availability of funds, corporate tax to

²⁸ Objective three is hereby considered.

GDP ratio (CT), to estimate the level of perception about profit, public investment to GDP ratio (PUI) to show how public investment facilitates private investment, ε is the error term and t is time dimension.

In the specification, private investment growth depends negatively on domestic interest rate, negatively on external debt to GDP ratio, negatively on debt service to exports ratio, positively on output and investment climate. The level of exchange rate effect is not determined a priori, but could be positive or negative on investment. When there is accelerated economic growth, capital inflow in the form of FDI would also improve. The increased economic growth will further enhance investment. Thus, economic growth and private investment are positively related as the accelerator effect suggests ($\theta_1 > 0$).

Exchange rate may or may not positively relate to private investment growth. This is on the grounds that, the aim of investors may not be outward oriented. In the case of high domestic demand and the case where FDI comes to take advantage of available domestic market, then exchange rate may not influence exports to grow. Contrarily, exchange rate depreciation is expected to boost exports. This inherently encourages investors to produce goods to take advantage of the huge world market ($\theta_3 < / > 0$).

Financing domestic investment attracts a cost particularly if funds are borrowed from the commercial financial institutions. This cost influences the level of investment in both private and public sectors. In this case, interest rate is expected to have a negative relationship with investment. When there is a relatively lower interest rates on loans, investors can borrow more and capital stock can increase to enhance output. On the contrary, where there is higher interest

rate, investors would be discouraged to invest. This may occur when, due to debt service, government resorts to domestic borrowing which pushes up interest rate ($\theta_4 < 0$).

Debt service is expected to have a negative effect on investment ($\theta_5 < 0$). A high debt service will minimise available foreign exports earnings to stimulate public investment. When debt and debt servicing of a country increase, investment falls as investors are discouraged because of the expectation that future corporate taxes would increase to pay off the outstanding debt. Also, when government resorts to domestic borrowing, interest rate rises and investment falls. Thus, the research considers whether this effect occurs in Ghana given the existing data. Also related to crowding out is that, debt would make existing capital in a debt ridden country to fly out (capital flight). This lead to a fall in net capital inflow, foreign and domestic private investment falls as well ($\theta_2 < 0$), particularly in the case of public-private partnerships. The results of these are that, investment falls when debt accumulation increases.

One of the issues that have been raised in Ghana and in literature is the availability of credit to the private sector. When there is easy access to investment credit, private investment is likely to rise. Thus, availability of domestic credit is likely to be positively related to the rate of investment ($\theta_6 > 0$), notwithstanding the rate of interest and other related issues. Literature on private investment has also emphasised the level of corporate tax rate. In developing countries, the tax system has implications for investment formation. Higher corporate tax would reduce investors' profit margins. Thus, it is expected that corporate tax would reduce investment ($\theta_7 < 0$).

Public investment, one of the components of aggregate investment, is expected to enhance private investment. In developing economies, where infrastructure, social amenities and other

facilities which are provided by government play a major role in socio-economic development and private investment is apt to increase ($\theta_8 > 0$). This is because the level of private cost of production will fall.

4.3.22 Public and Aggregate Investment Models

It is obvious that, external debt has influence on public investment. The need to service debt reduces available export earnings for public investment and import of critical inputs. Within the purview of external debt, the impact of external debt service requirement, apart from causing crowding out by public domestic borrowing, it could hamper public investment when debt and debt service reaches substantial levels, leading to debt overhang. The model for public investment could be specified using three sets of explanatory variables (Sturn, 2001).

These are structural variables such as population growth and urbanisation, economic variables including real GDP growth, public debt, foreign aid, and budget deficits, and lastly politico-institutional variables such as political instability, corruption and political business cycles. On the basis of these, the public investment model for Ghana is specified but excludes politico-institutional variables for some reasons. The first is the lack of appropriate time series data to adequately observe the effect of these variables (over the study period). Some of the variables that exist are over a short period of time to the extent that, there would be degrees of freedom problems when used. Secondly, it has been noted that, these variables tend to be insignificant in explaining public investment in developing countries (Clements *et al.*, 2003). Therefore, the following linear and non-linear public investment models are estimated, in which the impact of the other explanatory variables, apart from the external debt related variables, in the linear model are analogous to the non-linear model.

$$PUI_t = \pi_0 + \pi_1 A_t + \pi_2 PCG_t + \pi_3 PG_t + \pi_4 DSX_t + \pi_5 D_t + \pi_6 PI_t + \pi_7 FIS_t + \eta_t \quad (26)$$

$$PUI_t = \pi_0 + \pi_1 A_t + \pi_2 PCG_t + \pi_3 PG_t + \pi_4 DSX_t + \pi_5 D_t + \pi_6 PI_t + \pi_7 D_t^2 + \pi_8 FIS_t + \eta_t \quad (26a)$$

The aggregate investment model for comparison is given as:

$$GCF_t = \lambda_0 + \lambda_1 A_t + \lambda_2 \dot{y}_t + \lambda_3 Int_t + \lambda_4 DSX_t + \lambda_5 D_t + \lambda_6 D_t^2 + \lambda_7 PI_t + \lambda_8 PUI_t + \gamma_t \quad (26b)$$

Where:

- PUI Public investment as percentage of GDP (Ghana Statistical Service, 2010)
- A Foreign aid as percentage of GDP (World Development Indicators, 2010)
- PCG Per capita income growth (Bank of Ghana and Ghana Statistical service 2010)
- PG Population growth (Ghana Statistical Service, 2010)
- DSX Debt service to exports ratio (calculated from World Development Indicators, 2009 data)
- D: External debt as percentage of GDP (Bank of Ghana, 2010 and World Development Indicators)
- D² Square of External debt as percentage of GDP
- PI Private investment as percentage of GDP (Ghana Statistical Service, 2010)
- FIS Fiscal balance as percentage of GDP (ISSER various issues and Bank of Ghana)
- Int Interest rate (lending interbank rate-Bank of Ghana)

As economies grow, the level of public expenditure also grows. In this respect, the real per capita income is used as a proxy for economic development. This is expected to be positively related to public investment ($\pi_2 > 0$). In the same vain, population growth would cause public expenditure to rise ($\pi_3 > 0$). A large population requires meeting the socio-economic needs of the large citizenry. Also, foreign aid facilitates public investment. It is expected that foreign aid would enable government to spend more on public investment ($\pi_1 > 0$).

The levels of debt stock and debt service are expected, as in the case of private investment, to be negatively related to public investment ($\pi_4, \pi_7 < 0$). The crowding out of public investment and debt overhang on economic growth are posited to be caused by external debt service and debt stock respectively. These issues become more prominent as debt service and debt accumulation lead to absorption of large share of national output. Within this frame, the model

would be examined by considering possible non-linear effect of debt service and debt stock on public investment. Also, in line with government policy to reduce poverty, fiscal deficits are expected to be positively related to public expenditure ($\pi_8 > 0$).

4.3.3 External Debt Model

It is noted that, while the external debt growth model is not directly involved in the estimation of the external debt threshold, it is sufficient in observing the impact of external debt on economic growth. This is because, the accumulation of debt per se is not the main problem to economies but the repayment responsibility. It is the debt service obligation that directly relates to the debt overhang problem. The inclusion of the debt model is to facilitate the estimation of a 2SLS, to capture the simultaneity (feedback) between external debt and economic growth.

Following the debt-growth framework of Section 4.2, with respect to equations 15a, 15b and 17, the external debt growth model (equation 27) specifies that, it is determined by exports growth, exchange rate²⁹, interest rate on loans, economic growth rate, fiscal balance and level of investment. On the basis of this, the external debt growth model becomes:

$$D_t = \beta_0 + \beta_1 GCF_t + \beta_2 E_t + \beta_3 OP_t + \beta_4 IRL_t + \beta_5 \dot{y}_t + \beta_6 FIS_t + \delta_t \quad (27)$$

Where

- D: External debt growth rate (calculated from data obtained from Bank of Ghana, 2010 and World Development Indicators)
- GCF: Aggregate investment proxied by gross capital formation as percentage of GDP (World Development Indicators, 2009)
- E Exchange rate of GH¢ to US dollar (calculated from data obtained from Ghana Statistical Service)
- OP: Level of openness (calculated from World Development Indicators, 2010 database)

²⁹ The price quotation system of exchange rate will be used. It is the number of units of domestic currency that is equivalent to one unit of the foreign currency. For example, GH¢ 1.42 to US \$ 1. The opposite is the volume quotation system, which uses the number of units of the foreign currency per unit of the domestic currency, an example is US \$ 0.70 to GH¢ 1

- IRL Interest rate on external loans, is proxied by the average annual interest rate (Bank of Ghana and Ghana Statistical Service)
-
- y : Real GDP growth rate (Ghana Statistical Service, 2010)
- FIS Fiscal balance expected to capture government spending and revenue (ISSER and Bank of Ghana)

The higher the aggregate level of investment in an economy, the better the country is able to minimise debt accumulation ($\beta_1 < 0$). This can occur in three ways. First, if an initial debt acquired is put in a better higher returns investment, the yield could further enhance investment and thus reduce external debt accumulation. Secondly, adequate domestic initiated investment would serve to avoid debt accumulation. Thirdly, ability to attract enough foreign direct investment in the relevant sectors could enhance economic growth which would intern help minimise external debt accumulation.

Exchange rate (E) of a country can affect debt servicing through at least two ways; first is, a weaker or depreciating exchange rate raises exchange rate risk. Second, depreciating exchange rate improves exports earnings, all things being equal. In this case, exchange rate may or may not have a positive impact on debt service ($\beta_2 > / < 0$). Level of and growth rate of exports (X) is expected to have a negative relationship with debt accumulation. As the volume of exports increase, all things being equal, the quantum of earnings would increase and make it possible to service debt. Also, increased exports earnings offer large economic resources to import necessary investment machinery and undertake other development projects. Thus, both the direct and indirect effects of increased exports earnings are expected to have a negative impact on debt service and debt accumulation ($\beta_3 < 0$). Exports and economic growth together accelerate ability to service debt. Exports act as an indirect input into the production function. Increased demand for exports means that labour and capital usage would have to increase to produce to meet the international demand. Also, as a result of this, there is likely to be efficient usage of resource while taking advantage of the comparative advantage, economies of scale,

technological transfer, and increased capacity utilisation. Again, the marginal productivity of inputs would increase, enhancing subsequent level of exports and GDP.

Interest rate of loans (IRL) would have a positive effect on debt service ($\beta_4 > 0$). Loans contracted on concessional basis, all things being equal, would have a lower debt service obligation. Commercial rates are generally higher than concessional rates. On the other hand, by relaxing this assumption, the difference between the rates of growth of exports and international interest would greatly influence the extent of debt repayment. If the growth rate of exports is greater than loans interest rates, then a country can service its debt with excess foreign resources which can be used to purchase other investment goods (imports). This would also free scarce domestic resources to be used for other developmental activities (Afxentiou, 1993).

On the contrary, a lower exports growth rate relative to interest rate of loans would worsen debt service obligations. Economic growth and debt service are hypothesized to be positively related. Again, we can expect a bi-directional relationship between the two variables. High and accelerated growth of output offer (i) high ability to service debt, (ii) reduce debt accumulation as high exports makes imports possible, (iii) encourages foreign direct investment which further reduces the need to borrow for investment. This slow down of debt accumulation which is positively related to debt service reduces debt service obligations ($\beta_5 < 0$). The other part of the cycle is that, the reduced debt service frees resources to further enhance economic growth.

The relative magnitudes of government spending and revenue, reflected in fiscal balance may cause external debt to be either positively related to external debt increases or not. If the amount of revenue generated is significantly higher than public spending, then the need to obtain external loans would either not be there or minimised, theoretically. However, given the

developing status of Ghana and the trend of the two faces of fiscal policy, there is the likelihood that the relationship between external debt growth and fiscal policy would be positive ($\beta_6 > 0$) for Ghana. The expected signs of the coefficients in the models are given below.

Table 2: Expected Signs of Variables of the Models

Models	Expected Signs
<i>Growth Model</i>	$\alpha_1 > 0; \alpha_2 > 0; \alpha_3 > 0; \alpha_4 > 0; \alpha_5 < 0; \alpha_6 > 0; \alpha_7 > 0; \alpha_8 > / < 0; \alpha_9 > 0$
<i>Private Investment Model</i>	$\theta_1 > 0; \theta_2 < 0; \theta_3 < / > 0; \theta_4 < 0; \theta_5 < 0; \theta_6 > 0; \theta_7 < 0; \theta_8 > 0$
	Expected Signs of Subsidiary Models
<i>Public Investment Model</i>	$\pi_1 > 0; \pi_2 > 0; \pi_3 > 0; \pi_4 < 0; \pi_5 < 0; \pi_6 > 0; \pi_7 < 0; \pi_8 > 0$
<i>External Debt Growth Model</i>	$\beta_1 < 0; \beta_2 < / > 0; \beta_3 < 0; \beta_4 > 0; \beta_5 < 0; \beta_6 > 0$

4.3.4 Rationale for the Choice of Variables

In order to obtain results that are consistent with the objectives, the variables need to be in an appropriate form. The choice of the variables are based on theory, the theoretical framework developed as well as empirical literature, pivoted on existing data. In respect of both theory and empirical literature, a number of variables have been used to model growth either for individual and/or groups of countries. For this study, all the variables are in growth rates or ratios. The economic growth variable (\dot{y}) will be represented by real GDP growth rate of the country.

Labour Force Growth Rate (LF)

Labour according to literature (and based on country circumstances have been represented in empirical works by economically active population growth rate, population aged 15-64, labour force growth rate, population growth rate, etc. For this study, the labour force growth rate is used as it shows the actual group of the population that can contribute to output production.

Capital Formation

For capital, investment (public and/or private depending on the objective) has been used in empirical studies. The ratios of fixed investment, public sector fixed investment or private sector fixed investment to GDP have been the options. For the growth model, the level of gross capital formation to GDP (GCF) ratio is used as a proxy for capital formation. This shows the level of investment in the country.

Debt Overhang (External Debt to GDP Ratio-D)

The root cause of any external debt is its debt stock. This effect will be measured in the investment model by using foreign debt to GDP ratio, D . The lower this ratio, the less debt overhang prevails and vice versa. Its representatives in model have been ratio of total debt to GDP, gross public debt, debt service to GDP ratio, etc. The total stock of external debt as a ratio of GDP series is used to capture the impact of foreign debt on growth. Although, there are categories of external debt (bilateral, multilateral, concessional and non concessional), we do not consider each of these because the accumulation of each of these types of external debt is expected to have the same effect in the long run. The square of the level of external debt to GDP ratio, D^2 , is used to capture the possible presence of non-linear effect.

External Sector (Level of Openness-OP)

Exports earnings have many macroeconomic effects on output growth, domestic investment, debt repayment, imports, etc. In all these channels, at the end, exports are expected to contribute positively to output and investment. On the other hand, imports are to contribute to enhancing required machinery and inputs to promote growth. To examine external shocks, trade orientation/intensity or level of openness (sum of exports and imports to GDP ratio), exports, imports or terms of trade have been used in empirical works. To account for the external factor in the growth model, we use the level of openness to capture the impact of external contribution to economic growth.

Macroeconomic Stability/Policy (Fiscal Balance-FIS)

Literature has proposed and used a number of variables to capture macroeconomic policy/stability impact on growth. To account for this in growth, primary fiscal balance, public sector balance as a percentage of GDP or inflation has also featured in empirical works. For this study, in order to capture the influence of domestic revenue generation and not only expenditure side of government, it is appropriate to consider fiscal balance (i.e., the difference between public revenue and expenditure) as a percentage of GDP. That is, the difference between public revenue and expenditure. This is because, it has the advantage of combining both arms of fiscal policy.

Human Capital Development (Education Expenditure as a Percentage of GDP-EE)

Closely related to the labour force in output is the new growth theory proposal of human capital embodiment of labour. This is particularly related to the level of education, skills, innovation, efficiency and knowledge. Generally, it is observed that gross enrolment at primary, secondary or tertiary school levels and numbers of trained graduates among others are used in empirical works. The more these qualities are endowed in labour, the more labour is expected to

contribute to production and growth. Thus, this is expected to have a positive effect on economic growth. For Ghana's case, due to data non availability on number of trained persons at the tertiary level, gross enrolment rate or the level of skills and knowledge, we use the level of total (capital and recurrent) public education expenditure as a percentage of GDP (*EE*) as a proxy to capture human capital in the growth model. The justification for the proxy rest on the fact that, the renewed interest in education policy and expenditure has seen improvement in access to education, high quality graduates, improved educational infrastructure and massive continuity from one level of education to another. Some of the previous and current educational policy which have massive expenditure component include: school feeding programme, subsidies for higher education (tertiary), capitation grant (for payment of basic level examination fees), free compulsory universal basic education (FCUBE), schools under trees programme (i.e. building appropriate structures), free exercise books and uniforms, etc. In spite of these, one cannot rule out the possibility of misuse (corruption) of education funds. On the other hand, there seems to be a general appreciation for the educational expenditure.

Crowding Out Effect (Debt Service to Exports Ratio-DSX)

The level of debt service takes away export earnings. The higher debt service in relation to export earnings, the lower a country is able to retain much of its exports earnings for imports of machines, inputs and other important imports for investment, growth and development. One of the views of crowding out is the inability of the domestic private sector to secure finances for investment due to high government domestic borrowing, which pushes up domestic interest rate. Thus, domestic investment falls leading to a fall in output. Thus, we use the ratio of debt service to exports earnings to capture the level of crowding out in the economy.

Interest Rate (Int)

As theory proposes, interest rate determines the level of investment. The rate is negatively related to investment growth. In this study, the annual lending (interbank) rate is used to represent (proxy) interest rate in the investment model.

Exchange Rate (E)

The level of exchange rate influences debt service as well as private investment. This is related to exports earnings. The more a country is able to export relative to imports, the more likely the country will maintain a strong exchange rate. Depreciation of the Ghana cedi, for instance is expected to encourage exports, which has impact on ability to import and enhance growth as well. For this study, the GH¢ to US\$ exchange rate is used as most of the trading activities are undertaken using the US Dollar.

Investment Climate /Market Potential (Previous Income Level)

The level of previous income was included to capture the idea that, past income may influence the level of economic activities. Generally, a higher accumulated income has a tendency to improve the growth rate of present output and investment. Thus, it is expected that, the contribution of accumulated income would improve future investment and output. In the investment model, previous level of private investment is used as a proxy for investment climate.

Domestic Credit (DC)

As investment decision are made visa a vis the availability if funds, domestic credit influences the level of private investment. Credit to import machines and key raw materials would

enhance investment formation. This is captured in the neoclassical investment model by the ratio of credit to private sector to GDP.

Corporate Tax Rate (CT)

There are many taxes that business in Ghana face, including property tax, land rent, social security contribution but the major being corporate tax. The higher the level of corporate taxes paid, the more investors are likely to refrain from undertaking investment projects. The level of tax obligation to investor is represented in the private investment model by the company tax as percentage of GDP.

Public Investment (as Percentage of GDP-PUI)

As public and private investments go hand in hand, it is expected that public investment would facilitate the formation of private investment over the study period.

Governance Dummy Variable (Dum)

Other emerging issues in developing countries have been the political, governance and institutional elements in promoting investment and growth, whether a country operates a democracy or is under military rule. This is done by using dummies. Due to data unavailability, I use the form of governance as a proxy. Periods in which there were democracy were assigned a unit and zero otherwise.

Foreign Aid (A)

The quantum of international aid has been one of the main sources of finance to developing countries. This amount does not contain any debt burden for future generation, as it facilitates government expenditure. This is captured in the public investment by foreign aid to GNI ratio.

CHAPTER FOUR REFERENCES

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CHAPTER FIVE

DATA ANALYSES AND PRESENTATION OF RESULTS

5.1 Introduction

In this section, we present the data analyses. This is done to answer the research questions raised and the objectives of the study. The data is first defined and the analyses follow, in respect of growth and investment models for Ghana.

5.2 Data Sources and Type

Data³⁰ for the study is sourced from both Ghana's monitoring and implementing agencies (of debt and related variables) and creditor institutions. The research utilised annual time series data for the period 1970 – 2009. Thus, the secondary data for the study are obtained from both domestic and international sources.

Table 3: Descriptive Statistics of the Growth Model

	\dot{y}	D	D ²	FIS	OP	GCF	EE	LF
Mean	3.23	52.35	3276.92	-3.19	52.49	16.49	3.97	2.57
Maximum	9.72	92.60	8574.76	4.40	122.00	34.05	5.80	3.52
Minimum	-12.43	16.98	288.32	-13.30	6.32	3.38	2.00	1.68
Std. Dev.	4.44	23.44	2588.88	4.65	29.01	8.99	0.88	0.43

Note:

- \dot{y} : Real GDP growth rate (source: Ghana Statistical Service, 2010)
- LF: Labour force growth rate (source: Ghana Statistical Service, 2010)
- GCF: Gross capital formation as percentage of GDP (source: World Development Indicators, 2010)

³⁰ The selection of the variables was based on a) theoretical foundations in growth and debt theories and open economy macroeconomics; b) availability of the required data; c) the data that would fit well statistically in the models to be estimated and d) equations to be estimated that would give insight into Ghana's case. The analyses of the data reflect these issues.

- D: External debt as percentage of GDP (source: Bank of Ghana, 2010 and World Development Indicators, 2010)
- EE: Public education expenditure as a percentage of GDP (source: ISSER, Ghana Statistical Service, 2010)
- OP: Level of openness (source: World Development Indicators, 2010)
- FIS: Macroeconomic stability (source: ISSER various issues and Bank of Ghana)
- Std. Dev. is standard deviation

A look at the descriptive statistics in Table 3 shows that, the dependent variable and the variables of interest (external debt variables) are fairly and normally distributed. Their respective distributions may lead to significant effect on growth or clearly portray a better understanding of the impact of external debt.

5.3 Estimation Technique and Unit Roots Tests

5.3.1 Estimation Technique

The theoretical non-linear impact of external debt on economic growth indicates no significant single a priori link. The theoretical and statistical criteria lead to a polynomial model of equation 24. The non-linear function of this form is of the second degree polynomial. From equation 24 and general polynomial forms, the error term is additive and thus satisfies the usual classical assumptions.

Polynomial regression model is one of the non-linear models. Here, some of the independent variables are non-linear in variables, in this research it is external debt to GDP ratio square. It is noted that, many non-linear regression models such as polynomial function (example as equation 24) have the characteristics that, they can be converted into linear model by a suitable transformation of the variables. With respect to equation 24, the following transformation is made to convert the non-linear to a linear model, by using the substitution: $Z = D^2$. Thus, equation 24 leads to equation 24a as:

$$\dot{y}_t = \alpha_0 + \alpha_1 (LF)_t + \alpha_2 (GCF)_t + \alpha_3 (EE)_t + \alpha_4 (D)_t + \alpha_5 (Z)_t + \alpha_6 (OP)_t + \alpha_7 (FIS)_t + \alpha_8 Dum_t + \alpha_9 \dot{y}_{-1t} + \varepsilon \quad (24a)$$

The linear model obtained can now be estimated by the least square method.

There are a number of possible non-linear functional forms in literature including: Reciprocal models, Polynomial models, Semi-Log models, Double-Logarithmic models, CES models, Interactive Variable Method, among others. These functional forms are based on certain theoretical relationships of the variables concerned. The application of each form to data depends on the specific conditions under study. In as much as these functional forms are appreciated, the best functional form for estimating the model is the non-linear polynomial functional form and it is transformed for OLS to be applied because of the following reasons:

- i. The use of double log, log-lin or lin-log becomes problematic since there are critical negative values such as the dependent variable – GDP growth rate. The inability to take log of negative values poses a problem.
- ii. Also, the dependent variable is in growth rates, empirically the values cannot be transformed by taking logs, the transformation reduces the real nature of the values.
- iii. The objectives of the research are to determine the possible threshold level at which external debt becomes burdensome, which inherently shows the effect of external debt on economic growth. In this case, a polynomial specification would help to achieve this, as there is a squared term in the empirical equation to be estimated.
- iv. The theoretical underpinnings of the possible threshold (as shown in section 3.3) lend support for non-linear polynomial specification of the model. Again, there is the need to capture an aspect of the theory of the impact of external debt on economic growth.
- v. The problem of data in developing countries is also a major concern, particularly with respect to instruments. The inability to obtain and use better instruments is limiting.

Also, the concern has been raised that weak instruments typically bias coefficient estimates towards their unadjusted counterparts (Arndt *et al.*, 2010).

- vi. There are about three empirical bases for the use of the polynomial non-linear specification:
 - a. The first empirical base is the evidence in literature where the impact of debt related issues (such as public debt) on economic growth has been specified as a polynomial form. This is because, the theory behind these issues has similar non-linear effect on economic growth. Among the notable studies are Clements *et al.* (2003) and Presbitero (2010).
 - b. The second is about a related issue (external aid), which is said to portray a similar impact on economic growth, where the story of diminishing returns to aid is best captured by the non-linear relationship between aid and growth. In empirical work, the functional form has been a non-linear polynomial specification such as found in Hansen and Tarp (2001).
 - c. The idea of possible non-linear effect of external debt on growth follows the concept of (environmental) Kuznets curves [ECK] and the econometric methods used in EKC³¹ studies. The standard EKC model-quadratic function, might be a polynomial approximation to a logarithmic curve (Stern, 2004; Grossman & Krueger, 1991).

Based on the above condition, it is important, given the first objective of the study to estimate a non-linear polynomial model. However, the objective is also observed from the perspective of a 2SLS methodology. The results of the 2SLS and their comparison with the OLS are presented in Appendix 13, as well as a dynamic model (Appendix 15).

³¹ The Environmental Kuznets Curve (EKC) is named after Kuznets (1955) who first hypothesised that income inequality first rises and then falls as economic development proceeds

5.3.2 *Unit Roots*

The essence of regression analysis is to estimate short and/or long term economic relationships. Such analysis is to test theoretical economic postulations. But recent developments in econometrics reveal the need to ascertain the stationarity of time series properties. Two views are present: the case where all the variables are stationary at the same order of integration before estimation is undertaken and the case where variables of different stationary orders can also be estimated (Adam, 1992; Toda and Yamamoto, 1995; Egwaikhide, 1997).

New advances in data analysis require stationarity tests. This is usually the case when the units of measurements of the variables are in levels. On the contrary, the independent and dependent variables used in the models are weighted by GDP, to obtain ratios while others are in growth rates³². In addition, it is noted that, “most empirical studies in which determinants are modelled use ... shares ... (and similarly for other variables), because this is one of the methods of dealing with the problem of non-stationarity” (Jenkins, 1998, p.42). However, to strengthen the results, robust diagnostic analyses are applied (Khan, 1996; Nketia-Amponsah, 2009).

In addition to the above, the stationarity of the variables in the models were confirmed. This was done using two recent improvements³³ in the unit roots tests: the Ng-Perron and the Elliott-Rothenberg-Stock DF-GLS tests. The results of these tests are presented in Tables 4 and Appendix 6 below, showing that the variables are stationary. Along the lines of ADF unit root test, a more powerful variant is the DF-GLS unit root test proposed by Elliott, Rothenberg and Stock (ERS, 1996). These results (Table 4) show all the variables are stationary at either 1% or 5% significance level.

³² As in many cases, trends are removed by working with ratios and growth rates. In addition, to circumvent the stationarity problem of time series, percentage growth frequently shows no clear tendency to either rise or fall

³³The ADF and PP unit root tests are known to suffer potentially severe finite sample power and size problems. A variety of alternative procedures have been proposed that try to resolve these problems, including Ng and Perron, and Elliott, Rothenberg, and Stock DF-GLS tests (Wickremasinghe, 2004)

Table 4: Elliott-Rothenberg-Stock DF-GLS Unit Root Test Results

VARIABLES	Elliott-Rothenberg-Stock DF-GLS Test Statistic	Critical Values			Comment
		1%	5%	10%	
\dot{y}	-3.65	-2.62	-1.94	-1.61	I(0)***
LF	-2.27	-2.62	-1.94	-1.61	I(0)**
GCF	-1.61	-2.62	-1.94	-1.61	I(0)*
EE	-2.37	-2.62	-1.94	-1.61	I(0)***
D	-1.97	-2.62	-1.94	-1.61	I(0)**
OP	-1.95	-2.62	-1.94	-1.61	I(0)**
FIS	-2.22	-2.62	-1.94	-1.61	I(0)**
DSX	-1.98	-2.62	-1.94	-1.61	I(0)**
DC	-2.30	-2.62	-1.94	-1.61	I(0)**
CT	-1.96	-2.62	-1.94	-1.61	I(0)**
E	-1.94	-2.62	-1.94	-1.61	I(0)**
Int	-1.96	-2.62	-1.94	-1.61	I(0)**
PUI	-1.97	-2.62	-1.94	-1.61	I(0)**
PI	-1.97	-2.62	-1.94	-1.61	I(0)**
A	-1.98	-2.62	-1.94	-1.61	I(0)**
PG	-2.25	-2.62	-1.94	-1.61	I(0)**
IRL	-3.95	-2.62	-1.94	-1.61	I(0)***
PCG	-2.06	-2.62	-1.94	-1.61	I(0)**

Source: Author

Note: *** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.1 level

PUI and PI are public and private investment to GDP ratio respectively (Ghana Statistical Service)

DSX Debt service to exports ratio (Bank of Ghana data and calculations from World Development Indicators, 2010)

DC Domestic credit to private sector as percentage of GDP (calculated from World Development Indicators, 2010)

E Exchange rate of GH¢ to US dollar (Ghana Statistical Service)

Int Inter-bank lending rate (Bank of Ghana)

CT Company tax as percentage of GDP (Owusu-Afriyie, 2009, Bank of Ghana)

A Foreign aid as percentage of GDP (World Development Indicators, 2010)

PCG Per capita income growth (Bank of Ghana and Ghana Statistical service 2010)

PG Population growth (World Development Indicators 2010)

IRL Interest rate on external loans, is proxied by the average annual interest rate (Bank of Ghana and Ghana Statistical Service)

The other variables are as explained earlier.

To cross check the state of unit root, the Ng-Perron unit root test results (Appendix 6) also show the variables are stationary. In this case, and given the above mentioned conditions, the models are estimated. From the two unit root tests, there seems to be a weak stationarity status for some of the variables. Also, in order to include the notion that, external debt usually impacts on economic growth through accumulation, then it works through lags. Thus, previous amount of external debt would affect current GDP growth. This indicates that short run dynamics are also important to consider. We therefore estimate both the short run and long runs, and compare how external debt influences GDP growth in the two scenarios. The results of the dynamic model are given in Appendix 15 while that of the static model is in section 5.4 below.

5.4 Results of the Growth Model (Static Long Run Model)

Using annual series from 1970 through 2009 for Ghana, and in line with theory and empirical literature, the debt variable is specified in quadratic form. The regression results of GDP growth model³⁴ using Least Squares estimation method is given below.

³⁴ Appendices 5 and 6 contain the correlation matrix and graphs of the growth model variables respectively

Table 5: Empirical Results of the Effect of External Debt on Economic Growth

Variables	Coefficients of Different Specifications				
	A	B	C	D	E
	Effect of External Debt/GDP (Without Investment and Institution)	Effect of External Debt/GDP (Without Institution)	Effect of External Debt/GDP (Without Investment)	Effect of External Debt/GDP (With Investment) Divided	Effect of External Debt/GDP
C	-10 (-1.08)	-9.9 (-1.02)	-10.18 (-1.09)	-8.9 (-0.82)	-11.5 (-1.15)
D	0.3415 (1.99)**	0.3422 (1.93)*	0.3582(2.04)**	0.34(1.86)*	0.3511 (1.97)**
D²	-0.00364 (-2.37)**	-0.00364 (-2.31)**	-0.0038(-2.42)**	-0.0036(-2.04)**	-0.0038 (-2.40)**
FIS	0.36 (1.95)**	0.35 (1.87)*	0.37(1.99)**	0.36(1.68)*	0.401 (1.99)**
OP	0.65 (4.51)***	0.61 (3.14)***	0.44(4.22)***	0.11(3.01)***	0.11 (3.20) ***
GCF		0.0029 (1.75)*			0.067 (1.83)*
EE	0.28 (2.32)**	0.29 (2.26)**	0.31(2.32)**	0.54 (1.35)	0.252 (2.206)**
LF	0.65 (1.52)	0.64 (1.49)	0.46(1.38)		0.42 (1.34)
Dum			0.96(0.62)	0.68 (0.34)	0.44 (0.74)
y (-1)	0.32 (2.34)**	0.32 (2.23)**	0.34(2.39)**	0.33 (2.18)**	0.36 (2.33)**
Pui				0.032(0.12)	
Pi				0.036(0.14)	
Adjusted R²	0.589	0.586	0.592	0.593	0.60
F-Statistics	6.08	5.15	5.26	3.94	4.64
Prob(F-Statistic)	0.00017	0.00047	0.00039	0.002	0.0008
Durbin-h Statistic++	-2.11	-1.97	-1.70	-1.50	-1.80

Note:

Values in brackets are the t-statistics. *** Significant at the 0.01 two-tailed level; ** Significant at the 0.05; two-tailed level; * Significant at the 0.1 two-tailed level;

Pui and Pi are public and private investment to GDP ratio respectively. ++The Durbin-h statistics indicate that all the different models show no autocorrelation at the 1% and 5% significant levels.

In order to obtain robust results, various forms of the restrictions/specification were undertaken (columns A to E of Table 5) on the growth model (The results of the 2SLS estimation of the growth model are presented in Appendix 13). These were done to derive how debt influences growth given different socio-economic scenarios:

- i. The effect of external debt without investment and institutions;
- ii. The effect of external debt without institutions;
- iii. The effect of external debt without investment;
- iv. The effect of external debt when investment is divided into public and private investment; and
- v. The effect of external debt with investment and institutions.

Each of these specifications is considered relative to the preferred model (equation E). Comparatively, equation E is preferred as the baseline model upon which the threshold and other analyses are undertaken. The choice is made with reference to the better output including better levels of significance of the variables of concern, better explanatory power, good fit and fairly satisfactory inherent assumptions of the error term. The preferred model has the best adjusted R-square (0.60) relative to all other specifications. The F-statistic and its probability are quite adequate on the basis that investment and institutions play a vital role in the growth process as revealed in literature. Also, the inclusion of investment and institution improved the significance of the debt variables in the model. This shows that, it is important to include these factors in the model that explains how debt affects growth.

In order to use the estimated model (E) to derive the threshold, it is important to ascertain the inherent assumptions made on the error term. This is done by undertaking various diagnostics tests. The Durbin-Watson statistic³⁵ of 2.21 indicates that the model does not suffer from serial autocorrelation. However, the Durbin-Watson statistic becomes inappropriate when there is a

³⁵ The model's Durbin-Watson statistic close to 2.0 is consistent with no serial correlation of the error term. Acceptable range of Durbin-Watson statistic for no serial correlation is 1.5 to 2.5

lagged dependent variable as independent variable in the model. Rather the Durbin-h statistic³⁶ is used. The Durbin-h statistics in Table 5 shown there is no autocorrelation. This was supported by the Breusch-Godfrey serial correlation LM tests. The Breusch-Godfrey serial correlation LM test (is useful for testing serial correlation when there is lagged dependent variable as explanatory variable) results indicate a p-value of 0.2, showing that, the there is no serial correlation problem. The p-values of 0.74 and 0.22 of ARCM LM and the White Heteroskedasticity tests respectively show that we cannot reject the null (of homoscedastic residuals) hypothesis. Thus, the residuals do have constant variance which is desirable, meaning that residuals are homoscedastic. The Wald coefficient tests statistic (chi-square of 41.09 and p-value of 0.00) on all the variables show rejection of the null hypothesis, that all the coefficients are zero. This test supports the F-statistic. The Wald test result implies that the variables are important in influencing GDP growth for the sample period and thus, the model specification is justified.

³⁶ The Durbin-Watson statistic for checking autocorrelation becomes inappropriate when there is a lag dependent variable as explanatory variable. In order to solve this problem, the Durbin-h statistic has been proposed. This statistic, h , is given as:

$$h = \left(1 - \frac{1}{2}d\right) \sqrt{\frac{T}{1 - [T * \text{Var}(\hat{\alpha})]}}$$

where d is the Durbin-Watson statistic, T is the sample size and $\text{Var}(\alpha)$ is the variance of the estimate of the lagged dependent variable and $\text{Var}(\alpha) = \text{square of the standard deviation/error}$.

The Durbin's h statistic has the standard normal distribution in large samples. For a 5% significance level, the critical value is 1.96. Thus, if the Durbin- h statistic falls between -1.96 and 1.96, that is, $-1.96 < h < 1.96$; we accept the null hypothesis of no serial correlation. In other words, the error term features no autocorrelation. Alternatively, in large samples, this statistic has a normal distribution and hence reject the $H_0 : \rho = 0$ (of no autocorrelation) against $H_A : \rho \neq 0$ when $|h| > z^*$, the critical value of z .

The following are commonly used critical values/points on a standard normal distribution for deciding statistical significance for a two tail test: 10% significance level (+/- 1.65 standard errors); 5% significance level (+/- 1.96 standard errors) and 1% significance level (+/- 2.58 standard errors).

5.4.1 External Debt³⁷ and Economic Growth Relationship

One of the core results of the study is the testing of the debt threshold hypothesis. This hypothesis connotes an inverted U-shape relationship between long run economic growth and long run external debt to GDP ratio. In this case, the sign and significance of both external debt to GDP ratio variables are paramount. The results (equation E) show that, the effect of the ratio of external debt to GDP is positive and that of the square of external debt to GDP ratio is negative. The difference in the signs suggests that, there is a turning point in the contribution of external debt to economic growth in Ghana over the study period. Also, these critical variables are significant at conventional levels. The coefficient of the external debt to GDP ratio shows the rate at which debt contributes to output growth in the long run. The coefficient of this ratio being positive (0.3511) and significant at 5% indicates that, if the value of debt-GDP ratio changes by 1 percentage unit, then in the long run, output would change by 0.3511 percentage point. The acquisition of external funding below the threshold level is a spur to growth for the study period in Ghana – the stimulus effect takes place. The marginal contribution of additional external debt is always positive. This is the point where the change in economic growth relative to external debt is positive.

On the other hand, beyond a threshold level, any additional accumulation of external debt reduces output growth. The negative coefficient (-0.0038) and significant at 1% of the square of external debt to GDP ratio indicates that, acquisition of external debt above the threshold level significantly reduces output. At this stage, diminishing returns sets in, external debt servicing becomes a problem as it takes a large part of export earnings. Also, within this range of external debt accumulation, the debt repayment rate far outweighs the returns from such external funding. The speed of this decline would depend on the rate of repayment: interest rate, the type of loan –

³⁷ Results of the external debt growth model (section 4.3.3) are presented in Appendix 14

short, medium or long term, the stock of external debt, and domestic revenue generation capabilities. The negative relationship has been observed in some studies. Fosu (1996, 1999) and Anyanwu and Erhijakpor (2005) found that, foreign debt servicing hinder economic growth. Thus, the results of the debt variables show that there is non-linear effect of external debt on growth. The results of the debt variables can be used to estimate the threshold level.

5.4.2 *External Debt Threshold Level*

The combination of the two opposing signs is an indication that, there exists a threshold in the external debt to GDP ratio. The threshold level is estimated in two similar ways. The first is the quadratic method. This involves the fact that all other factors affecting GDP growth remain constant. By taking a partial derivative of the GDP model with respect to external debt, and setting the outcome to zero, we solve for the value of the external debt to GDP ratio. At this point: $[\frac{\partial y}{\partial D} = 0]$. By this process, the optimal threshold of Ghana for the study period is estimated below (to be 46.2%).

$$\frac{\partial y}{\partial D} = 0. \text{ From the output of the economic growth model,}$$

$$\frac{\partial y}{\partial D} = 0.3511 - 0.0076D = 0 \Rightarrow 0.3511 = 0.0076D$$

$$\therefore D = 0.3511 / 0.0076 = 46.2\%$$

The second form is conditional on the fact that, the effects of all non-external debt factors in the growth model remain unchanged. The threshold level is where the sum of the two sides give the highest impact on growth. The value of external debt to GDP ratio is varied from 1 to 100. Thus, by using the coefficients of the external debt variables, the threshold level is estimated to be 46.2%. Appendix 7 presents the estimated external debt threshold of the second approach, while Appendix 8 shows the corresponding Laffer curve. In both approaches, the results are the same, which have economic implications. The behaviour of external debt threshold under the condition

that, there is no other factor (apart from external debt) affecting economic growth is presented in Appendix 11.

5.4.3 Economic Implications of External Debt Threshold Level

A threshold level can be normal, skewed to the left or right. Whatever the case, the level presents three cases:

- a. The first is that, if it is or close to 50%, then external debt has normal effect, indicating the economic factors and the management of loans from external sources maximises the benefit of loans to 50% level. In other words, such a country can accumulate external debt up to 50% of her GDP.
- b. The second is that, if the threshold level is very high (60-89%) or extremely high, 90% and above, then at least one of these conditions holds i) the country has high capacity to service debt; ii) the negative effect of external debt on growth is very low; iii) loans are being used effectively; or iv) loans are being managed effectively.
- c. The last is, if the threshold level is very low (1% to about 30%) then foreign debt is having a heavy burden on growth.

For the study period, the external debt threshold level of Ghana is estimated to be 46.2% (examples of estimated threshold levels include 53% for Jordan-Meghyereh *et al.* (2003); 60 – 65% for India–Topalova and Nyberg (2010); 35 – 42% for Indonesia–Mati (2005); 77% for 79 countries and 64% for developing countries–Caner *et al.* (2010); Countries with good policies and institutions face overhang when debt rises above 15 – 30% of GDP, but the marginal effect of debt on growth becomes irrelevant above 70–80% (Cordela *et al.*, 2005). The moderate threshold level suggests that, Ghana encounters growth rate problems (in respect of external debt) at an average external debt to GDP level. External debt servicing would sap export

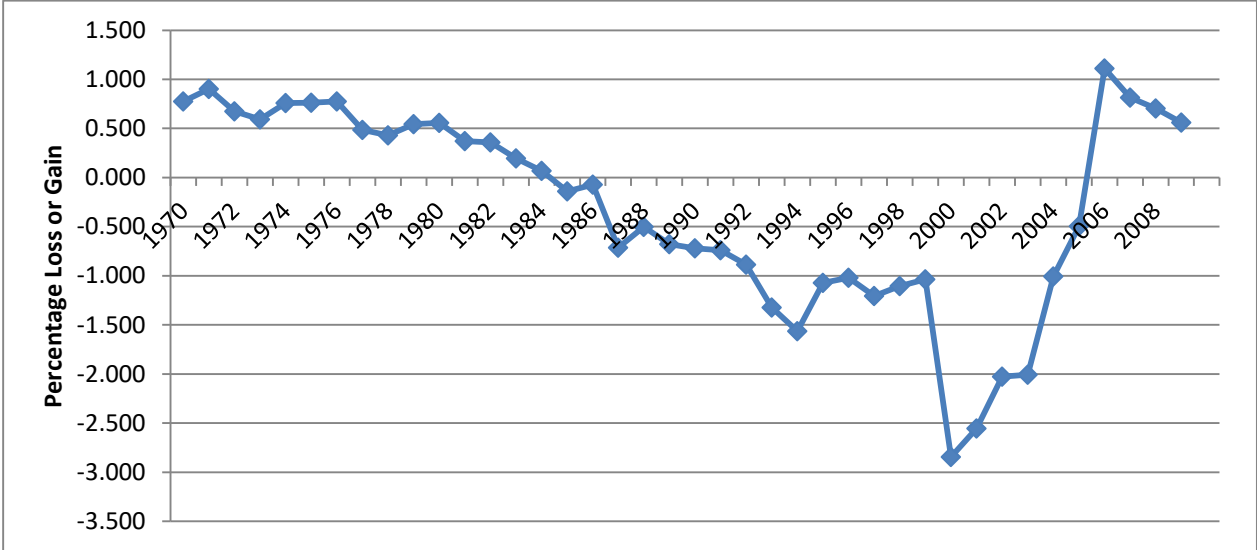
earnings. This would reduce export revenue available for domestic expenditure. Obviously, this has been the case in Ghana, culminating in the involvement in HIPC initiative in 2001. Such a situation has growth loss impact.

In the same way, such external debt threshold pre-supposes that, the repayment rate of foreign debt reduces the returns from utilisation of loans. This might be the reason why Ghana's export earnings are increasing but due to high debt servicing requirement, over the years, Ghana has not been reaping the due benefits. This shows that, such negative effect of debt has set in motion a debt trap cycle which has growth losses.

5.4.4 Growth Loss of Exceeding the Estimated External Debt Threshold

There is growth cost if the external debt to GDP ratio exceeds the threshold for an extended period of time. This is costly in terms of GDP growth. This is the level which shows how high growth could have been had the external debt-GDP ratio been at the threshold level. On the basis of the estimated threshold, the annual contribution (gain–positive or loss–negative on growth) from external debt to GDP was estimated. This was calculated by taking the difference between estimated external debt threshold and actual external debt ratio for each year and the results multiplied by the coefficient of the square of external debt to GDP ratio. The resulting cumulative loss, over the 40 years is 12.28 percentage points in GDP loss. On the average, there is about 0.306 percentage points loss annually (see Appendix 9) over the study period through the negative effects of high debt servicing obligations. Caner *et al.* (2010) estimate a growth loss of 0.017 for 77 developing countries, while Anyanwu and Erhijakpor (2005) estimated 2.06 percentage points of growth loss for 14 West African countries. The annual impact of the external debt on economic growth is informative. This can be seen from Figure 20 below.

Figure 20: Estimated Contribution of External Debt (Percentage Gain or Loss) to Economic Growth



The graph (Figure 20) shows how external debt was accumulated (from the 1970s) and how it affected economic growth. The ERP slowed down the growth loss from external debt at the initial stages (1984 to 1986), but at the latter stages, the renewed interest to offer loans and loans contracted from the same programme worsened external debt impact on economic growth until the period 1999-2000. This indicates why Ghana qualified to join the HIPC initiative in 2001. Thus, from 2001, there were improvements in external debt contribution to economic growth peaking in 2007, due to debt cancellation, rescheduling, etc. The huge external debt acquired in late 2007 and the build up of external debt has started a downward trend again as observed from the graph.

It is observed from Appendix 8 that, the total contribution of external debt to GDP rises from debt-GDP ratio of 1% to 46%. After this threshold, debt contribution to GDP although positive, begins to fall until the debt-GDP ratio reaches 92% (reaching zero contribution at 92%). Thus,

any increase in the ratio above 92% will turn to reduce GDP growth (negative contribution). The extent of reduction becomes worse as the ratio gets higher. The implied effect of debt on GDP is presented in Appendix 9.

5.4.5 Discussion of Other Results of the Economic Growth Model

5.4.51 Human Capital Development and Labour Force

The results obtained from the research show that, while human capital development was positive and significant in explaining GDP growth, labour was positive but not significant. Similar results were found for Jordan (Meghyereh *et al.*, 2003) but labour was significant for Indonesia (Cholifihani, 2008) and SSA (Iyoha, 1999). This probably confirms the notion that educational expenditure may be rising over the years, but due to the high level of unemployment of graduates for example, human capital is not yielding its full results. Also, the level of brain drain particularly in critical areas of development skills and expertise, inappropriate educational focus, and probably high illiteracy (adult literacy of 66% in the early 2000s) level may be contributory factors.

5.4.52 Capital Growth

The capital component–investment contributed positively to growth performance, although this has relatively smaller coefficient and significant at 10%. A 100% increase in gross fixed capital formation would induce economic growth by 0.29% (when there was no institution) and 6.7% (with institution), all things being equal. This implies that, investment better contributes to economic growth when there are proper democratic institutions to guide the process. This confirms the need to improve infrastructure facilities such as good road network, telecommunication facilities, transport system, and so forth. The positive contribution of

investment to growth is an indication that, the country's dependent on public debt could be reduced. This is due to the multiplier effect that increased investment offers in terms of facilitating the productive process. Also, similar results were obtained for both Nigeria and South Africa (Ayadi and Ayadi, 2008) and Kenya (Were, 2001).

5.4.53 Level of Openness

In order to incorporate the effect of both exports and imports, the research utilised level of openness (trade intensity) to capture the external trade sector. This coefficient shows the expected positive sign and it is highly significant at 1% in all the various models. In other countries, this effect has been observed: for West Africa (Anyanwu and Erhijakpor, 2005) and for low-income countries (Clements *et al.*, 2003). This is because, exports earnings contribute to income which is either used to service external debt or undertake developmental projects domestically. Also, imports of critical inputs, plants, machines, and technology transfer foster the foundation for accelerated growth. The combined effect of these two elements is shown in the positive impact of the level of openness in the growth model. Indicatively, as trade intensity increases, one of the two gap problems (lack of savings and foreign exchange) is reduced.

5.4.54 Fiscal Policy

The results (Table 5) also indicate that the level of fiscal balance has significant (at 1% level) positive effect on economic growth. This confirms the fact that, both domestic revenue and government expenditure enhance GDP growth for the study period. In respect of this, an improvement in revenue collection without harming productivity would enhance output growth in the same direction. The usefulness of fiscal deficits was also affirmed for West Africa (Anyanwu and Erhijakpor, 2005) but contrary results were obtained for Nigeria and Morocco (Edo, 2002). Ability to generate adequate domestic revenue without hampering production and

output, and proper use of such funds to provide infrastructure facilities which are lacking in developing countries is a spur to growth. Also, due to the high level of public sector in socio-economic activities in Ghana, as the largest employer of labour in the formal sector, provider of major social services, and the quite under-developed private sector, the activities of government no doubt have great impact on economic growth.

5.4.55 Previous Income Level

The level of previous income was included to capture the idea that, past income may influence the level of economic activities. It was noted that, in all the different versions of the growth model (see Table 5), the level of accumulated income positively and significantly influenced current real GDP growth, but contrary result has been found for Turkey (Karagol, 2002). This variable connotes the ideal that, output activities undertaken in the previous period contribute to the level of growth in current period. Investments in economic projects such as infrastructure (roads, electricity, etc) begin to yield output mostly with a time lag. Thus, the continual provisions of social and economic amenities have positive expectation on future growth prospects.

5.4.56 Form of Governance

The current set of growth factors has raised the issue of institutions. These are to facilitate the growth process of every economy. In this research, due to lack of series on good governance indicators, a dummy (the form of governance), whether democracy or otherwise was incorporated. The results from Table 5 show that, although democratic governance has positive influence on growth, it is not significant in explaining growth. This case is also observed

irrespective of the inclusion of investment or not. A dummy for the HIPC initiative³⁸ period was introduced into the model to observe the impact of the worldwide policy. However, the policy was neither significant nor made any significant changes to the coefficients, although the inclusion of the HIPC initiative dummy reduced the probability values of the debt variables marginally (from 0.05 to 0.08 and 0.02 to 0.03 for external debt–GDP and debt service to exports ratios respectively). This means that, the HIPC initiative (though it has been in existence since 2001) has led to a reduction of the impact of debt overhang.

In comparison, with respect to the impact of private and public investment on GDP growth, it can be said that, private investment had a greater influence on growth. This indicates that, to achieve high growth and employment creation, emphasis should be placed on improving private sector development. This can be done by facilitating their growth using appropriate macroeconomic policies.

5.4.6 General Goodness of Fit of the Growth Model

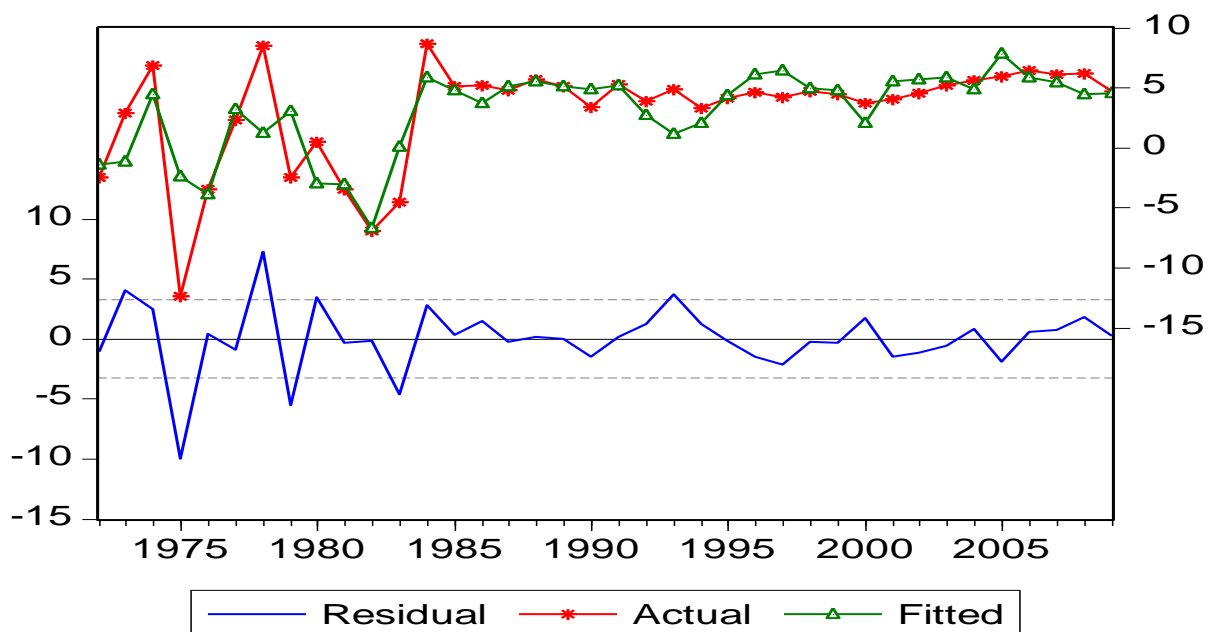
Generally, the model explains about 60% of the changes in economic growth. The adjusted R^2 tells how well the regression line fits the data. It measures the percentage of the total variation in GDP explained by the independent variables in the model. Thus, the independent variables explain about 60%, that is, the level of linear association between GDP growth and the explanatory variables.

The graph (Figure 21) presents three series. The residuals are plotted against the left vertical axis and both the actual and fitted (predicted) GDP series are plotted against the vertical axis on the

³⁸ Another model was estimated with HIPC initiative dummy, in place of the institutional dummy. The results of this model are not shown here. The dummy had a value of 1 for the HIPC initiative period of 2001 to 2009, otherwise 0.

right. It can be seen that, quite a good fit exists. The fitted values nearly cover up the actual values on the graph particularly in later years. Also, the residuals indicates that i) the growth model fits better in the later part of the sample than in the earlier years - the residuals become smaller in absolute value, i.e. there is smaller oscillation and ii) there is very small number of data points (late 1970s and early 1980s) for which the models' fit is really good. This is the period culminating to the ERP where external debt and other macroeconomic factors were deteriorating. At the same time, there was the world crude oil price shock of 1979 and the severe bush fires of 1983 in which many cocoa farms were burnt, as well as unprecedented drought throughout the country.

Figure 21: Graph of Actual and Fitted Residual



Source: Author

5.5 Impact of External Debt on Investment

5.5.1 Results of Private Investment Model³⁹

In order to determine the existence of debt overhang, crowding out and accelerator effects, on private investment, a number of models were built around the theories of investment. Table 6 presents the results of four of such theories. Each of the equations (A to D) is in turn explained, followed by general inferences from these equations in respect of the issues under consideration.

Table 6: Regression Results of Private Investment

Variables	Coefficients of Private Investment Specifications			
	A	B	C	D
	Effect of External Debt (Keynesian Conditions)	Effect of External Debt (Neoliberal Conditions)	Effect of External Debt (Uncertainty Conditions)	Effect of External Debt (Neoclassical Conditions)
Const	5.78 (3.44)***	5.52 (3.06)***	6.0 (3.3)***	4.44 (1.92)*
D	-0.057 (-1.88)*	-0.12 (-3.87)***	-0.07 (-1.85)*	-0.09 (-3.3)***
DSX	-0.019 (-0.57)	-0.026 (0.84)	-0.013 (-0.5)	-0.03 (-1.3)
OP	0.069 (1.64)*	0.04 (1.3)		
DC	0.133 (0.54)	0.23 (1.82)*		0.05 (0.63)
CT				0.34 (0.39)
E		1.60 (5.2)***	1.16 (3.5)***	1.17 (3.7)***
Int		-0.15 (-1.80)*	-0.08 (-0.89)	-0.19 (-2.2)**
y	0.19 (1.74)*		0.06 (0.57)	0.14 (1.67)*
Pui				0.55 (3.7)***
Pi (-1)			0.30 (1.85)*	
CPI	0.06 (3.21)***			
Adjusted R²	0.71	0.74	0.73	0.85
F-Statistics	13.30	19.65	18.51	19.7
Prob(F-Stats)	0.00	0.00	0.00	0.00
Durbin-Watson Statistic	1.42	1.7	2.1	2.2

Source: Author

Note: Values in brackets are the t-statistics. *** Significant at the 0.01 two-tailed level; ** Significant at the 0.05 two-tailed level; * Significant at the 0.1 two-tailed level; All variables are as explained earlier.

The Keynesian private investment concept may comprise the accelerator and flexible accelerator models. In these models, the emphasis is placed on the impact of GDP growth and internal funds

³⁹ Appendix 10 contains the graph of the investment model variables respectively.

such as credit to the private sector. It is observed that, from equation A, Table 6, the accelerator effect applies in Ghana as the coefficient is positive and also significant at 10%. This means that output has significant implications for private investment. A proxy for price of output, CPI is also positive and significant at 10% as expected, indicating that investors respond to output price. In the same way, a control variable (trade intensity) also shows positive and significant contribution to private investment growth. Domestic credit is positive but not significant in explaining private investment growth.

The external debt variable shows a significant negative effect while debt service was not significant. The implications of the effects of the debt variables are that, investors put much emphasis on the discouraging repercussions of debt accumulation while debt service induced crowding out effect applies marginally. Thus, within the Keynesian-accelerator basis, the debt overhang has strong existence than the crowding out effect.

In the framework of the Neoliberal (McKinnon-Shaw) – equation B of Table 6, the ‘conduit effect’ does not apply. The coefficient of interest rate was rather negative. This shows that, the proposal to actually liberalise the interest rate for the rate to go higher so that availability of loanable funds would increase for investors to borrow, does not hold. This notwithstanding, the level of domestic savings enhances private investment as it is significant at 10% level.

In the same way as the Keynesian model, the debt overhang is observed but does not seem to go through the crowding out effect alone. The coefficient of debt is negative as expected and highly significant (1%) while debt service is not significant. This confirms the fact that, in the past the Ghana government has not borrowed much from the private domestic financial institutions.

Thus, private investment is influenced through expectations of future higher taxes and associated investor discouragement.

Equation C shows the impact of external debt under uncertainty propositions. In this case, related policies are examined. The proxy for investment climate—previous investment level shows a significant (10%) positive effect (0.3) on private investment growth. Thus, given any favourable investment in the previous period, private investment is likely to respond positively in the current period, all things being equal.

In addition to the investment climate, interest rate seems to show the normal negative impact (-0.08) on private investment. This contradicts the idea that the interest rate should be allowed to be determined by the market in the McKinnon-Shaw proposition, where they propose that, higher interest rate leads to higher savings and consequently higher private investment. In this line, one of the main goals of the Monetary Policy Committee of Bank of Ghana is to guide the market by setting the prime rate as a bench mark for the financial institutions to respond. But there have been wide gaps between the lending and deposit rates since 2003.

Another investment related variable—exchange rate seems to be one of the most important variables under the uncertainty model. The coefficient is positive and highly significant (1%). With the liberalization policy, a depreciation of the exchange rate encourages exports. This indicates that, private investors respond greatly to exchange rate movements. Thus, private investors seem to be less uncertain with exchange rate than with interest rate.

It is observed that both the debt overhang and crowding out effects occur under the policy uncertainty scenario. The negative (-0.07) and significant (10%) of the debt level reveals the

non-linear impact of external debt accumulation on GDP in the long run. While the debt service variable was negative, it was not significant. This also confirms that domestic borrowing by government has not exerted much on private investment to reduce GDP greatly. Private investors may have been considering the policy environment of future taxes or they are not getting infrastructural support from government since the government suffers from liquidity constraints as a result of debt service.

Equation D is based on the Neoclassical model of investment which emphasis the role of interest rate, tax structure, public investment among others. Within this framework, it is noted that the external debt overhang strongly exist. The coefficient is negative (-0.09) and highly significant (1%). On the other hand, the crowding out variable is not significant. This confirms earlier outcomes.

Within this model, the variables that can be linked to policy and Keynesian propositions are correctly signed and also significant. For instance, public investment and exchange rate enhance private investment growth. The variables are positive and highly significant at 1%. Interest rate, as expected is negative and significant at 5% level. This confirms the neoclassical view. As interest rate rises, private investment falls. Again, the accelerator effect is confirmed as in equation A. Output growth enhances private investment decision. Other variables of interest such as corporate tax structure and domestic credit which are important in determining private investment are each positive as expected, although they are not significant.

5.5.2 Results of Public and Aggregate Investment Models

To ascertain the relative impact of external debt accumulation on both public and private investment, as well as aggregate investment in the economy, different models were estimated for

each of these categories of investment. This is in respect of crowding out effect and debt overhang hypothesis. The aggregate and public investments were built to capture the possible non-linear effect of external debt. The results of these models are presented in Table 7 below.

Table 7: Results of Impact of External Debt on Public and Aggregate Investment

Variable	Public Investment		Aggregate Investment	
	Linear	Non-Linear	Linear	Non-Linear
Constant	-5.8 (-2.08)	-5.8 (-2.0)	2.4 (1.5)	4.29 (3.2)
A	0.08 (1.3)	0.08 (0.35)	0.05 (0.27)	0.003 (0.2)
PCG	0.04 (1.4)	0.04 (1.4)	0.03 (0.39)	0.02 (0.31)
I	0.18 (2.6)	0.18 (2.5)	0.22 (2.95)	0.09 (1.44)
DSX	-0.27 (-1.9)	-0.27 (-1.9)	-0.11 (-4.4)	-0.04 (-2.06)
D	-0.04(-0.94)	0.04 (1.69)	-0.005 (-1.1)	-0.11 (-2.55)
D²		-0.09 (-1.96)		0.001 (4.7)
PI	0.56 (4.6)	0.56 (4.46)	0.79 (4.8)	0.89 (6.9)
PUI			0.62 (3.4)	0.8 (5.4)
PG	0.31 (1.4)	0.32 (0.38)		
FIS	0.30 (2.4)	0.30 (2.2)		
R²	0.81	0.817	0.94	0.96
D-W	1.6	1.7	1.6	2.5
F-stat	17.39	14.96	81.4	122.2
Prob(F-Stats)	0.00	0.00	0.00	0.00

Source: Author

5.5.3 Crowding Out Effect

One of the objectives of this study is to determine the extent of crowding out effect of external debt accumulation. This is examined from the perspective of various specifications. In relation to the effect of external debt service to exports ratio on private investment, it was found that, there is a negative relation between the two variables.

The crowding out effect, as in the case of private investment, is also evident when viewed from both public and aggregate investment perspective in Ghana. The significance of the debt variable in all the different versions of the public and aggregate investment attests to why Ghana has suffered greatly from external debt repayment. This problem is confirmed by the participation of

Ghana in various global external debt management policies, particularly in SAP and HIPC initiative. Relatively, the extent of crowding out seems prominent in public than private investment. Thus, it can be deduced that, the existence of crowding out on aggregate investment is broadly obtained from public investment. The problem of debt repayment of the 1980s and 1990s is reflected in Figure 11, where debt service was far higher than grants received.

High foreign debt servicing has led to marginal increased usage of domestic borrowing by government. This raised domestic interest rate (lending rate), thus, constraining the ability of private domestic borrowing, as demand for loanable funds increased. The increased interest rate increases the cost of borrowing and hence reduces private investment. It is in line with this situation of debt servicing requirement that led to the institution of VAT in 1998 and flat rate of VAT for the Ghanaian informal sector in a bid to raise enough domestic revenue. Generally, the results reveal that external debt service crowds out investment formation in the country over the research period. Thus, external debt service has influence on private investment as such affect works through government action in response to debt servicing requirements. The crowding out effect does not seem strong enough on private investment in Ghana, rather on public investment. It is noted that, Figure 10 collaborates the insignificance of the variable or the weak presence of a crowding out (on private investment) as the share of domestic borrowing recently gained prominence, in terms of proportion of government total debt.

5.5.4 Debt Overhang Effect

The debt overhang variable is expected to be negative and significant. For the various investment models, it is observed that foreign debt as a percentage of GDP harm private investment formation for the study period. In a similar way, the magnitude of the debt overhang indicator shows a higher level in aggregate investment model. External debt has more effect on public

rather than on private investment. While private investment may be crowded out by public domestic borrowing, the effect of external borrowing is seen more on public investment.

Similar results were obtained by Iyoha (1999) and Fosu (1996) for Sub-Saharan African countries including Ghana, and for Zimbabwe by Jenkins (1998). This might be due to the government's inability to import necessary inputs and machines for investment and also gain foreign exchange to implement private sector infrastructure support projects. Alternatively, the inability of government to provide such facilities increases private sector investment costs.

This indicates that, high external debt servicing reduces available exports earnings to undertake investment projects which have great impact on economic growth. For the research period, servicing of foreign debt constrain foreign exchange for critical imports and reduces available resources for public investment. In addition to the liquidity constraint, the huge debt and debt service reduces investor confidence through expectation of higher taxes. This probably would happen when the country has reached the external debt threshold, which is estimated to be quite low, collaborating the actual high debt-GDP ratios.

5.5.5 Accelerator Effect

The “accelerator effect” exists in the investment model. This is shown by the positive and significance of output growth effect on investment as GDP is expected to enhance domestic private investment. The accelerator effect seems stronger on private than on public investment. Moreover, the effect is more significant on private than on public investment. This might be due to the fact that, government would have to invest irrespective of the state of per capita GDP growth. Rather, for private investment, the state of economic growth serves as a stronger indicator to undertake their investment decisions.

A number of reasons may present this situation. First, there may be quite high adjustment toward desired capital stock. Secondly, output growth may be offering confidence to the private sector. Thirdly, it is observed that the growth trend of GDP since 1985 (constituting most part of the research) have ranged from 3.3% to 7.3% (an average of 4.8% over 25 years). This trend has strong basis to pull private investment along. Fourthly, increases in growth caused by improvement in aggregate demand may have also energized private investment. Fifthly, the output growth seems to support infrastructure development which reduces private cost of operation.

5.5.6 Discussion of Other Private Investment Model Variables

In relation to the impact of debt service, there is a negative effect of domestic interest rate on private investment. The significant impact collaborates that of debt service. The idea behind this phenomenon is that, the private sector put much emphasis on the level of interest rate in undertaking investment. Thus, government's demand for capital from the private financial institutions puts upward pressure on the domestic lending rate. This is on the background that, the interest rate over the years has been relatively high compared to other developed countries. The average lending rate for the 2000s is about 32.8%.

Previous private investment level has significant impact of current private investment. The lag of private investment level which was used to capture the investment climate seems to enhance private sector's investment formation, although significant at 10%. The impact of the exchange rate was found to be highly significant in improving private investment. The main reason for this arises from the export of goods and services, through various initiatives by government, such as the Ghana Exports Promotion Council. This is evident in the rise of non-traditional exports by 56% from 2005 to 2009.

The analyses show that, there is a positive effect of public investment on private investment. These two variables are highly correlated and the impact of public investment on private investment is significant at 10%. This is clear from the inherent potential contribution of public investment in areas such as infrastructure provision. The existence of these facilities reduces the associated cost to the private sector in undertaking investment activities. Similar results were obtained for Iran (Safdari and Mehrizi, 2011).

The availability of domestic credit positively contributes to investment. This confirms earlier studies for Ghana (Asante, 2000). In the same way, trade intensity seems to contribute to private investment decision making. In accordance with the rationale that increased aggregate demand would facilitate investment formation, the output price index shows this scenario. As the price of output increases, investors take advantage of increased profit to invest more. Also, this implicitly supports the q-theory of investment where the increased value of existing capital leads to more investment.

5.5.7 Discussion of Other Public and Aggregate Investment Model Variables

Foreign aid positively contributes to public expenditure although this is not significant. This confirms the relatively lower annual grants received compared with debt service (Figure 11) for some parts of the research period. In other words, the net receipt becomes negative for those periods. Interest rate, contrary to expectation, is positive on public investment. The need to borrow from the private financial sector, when it becomes necessary does not seem to consider the level of interest rate. Thus, irrespective of the rate of interest, government domestic borrowing persists and this also confirms the negative impact of interest rate on private investment.

The rate of population growth collaborate the positive impact of fiscal deficits on public investment. As the population grows, the need to expand public services becomes important in a developing country like Ghana. In this respect, government spending increases leading to fiscal deficits and ultimately resulting in external debt accumulation.

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CHAPTER SIX

SUMMARY OF FINDINGS, POLICY RECOMMENDATIONS AND CONCLUSION

6.1 Summary of Findings

The main objective of this study is to determine the long run impact of foreign debt on economic growth and investment in Ghana for the period 1970 – 2009. In specific terms, the study determined whether the level of Ghana's public external debt accumulation significantly affects output growth. It also examined the existence of foreign debt threshold and lastly determined whether there is crowding out of investment through external debt service.

The contributions of this study are as follows: a) a non-linear effect of external debt on output growth was revealed, b) the external debt threshold for Ghana was estimated to be 46.2 percent, supporting the external debt Laffer curve hypothesis, c) the research also uncovers a cumulative growth loss of 12.28 percentage points (indicating the growth loss when the estimated external debt threshold is exceeded), d) this leads to an annual average growth loss of 0.306 percentage points, and an increase in the ratio above 92% will turn to reduce GDP growth, e) external debt crowds out private investment but more pronounced on public investment and f) there exist debt overhang effect of external debt over an extended period of time. The study is the first to estimate growth loss caused by external debt, and determines the relationship between external debt and economic growth as non-linear for Ghana. In respect of the hypotheses, the study shows that external debt has significant negative effect on economic growth beyond a threshold, Ghana suffers significant growth loss from external debt accumulation; and external debt and debt servicing crowds out investment.

It was noted that in the long run, there is non-linear relationship between external debt and economic growth. This gives rise to the debt overhang problem as well. For lower levels of external debt–GDP ratios, the contribution to output growth is positive. But beyond a certain optimal point, the impact of external debt on growth starts to fall.

The results suggest that, there is a turning point in the contribution of external debt to economic growth in Ghana. The optimal threshold for Ghana for the study period is estimated to be 46.2%. The implications of debt threshold level are that, such a moderate threshold level means foreign debt is having a burden on growth. The threshold level suggests that Ghana encounters growth rate problems after this moderate debt to GDP level. This indicates that, future loans would only compound the debt problem beyond the threshold level.

As observed, if the country maintains the debt–GDP ratio at the optimal level, then the maximum benefit of external debt would be achieved. The study shows that beyond the 46.2% ratio, the impact of foreign debt on growth falls until the external debt GDP ratio reaches 92%, where there is zero contribution. Any foreign debt acquired further than the 92% mark would actually be negative on output. This confirms the reason why Ghana qualified for HIPC initiative in 2001 since the debt ratios were far in excess of 92%. Using the estimated 46.2% external debt threshold, the total growth loss is 12.28 percentage points over the study period. Thus, annually, over the study period, the estimated growth loss is 0.31 percentage points, all things being equal.

The investment model shows that the influence of external capital in the form of loans, in the long run leads to crowding out of investment and debt overhang on output. This occurs in two ways. First, through debt servicing, as exports revenue are retained abroad. This foreign exchange constraint reduces available foreign exchange requirement for public investment that

support private investment. Second, investment is affected through government's response to such external debt servicing requirements. Domestic private investment is also constrained at the end through interest rate and tax conditions. The combined effects in the two scenarios support the existence of debt overhang. Thus, in the long run, external debt accumulation and its related debt repayment leads to crowding out and debt overhang for the reference period.

Human capital development, according to the endogenous growth model, is expected to enhance growth of output. The analyses indicate that, human capital significantly contributes to growth. Similarly, labour force was also found to be positive but not significant. These may be due to the existence of unemployment and brain drain. Juxtaposing this with the importance of human capital, dampens the impact and contribution of human resources to output growth. Thus, given these conditions, labour force is continuously increasing, but that is not being translated into productive use, which has high positive correlation with output growth.

The level of capital was found to be positively related to GDP. This is important because for Ghana to enhance GDP, capital should facilitate labour productivity. Ghana's public capital investments have partly been in infrastructure, which reduces the cost component of private investment.

The external sector variable shows the expected positive sign and it is also significant. The export component offers the country ability to service existing debt, while at the same time minimising or avoiding the acquisition of new debt. Also, high export earnings generate enough import capacity. This would assist or offer needed imports of critical inputs, plants and machines for growth. The combined effect of these two elements is a spur on growth.

The macroeconomic environment significantly influences the level of output growth. This variable significantly contributes to growth, through the effect of government expenditure purporting that greater attention should be given to macroeconomic performance in output growth. Thus, the proper use of domestic revenue to provide infrastructure facilities, which are lacking in developing countries, stimulates growth. In the same way, the market potential seems to enhance output growth within a democratic society.

In addition, other control variables gave varied impacts. While the accelerator effect was present, the cost of investment goods negatively influences private investment demand. Availability of credit seems to have influenced the level of investment positively. The results show that, the poor macroeconomic environment had impacted on the desire to undertake investment activities by corporate individuals. This is reflected in the uncertainty that surrounds investment environment. The totality of macroeconomic variables indicates that the cost of doing business is high.

Further analyses show that private and public investments are highly related, public investment significantly enhances private investment. This is obvious as in developing countries, private investment actors put much emphases on the contribution by public sector in terms of policy affecting investment and the general macroeconomic policy environment. This indicates that, to achieve high growth and employment creation, emphasis should be placed an improving private sector investment development, through facilitating their growth by using appropriate macroeconomic polices.

6.2 Policy Recommendations

The results obtained lend support for the implementation of appropriate policies to deal with near existence of debt trap. In respect of the moderate debt threshold, policy makers need to strengthen debt management institutions and personnel so that there can be effective management and use of foreign loans. The policy implications emanating from the results are presented in two forms: those that pertain to stemming external debt accumulation and those relating to crowding out.

6.2.1 Recommendations to Avoid External Debt Associated Growth Loss

The following are main recommendations proposed to stem external debt accumulation (as pertains to the research).

- The estimated optimal external debt threshold should serve as guide for policy-makers. As the need to borrow externally cannot be completely avoided, government and policy-makers in Ghana should situate the amount borrowed and amount to be borrowed in the context of ability to pay and the returns from loan's investment.
- Government and policy-makers must be guided by critical threshold for which external debt contribution to economic growth becomes negative. Such an amount would serve as the largest amount of external debt the economy could accommodate given the GDP.
- In addition, Ghana has to reduce foreign debt accumulation, given the moderate debt threshold level, and substitute that with non-debt financing such as grants and other domestic revenue. In doing these, policy-makers should exercise caution in order not to disturb the productive processes and activities.
- It was observed that, higher debt flow leads to higher external debt servicing responsibilities. Since this higher debt servicing obligation is the root cause of growth slow down, a policy should be directed at minimising debt flow so that debt servicing

would also fall. This would lead to 'proper' use of foreign exchange. Also in this direction, domestic revenue generation should be enhanced.

Other policy recommendations in respect of reducing external debt accumulation include:

- Moreover, future debt should be acquired on concessional base as such debt commands low interest rate, high grace and maturity periods. Such conditions reduce the rate of repayment, thus allowing the returns from investment of loans to yield benefit of contributing to GDP. This is important as the trend in the late 2000s shows, commercial loans are being contracted.
- Acquired debt should be invested in productive projects that have high returns, multiplier effect and linkages over the shortest possible time. Such high returns would highly offset the repayment responsibility.

6.2.2 Recommendations to Stem Crowding Out and Other Related Issues

In order to escape the implications of crowding out, domestic borrowing should be minimised if not avoided. This means that, the Revenue Agencies Governing Board together with the Parliament of Ghana should diversify the domestic revenue generation sources so as to improve domestic revenue. This would take care of interest rate ramifications.

In addition to the recommendations in respect of reducing external debt accumulation and crowding out, a number of proposals are made based on the results. Government policy should provide the macroeconomic environment for improving private sector investment while government investment should be selective to boast critical backward and forward linkages in the economy. Also, there should be policies to continually target accelerated economic growth, to overcome debt servicing problems.

Another form of borrowing from the public, without causing crowding out is the use of open market operations, such as treasure bills. This form of government borrowing does not directly go through the private financial market and thus avoids increased demand for loanable funds. Although this form of government financing has interest rate ramifications, it prevents crowding out on private investment.

Policies should be geared towards improving labour force and human capital contribution to GDP in the following ways:

- a. Redirecting educational expenditure into areas that have much multiplier effect on output;
- b. Stemming the brain drain of skilled labour through appropriate financial and other incentives;
- c. Expanding educational accessibility;
- d. Improving educational quality; and
- e. Making adequate use of the available literate and highly skilled labour force, thus minimising labour unemployment.

The high level of capital's contribution to GDP growth requires much attention to capital development. Particularly, there should be targeted policy to expand and improve the infrastructure facilities including good roads, telecommunications, transport, etc. It is noted that, government policy initiatives that facilitate investment from the private sector is an indication that, the burden on government to borrow would be reduced.

To concretise the impact of trade intensity on GDP, Ghana needs to beef-up her potential exports. There should be efforts and policy to enhance both traditional and non-traditional

exports. Since Ghana does not have much control over the price of her traditional exports on the world trade market, effort should be made to continually increase her quantum of exports to achieve higher export earnings. At the same time, policies should be directed to export processed goods to enhance value. Thus, there should be directed growth process.

The confirmed usefulness of macroeconomic performance in output growth suggests that, government policies should be directed toward economic growth. One of such policies is through directed domestic public expenditure including both current and capital expenditure. Also, government should intensify domestic revenue generation without hampering production and output particularly from the private sector.

Also, the growth process should be made to reflect in higher gross investment. As growth occurs, government policies should re-direct the growth in the economy to reflect in further investment creation. Thus, growth should be made to emanate from productive processes and not from activities that do not have linkages such as importation and trading in finished goods.

Ever since the establishment of the Monetary Policy Committee (MPC) of Bank of Ghana, there has been wide gaps between the prime rate set by the MPC and the interest rate the banks charge. This means that, these two groups of institutions perceive the economy from different perspectives. To close the gap between relatively low prime rate and higher inter-bank interest rate, efforts should be made to reconcile the rates so that there are no large margins on the prime rate, which to some extent influences investment.

6.2.3 Other Related Recommendations

On the basis that, the root cause of the Ghanaian external debt accumulation is fiscal deficits, fiscal consolidation becomes important to any government that focuses on the elimination of debt. In this case, and in order for the fiscal policy to function effectively, government must consider the total cost of essential expenses while identifying ways to generate as much benefit from those purchases as possible. The government would have to create avenues and procedures that help to eliminate public sector waste, and increases the efficiency of the consumption of the goods and services purchased. This would help to avoid or at least minimise the amount of new debt accumulation. Moreover, the bulk of fiscal consolidation will require specific structural reforms to spending and revenue programmes to stabilise the economy and then reduce debt-GDP ratio. In addition, strong growth would help reduce the rate at which the government would need to obtain external funding.

On the spending side, many reform options offer budgetary savings through improved efficiency, without loss of desired outcomes or productivity. In relation to the revenue side, the country's tax systems should avoid inefficiencies that reduce revenue and undermine fairness. Ability to reduce the scope and scale of tax administration expenditures remains an important aspect of revenue generation. Observably, shifting taxation toward less inefficient tax bases also holds much promise.

It is important for government and policy-makers to consider mismanagement of loans. Irrespective of the aim of acquiring external loans, when the loan is misused, the intended purpose would not be achieved. When mismanagement occurs, the burden of repayment increases as projects or investment are not implemented, not completed or not done to required

standard and quality, no returns would emanate from the investment, thus complicating the debt burden.

One of the critical concerns raised about the usefulness of loans in developing countries is corruption. When corruption steals amount intended for societal use, the economy suffers from growth and ultimately development. It is necessary for government and policy-makers to beef up effort to curtail any form of corruption that would reduce external loans for the planned official purpose.

Related to corruption are weak institutions and insufficient supervision of appropriate agencies. When public institutions are weak to perform their functions, there would be high probability for corrupt practices to thrive. Government must strengthen public institutions so that the supervisory roles of government activities could be enhanced. Also, it is important for government to develop a clear development policy. Within such development policy framework, any external funding could be easily channelled and receive proper policy direction.

Grants do not have debt burden on the economy. As such, the government should intensify efforts with development partners to secure and properly utilise grants. This is in addition to the fact that, foreign aid has positive impact on public investment. With adequate amount and use of acquired grant, the complementary level of external debt would be minimised leading to reduced external debt service. This would reduce the pressure to borrow from the private domestic market which causes crowding out.

6.3 Conclusion

Countries in the world receive external funding in various forms for development. The debt component is critical for developing countries such as Ghana. The expectation of foreign debt to a country is that, it would close any outstanding foreign exchange requirement gap. This would help kick start a growth process. In this respect, this study examined the long term impact of external loans on economic growth and the channel through which the impact is transmitted, by determining the optimal debt threshold, external debt induced growth loss, crowding out effect and debt overhang proposition for Ghana over the 1970 – 2009 period.

The research uncovers a non-linear relationship between external debt and real GDP growth. The positive contribution of external debt to GDP (at lower levels of external debt) supports the notion that, a certain minimum requirement of external funding is necessary to support the growth process. If the institutional and management capacity is enhanced, the debt threshold could be pushed higher, thereby increasing the contribution of external debt to output growth. With this, it is concluded that external debt has significant positive impact on GDP growth, but has an inherent diminishing returns, beyond a certain threshold level.

One of the striking and informative results obtained is the moderate external debt threshold. This threshold is estimated to be 46.2%. This is based on the results that there is a non-linear effect of debt on economic growth. Such debt threshold indicates that foreign debt is having a burden on economic growth in the long run. Such a debt threshold indicates that, Ghana has quite low capacity to absorb, and utilise external loans as well as low ability to repay contracted foreign loans. In addition, it suggests that the negative effect of debt on growth could be high, and the benefits of loans are not being adequately harnessed. Obviously, the debt threshold level and the impact on output growth indicate that, the solution to external debt problem in developing

countries may not only rest within the purview of external policy such as HIPC initiative but also on individual country institutional and management constraints.

In relation to the second objective, the cumulative growth loss of surpassing the estimated external debt threshold is 12.28 percentage points. This leads to an annual growth loss of 0.31 percentage points, *ceteris paribus*. This paper develops a new early warning system for external debt crisis. The results provides noticeable warning signals for policy-makers to act before external debt levels reach a critical value that heralds the arrival of full-blown external debt problem. The research shows that beyond the 46.2% ratio, the impact of foreign debt on growth falls until the external debt-GDP ratio reaches 92%, where there is zero contribution. Any foreign debt acquired further than 92% mark would actually have negative effect on output.

The third objective of this study was to examine the extent of crowding out effect and debt overhang. The study observed the existence of both effects. This indicates that, high external debt servicing reduces available export earnings to undertake investment projects which have great impact on economic growth. Thus, the generality of debt overhang exists for the study period through its crowding out effect on private investment as well as its strong effect through depressing public investment by constraining finances. Also, it is evident that, the huge debt and debt service raise future tax expectation and discourage the private sector from undertaking investment projects.

6.4 Future Research Areas

However, these results may require further investigation on the relative impact of domestic and foreign debt on economic growth. In this case, the individual debt series would determine the relative importance to economic growth and society.

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APPENDICES

Appendix 1: Additional Notes on Neoclassical Theory of Investment

This model makes strides in terms of analysing effects of changes such as:

- Technology gains (technological progress makes more output possible with the same capital stock, leading to desired capital stock increases);
- Real interest rates (has inverse relationship with desired capital stock); and
- Tax incentives.

In spite of these gains, there are some problems with the baseline model. It was not able to answer some questions and those formed the basis for further research to improve on the work by Jorgenson. Some of the problems were:

- The model predicts an instantaneous speed of adjustment of capital stock which is unrealistic;
- There is no role for future expectations (apart from appreciation term, $\Delta P_t/P_t$); and
- The “accelerator model” –the positive effect of output increase on investment, $I_t = \Delta K_t + \delta K_{t-1}$ holds when c_t , user cost is assumed to be approximately constant.

Again, the model did not consider dynamics of the variables. In order to account for adjustment costs and rational expectations led to the development of a more ‘realistic’ model-the q theory by Tobin (1969).

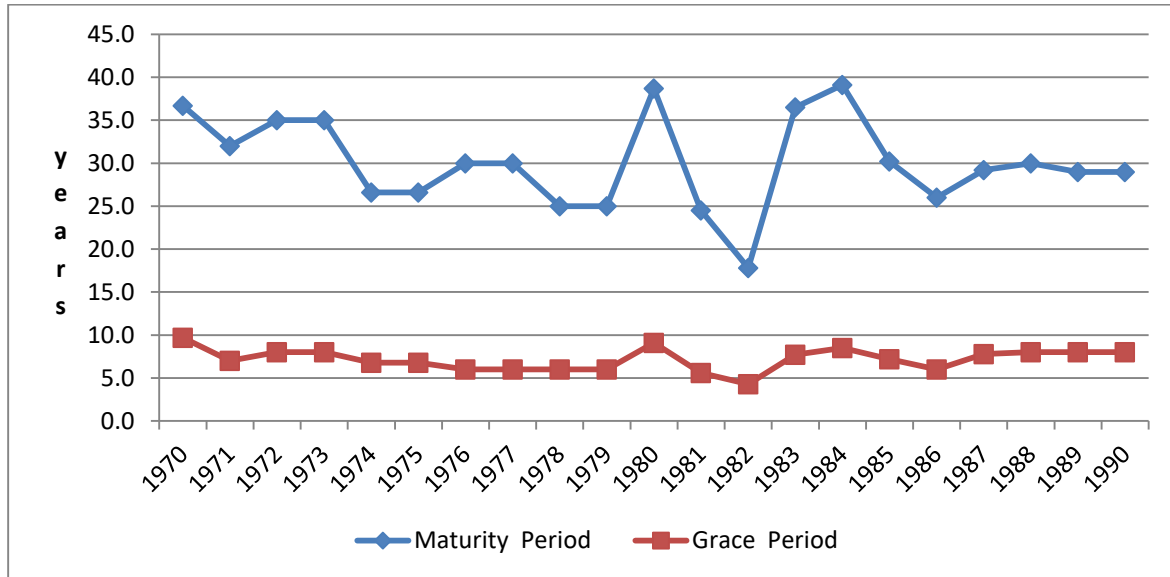
Appendix 2: Additional Notes on Tobin's q Theory of Investment

This model suggests that investment, (I_t) is increasing in q , that is, rate of investment is a function of q . Tobin's q is assumed to behave like a sufficient statistic - given q , other information (both observed and unobserved) does not matter. It contains all the necessary information needed to take an economic decision about investment. Thus, the interest rate effects work through the stock market valuation of the firm.

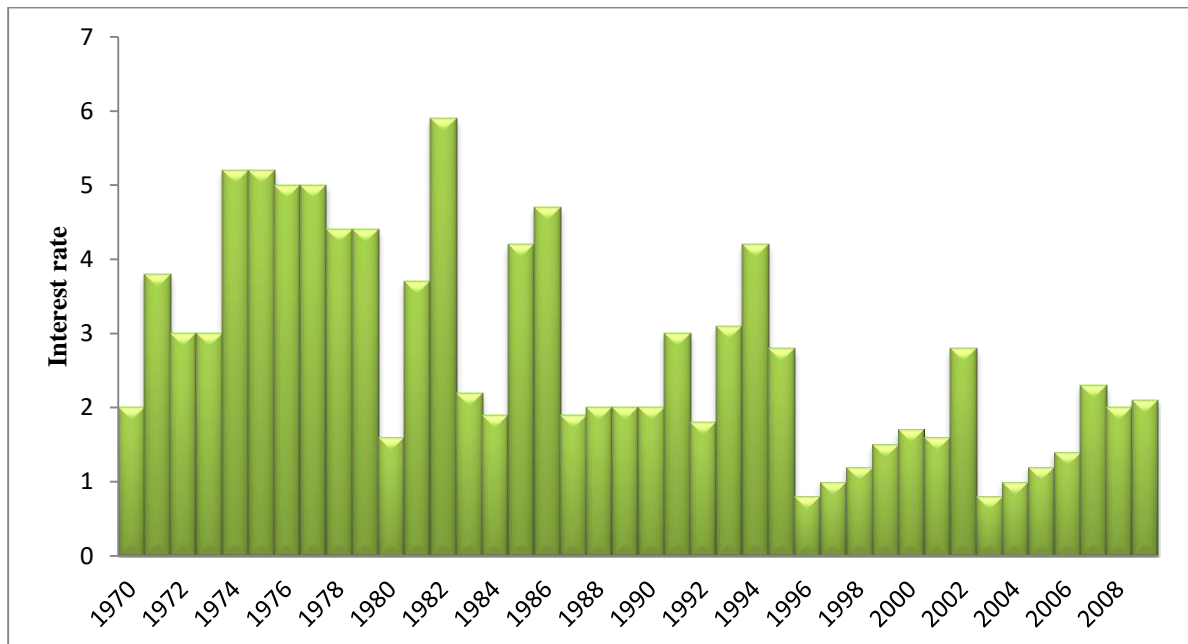
Unlike the neoclassical case, the Tobin's q considers the micro level entities by incorporating the adjustment cost of capital in terms of cost of installing investment capital. These adjustment/installation costs explain why q is not always equal to one. These additional costs may slow down the adjustment in the long run. These explain why investment mostly depends on marginal q , as opposed to average q . Also, in terms of market conditions, monopoly is more likely to have q greater (than unity) than that of competitive firm, although there are some exceptions to these.

If there were no costs of adjustment, the present value of the marginal cost of capital would be independent of the investment rate. Again, if there were no depreciation, the investment rate, I , equals the rate of change of the capital stock $\Delta K/K$. (i.e., $I = \Delta K/K$).

Appendix 3: Maturity and Grace Period of Loans (Years) of Ghana

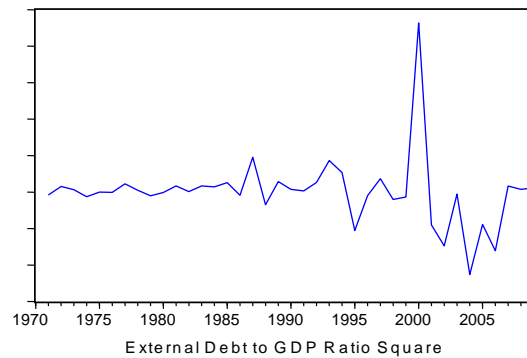
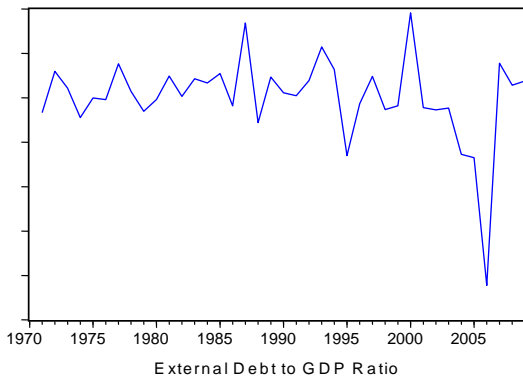
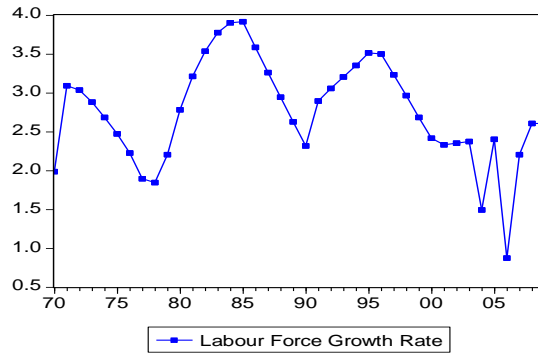
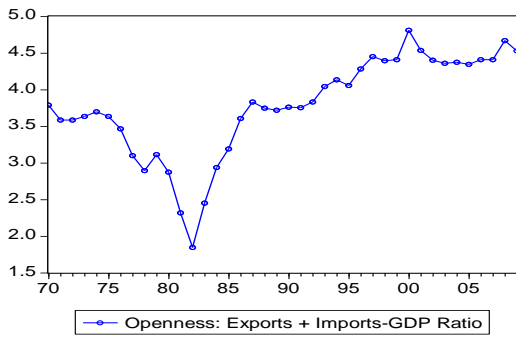
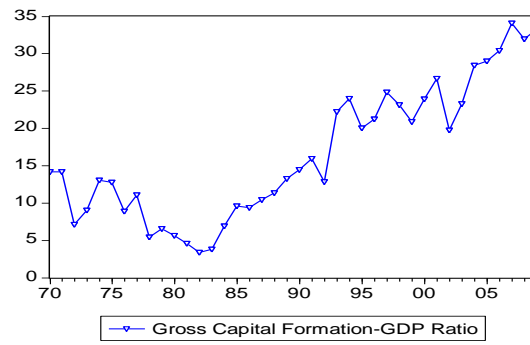
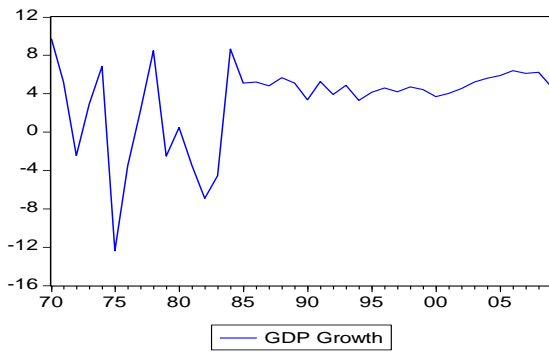
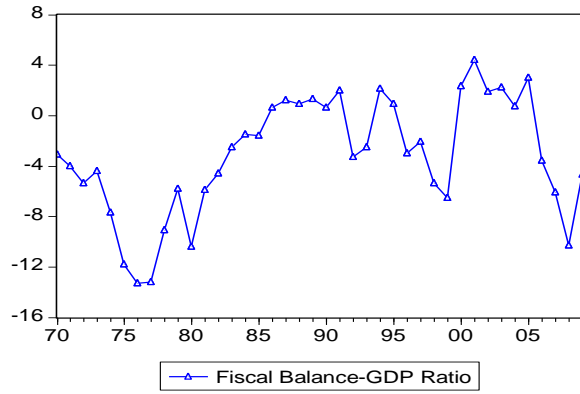
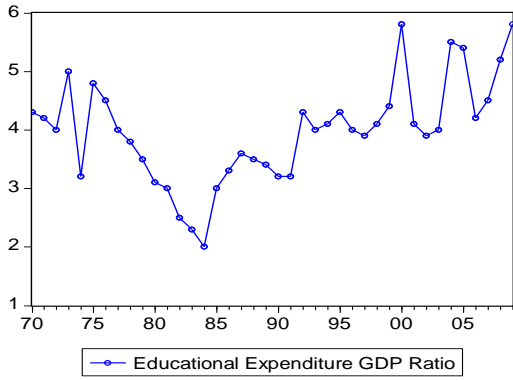


Appendix 4: Average Annual Loan's Interest Rate (%)



Appendix 5:

Graphical Representation of the Growth Model Variables



Appendix 6: Ng-Perron Unit Root Test Results

VARIABLES		MZt Statistic	Comment
\dot{y}		-2.69	I(0)***
LF		-1.99	I(0)**
GCF		-1.98	I(0)**
EE		-2.04	I(0)**
D		-1.99	I(0)**
OP		-1.98	I(0)**
FIS		-1.99	I(0)**
PI		-1.99	I(0)**
PUI		-1.98	I(0)**
Int		-1.97	I(0)**
DSX		-1.99	I(0)**
CT		-1.99	I(0)**
DC		-2.1	I(0)**
E		-1.9	I(0)*
A		-1.99	I(0)**
PG		-1.92	I(0)**
IRL		-1.98	I(0)**
PCG		-1.99	I(0)**
Asymptotic Critical Values	1%	-2.580	
	5%	-1.980	
	10%	-1.620	

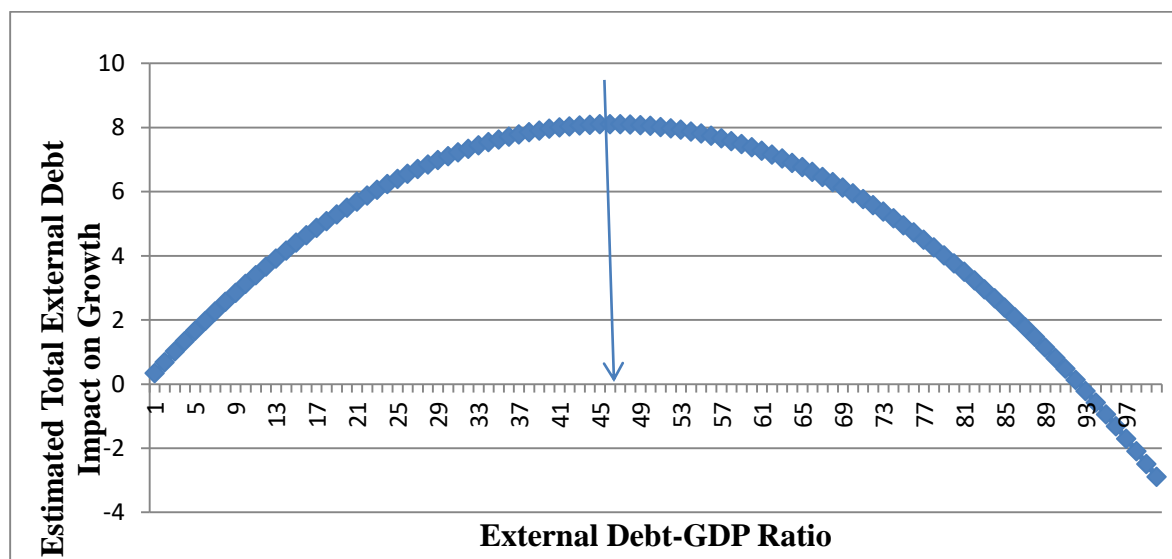
Note: *** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.1 level

MZ_t is the modified transformation of the t-statistic of the Ng-Perron test. MZt is used since MZt = MZa * MSB. Lag length: (Spectral GLS-detrended AR based on SIC, Maxlag = 9); with a constant

Appendix 7: Table of Threshold Estimation

A	B	C	F (=A*C)	H	J (=B*H)	K (=F+J)
D	$(D)^2$	Coefficient of D	Coefficient of D * D	Coefficient of $(D)^2$	Coefficient of $(D)^2 * (D)^2$	Sum of F and J
1	1	0.3511	0.3511	-0.0038	-0.0038	0.3473
2	4	0.3511	0.7022	-0.0038	-0.0152	0.687
...
45	2025	0.3511	15.7995	-0.0038	-7.695	8.1045
46	2116	0.3511	16.1506	-0.0038	-8.0408	8.1098
47	2209	0.3511	16.5017	-0.0038	-8.3942	8.1075
48	2304	0.3511	16.8528	-0.0038	-8.7552	8.0976
...
92	8464	0.3511	32.3012	-0.0038	-32.1632	0.138
93	8649	0.3511	32.6523	-0.0038	-32.8662	-0.2139
94	8836	0.3511	33.0034	-0.0038	-33.5768	-0.5734
95	9025	0.3511	33.3545	-0.0038	-34.295	-0.9405
96	9216	0.3511	33.7056	-0.0038	-35.0208	-1.3152
97	9409	0.3511	34.0567	-0.0038	-35.7542	-1.6975
98	9604	0.3511	34.4078	-0.0038	-36.4952	-2.0874
99	9801	0.3511	34.7589	-0.0038	-37.2438	-2.4849
100	10000	0.3511	35.11	-0.0038	-38	-2.89

Appendix 8: Estimated External Debt Laffer Curve

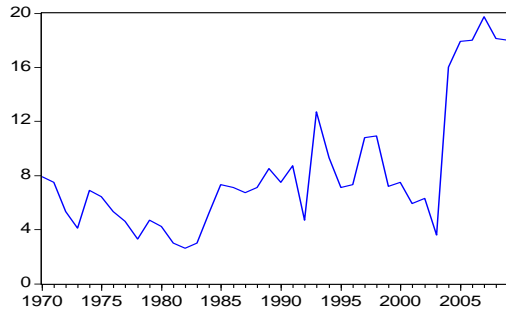


Appendix 9: Annual Growth Loss (Negative Value Only) of Exceeding Estimated External Debt Threshold

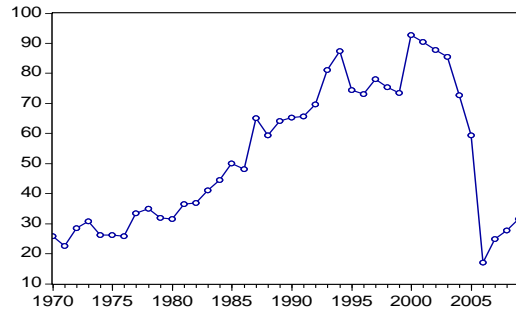
Year	Annual Growth Loss
1970	0.775
1971	0.902
1972	0.675
1973	0.591
1974	0.760
1975	0.762
1976	0.776
1977	0.485
1978	0.429
1979	0.543
1980	0.557
1981	0.371
1982	0.358
1983	0.195
1984	0.068
1985	-0.140
1986	-0.072
1987	-0.713
1988	-0.500
1989	-0.678

1990	-0.722
1991	-0.739
1992	-0.887
1993	-1.323
1994	-1.565
1995	-1.071
1996	-1.021
1997	-1.206
1998	-1.105
1999	-1.037
2000	-2.846
2001	-2.554
2002	-2.028
2003	-2.007
2004	-1.006
2005	-0.494
2006	1.110
2007	0.814
2008	0.705
2009	0.560
	-12.280

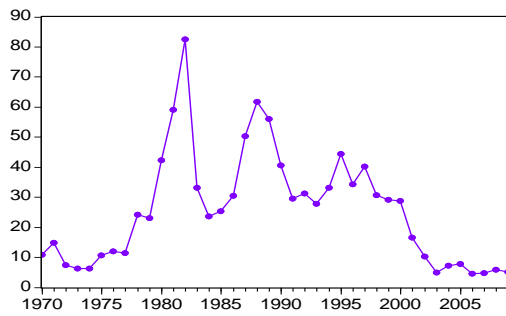
Appendix 10: Graphical Representation of the Investment Models Variables



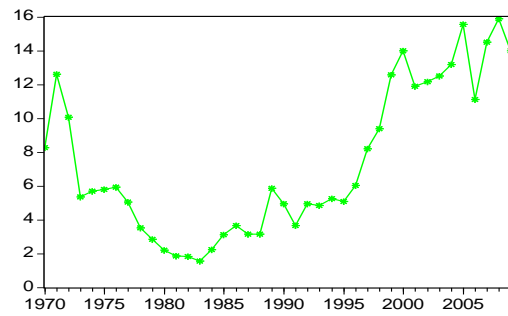
— PI-Private Investment GDP Ratio



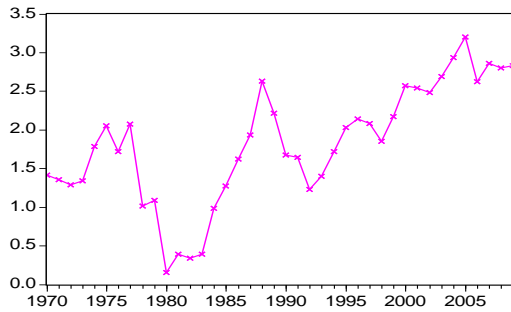
— D-Public External GDP Ratio



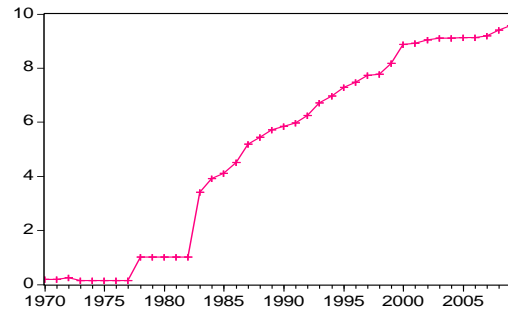
— DS-Debt Service Exports Ratio



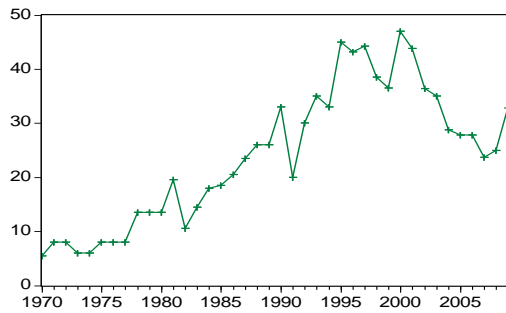
— DC-Domestic Credit to Private Sector GDP Ratio



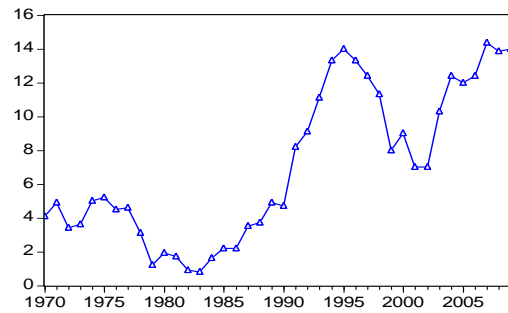
— CT-Corporate Tax GDP Ratio



— E-Exchange Rate



— INT-Lending Rate



— PUI-Public Investment GDP Ratio

Appendix 11: Conditional Regression (Growth as Function of only External Debt)

The conditional regression (where external debt is the only independent variable) shows that there is a possible non-linear relationship between growth and foreign debt accumulation. This confirms our earlier results of the growth model. The external debt to GDP variable and its square showed the expected positive and negative signs respectively but are not significant. On the basis of these, the threshold determined from the conditional regression showed an unrealistic level of 194.5%, which is quite different from the ideal level 46.2%. This level of threshold (194.5%) cannot be used for policy recommendation due to a number of reasons:

- Conventional growth theories have convincingly not concentrated on only one variable as determinant of growth. Thus, using only debt to GDP ratio to determine the threshold would be limiting.
- Empirical literature has also estimated growth models which include other variables in addition to the traditional labour, capital and efficiency parameters-augmented growth models. Thus, it would be of importance to include other variables of concern in the model before the threshold is estimated.
- The Ghana specific research has shown that, historically external debt has consistently been a part of national budgets and that the nation has been part of all international debt management policies. In addition, these debts were acquired and used for various infrastructure and other expenditures such that, those elements should feature in the estimated growth model, in determining the threshold.

- The theoretical framework developed and used for the study suggests the inclusion of other variables in the growth model. This is on the basis that, the external debt threshold to be estimated should include other important macroeconomic variables.
- External debt in some cases is acquired in forms other than cash such as intermediary inputs and raw materials particularly in the early years of the industrialisation effort. Thus, external debt acquired through other non cash means also impact on growth. Those variables also have to be included in the growth model. Thus, given the above factors, it can be concluded that, the threshold level of 194.5% cannot be used for policy recommendation.

Appendix 12: Quotient Rule

If $y = \frac{f(x)}{g(x)}$ then $\frac{dy}{dx} = \frac{g(x).df(x) - f(x).dg(x)}{[g(x)]^2}$ applying the formula on equation 8b

$\frac{dg}{dd} = \frac{(-d)(-r) - [\pi + t - \theta - \lambda\alpha - rd](-1)}{(d)^2}$ removing brackets

$\frac{dg}{dd} = \frac{dr + [\pi + t - \theta - \lambda\alpha - rd]}{(d)^2}$ simplifying

$\frac{dg}{dd} = \frac{dr + \pi + t - \theta - \lambda\alpha - rd}{d^2}$ canceling out like terms

$\frac{dg}{dd} = \frac{\pi + t - \theta - \lambda\alpha}{d^2}$

Appendix 13: 2SLS Processes, Results and Comparism With OLS Results

There seems to be some possible feedback between economic growth and external debt. Under such circumstances, the study observed the behaviour of the economic growth model within such possible simultaneity. The process involves identification, estimation and evaluation of the statistical reliability of the econometric models in question. The identification problem related to establishing whether the structural parameters can be estimated from the reduced form estimates. The set of equations can only be estimated when it is exactly identified or over-identified. Econometrically, for an equation in a system of simultaneous equations to be identified, there must exist a variable excluded from the equation being identified, but included in the other equation(s) in the system. On the other hand, an equation in a system of simultaneous equations will be unidentified if there exists no variable excluded from the equation but included in the other equation(s) in the system (Mukras, 1993)⁴⁰. This can be ascertained by using order and rank conditions of identification.

The order condition is a necessary condition. The order condition states that, the number of pre-determined variables (exogenous and lagged endogenous variables- V_{EXE}) excluded from a given equation is at least as large as the number of endogenous variables included in the system less one ($V_{ENI} - 1$). This becomes $V_{EXE} \geq V_{ENI} - 1$.

Given the growth model (equation 24 reproduced here for ease of appreciation)

$$\dot{y}_t = \alpha_0 + \alpha_1 (LF)_t + \alpha_2 (GCF)_t + \alpha_3 (EE)_t + \alpha_4 (D)_t + \alpha_5 (D)_t^2 + \alpha_6 (OP)_t + \alpha_7 (FIS)_t + \alpha_8 Dum_t + \alpha_9 \dot{y}_{-1t} + \varepsilon \quad (24)$$

⁴⁰ Mukras M. S. (1993) Elementary Econometrics, East African Educational Publishers, Nairobi

and the two subsidiary models

$$GCF_t = \lambda_0 + \lambda_1 A_t + \lambda_2 \dot{y}_t + \lambda_3 Int_t + \lambda_4 DSX_t + \lambda_5 D_t + \lambda_6 D_t^2 + \lambda_7 PI_t + \lambda_8 PUI_t + \gamma_t \quad (26b)$$

$$D_t = \beta_0 + \beta_1 GCF_t + \beta_2 E_t + \beta_3 OP_t + \beta_4 IRL_t + \beta_5 \dot{y}_t + \beta_6 FIS_t + \delta_t \quad (27)$$

The order condition shows that, the growth model is over-identified since $V_{EXE} = 6$; $V_{ENI} - 1 = 1$; $\therefore \Rightarrow V_{EXE} \geq V_{ENI} - 1 \Rightarrow 6 > 1$. Thus, the growth model is over-identified. In the same vain, external debt growth and aggregate investment models are also identified.

Having satisfied the identification problem, the appropriate estimation technique is the two stage least square (2SLS). The 2SLS is ideal as it does not give multiple parameter estimates as indirect least square does. Also, it can be applied to individual equations in the system (without directly taking into account any other equations in the system).

The Eviews 2SLS estimation of \dot{y} is analog to the estimation of the earlier transformed polynomial model. The variables specified (in the equation window of Eviews), are according to equation 24a while instrument list constitute all exogenous variables (including lags of endogenous variables) in the system of simultaneous equations. By this process, the results of the growth model (by taking into consideration the feedback from external debt and investment), using 2SLS are presented below:

Variable	Const.	D	D ²	FIS	OP	GCF	EE	LF	y(-1)	Dum
Coefficient	-3.3	0.3793	-0.0039	0.26	0.58	0.09	0.73	0.27	0.033	0.21
t-statistic	-0.28	1.91	-2.08	1.69	1.68	1.46	2.36	1.59	1.12	0.19

Comparism Summary of OLS and 2SLS of the Growth Model

The comparison is made with reference to conclusions from Table 5 and the 2SLS results above. The following inferences can be deduced:

- Coefficient estimates of growth model using OLS of the transformed non-linear polynomial model and 2SLS method are identical in signs.
- The standard errors of the 2SLS are marginally larger than the OLS estimates. These led to a slight difference in the significance of the variables of concern. While the debt to GDP ratio and its square were significant at 0.05 and 0.02 respectively in the OLS, they were 0.06 and 0.04 respectively in the 2SLS.
- Coefficient estimates of the external debt variables using OLS method are marginally different from those of 2SLS method. While the debt and its square are 0.3511 and -0.0038 for the non-linear polynomial, they were 0.3793 and -0.0039 respectively for the 2SLS estimation.
- The existence of the expected signs of the debt variables shows that, there is non-linear impact of external debt on economic growth with the 2SLS estimation as well.
- The corresponding threshold level (using the 2SLS) is 48.6%, a difference of 2.4 percentage points from the non-linear model.
- The significance of the other exogenous variables in the 2SLS are marginally reduced, although they are all significant at the same levels as in the OLS.
- Comparing the two results, one clearly sees that they are practically the same. A look at the results of Tables 6 and 7 (and results of external debt growth model of Appendix 14) suggests that, the corresponding adjusted R^2 is relatively high,

and thus the estimates of investment and external debt would be close to their actual values. The explanation here is that, high value of R^2 means that the estimated values of the endogenous explanatory variable (investment and external debt in equation 24) are very close to their actual values for which they are expected to be proxies and less likely to be correlated with the stochastic term in the original structural equation. As these (estimates) are used to estimate the 2SLS (of \dot{y}), it means that, there would not be much difference between the two estimates (of OLS and 2SLS for growth).

Appendix 14: Results of External Debt Growth Model

The expected negative relationship between investment and external debt growth was revealed. In this case, as the level of investment increase, the need to acquire external debt reduces. This may be due to ‘proper’ use of previous loans contracted and other resources. Investment level is significant at 1% as well as the rate of change of exchange rate. The continual depreciation of the GH cedi to the US dollar, the major trading currency worsens debt accumulation.

The relative magnitudes of exports and imports reflected by current account (deficits) in the model shows a positive relationship with external debt growth. As expected, the higher import relative to export for most part of the study period confirms the positive sign. Thus, the higher the net exports, the higher the growth of external debt.

The level of economic growth has the expected negative sign. As the economy grows, the need to acquire external debt also falls. This can be due to higher revenue and income related abilities of the economy. However, contrary to GDP growth, the level of government spending leads to external debt accumulation. This is because, the continual effort to undertake infrastructure projects to facilitate the private sector and reduce poverty has led to the acquisition of more loans. The level of interest rate on loans shows the expected positive relationship between loans interest and external debt growth. As the rate on loans increase, the rate of growth of external debt is bound to increase.

Results of External Debt Growth

Variable	Constant	GCF	E	OP	\dot{y}	FIS	IRL
Coefficient	-9.7	-2.2	0.51	0.91	-0.71	1.8	1.6
t-statistic	-0.6	-3.19	3.3	2.9	-1.15	2.69	0.7
<hr/>							
$R^2 = 0.70$	F-Stat = 12.47		Prob(F-stat) = 0.00			D-W = 1.8	

Appendix 15: Error Correction Model of Economic Growth

We noted that few of the variables are stationary at low level of significance. This gives a cause for concern. Thus, we explore an alternative approach of cointegration to error correction modeling of the growth model. This cointegration approach has the tendency to combine the short run dynamics and long run effects through an error correction term. In addition, to circumvent the stationarity problem of time series data, percentage growth frequently shows no clear tendency to either rise or fall, while changes in the logarithms of data series are more likely to be stationary in levels.

Two main approaches are used to ascertain the non-stationarity of variables. These are the two-step Engle-Granger (1987) approach and Johansen method. This allows for a distinction to be made between the short and the long runs. If the growth rate, control and external debt variables are integrated of order 1, then in order to ensure stationarity, the dependent variable should be expressed as a first difference, Δy_t . When all variables are I(1), and they are co-integrated, then non-stationarity is not an issue (Jenkins, 1998: pp. 42). The unit root statuses of the variables were undertaken and the results are presented in the table below.

Table 15A: Further Unit Root Test Results Using Augmented Dickey Fuller Method

VARIABLES	Augmented Dickey-Fuller Test Statistic	Prob. value	Comment
Δy	-7.148	0.0000	I(1)
ΔLF	-10.24	0.0000	I(1)
ΔGCF	-7.243	0.0000	I(1)
ΔEE	-5.443	0.0001	I(1)
ΔD	-5.485	0.0001	I(1)

ΔOP	-6.933	0.0000	I(1)
ΔFIS	-6.087	0.0000	I(1)
ΔD^2	-6.059	0.0000	I(1)

The statistics for the 1%, 5% and 10% of the Augmented Dickey-Fuller unit root test are -3.610, -2.938, and -2.607 respectively.

It can be noted from Table 15A that, the first difference of the variables are all significant at 1% significant level implying that they are stationary at first difference. This gives way for cointegration test to be performed, ensuring that there is a long run relationship between the dependent variable on one hand and the independent variables on the other. The cointegration tests were performed using two main approaches: the Engle-Granger and the Johansen cointegration tests. The Engle-Granger cointegration test was based on the error term extracted after estimating the long run static model given below. If the unit root test on the error terms from the static model is stationary, there is cointegration, which indicates that the model can be estimated in first difference.

$$\dot{y}_t = \alpha_0 + \alpha_1 (LF)_t + \alpha_2 (GCF)_t + \alpha_3 (EE)_t + \alpha_4 (D)_t + \alpha_5 (D)_t^2 + \alpha_6 (OP)_t + \alpha_7 (FIS)_t + \alpha_8 Dum_t + \alpha_9 \dot{y}_{-1t} + \varepsilon$$

The Engle-Granger two step cointegration test was applied along side the Johansen cointegration test. From Table 15B, the unit root test conducted on the error term extracted from the long run static model show stationarity, even at 1% significant level. This indicates that, there is long run relationship among the variables of the economic growth model.

Table 15B: Engle – Granger Cointegration Test Results

Null Hypothesis: ECT has a unit root				
Exogenous: Constant				
Lag Length: 4 (Automatic based on SIC, MAXLAG=9)				
			t-Statistic	Prob. value
Augmented Dickey-Fuller Test Statistic			-4.694123	0.0006
Test Critical Values:	1% level		-3.646342	
	5% level		-2.954021	
	10% level		-2.615817	

With various assumptions experimented about the variables, there is at least one cointegration relationship among the variables. Thus, the Johansen cointegration test summary was carried out and the results are presented in the table below. It is noted that, with the trace statistics, there is cointegration irrespective of the test type. On the other hand, the Maximum-Eigen Values show cointegration in four out of five test types.

Table 15C: Johansen Cointegration Test Results

Selected (0.05 level*) Number of Cointegrating Relations by Model					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	1	2	2	2	3
Max-Eig	0	1	1	2	3
*Critical values based on MacKinnon-Haug-Michelis (1999)					

Having established cointegration⁴¹, we proceeded to estimate an encompassing parsimonious model. Given this situation, then a dynamic model of growth can be built by creating an ‘error correction’ term (ECT) which reflects the convergence of GDP growth

⁴¹ Two series are cointegrated if they never drift apart from each other, that is, they maintain an equilibrium. That is a linear function of two is I(0), stationary

on its long run equilibrium. An arbitrary lag length of three was initially used. The insignificant variables were eliminated by using the standard Akaike and Schwarz Information Criteria. The coefficient of ECT measures the speed with which GDP growth converges on its long run equilibrium. It is expected to be a) negative; b) less than unity and c) statistically significant. The other variables in the equation will be those which capture or determine GDP growth in the short run. Changes in GDP will thus be a function not only of current changes in the independent variables, but also of the cumulative effect of lagged changes in all the variables and the adjustment of total GDP towards its long-run equilibrium path (indicated by the error correction term). The general form of the error correction model of growth can be given as:

$$\begin{aligned} \Delta \dot{y}_t = & \alpha_0 + \sum_{i=0}^n \alpha_1 \Delta LF_{t-i} + \sum_{i=0}^n \alpha_2 \Delta GCF_{t-i} + \sum_{i=0}^n \alpha_3 \Delta EE_{t-i} + \sum_{i=1}^n \alpha_4 \Delta D_{t-i} + \sum_{i=1}^n \alpha_5 \Delta D_{t-i}^2 \\ & + \sum_{i=0}^n \alpha_6 \Delta OP_{t-i} + \sum_{i=1}^n \alpha_7 \dot{y}_{t-i} + \sum_{i=1}^n \alpha_8 FIS_{t-i} + \alpha_9 Dum_t + \alpha_{10} ECT_{-1} + v_t \end{aligned}$$

The error correction model captures the short run dynamic as well as long run properties of the economic growth model. This is because, it include variables both in levels (i.e., error correction term, dummy) and differences (of all other explanatory variables). Therefore, the model can be estimated with Least Square method since all the variables included in the model are stationary. By applying the general-to-specific methodology, the parsimonious error correction model results are presented below.

Table 15D: Results of the Preferred Error Correction Model of Economic Growth

Variable	Coefficient	Prob-value
C	-0.1477	0.862
$\Delta y_{(-1)}$	0.4647	0.010
$\Delta D_{(-3)}$	0.1294	0.061
$\Delta D^2_{(-1)}$	-0.00258	0.138
$\Delta FIS_{(-2)}$	0.5163	0.025
$\Delta OPEN_{(-2)}$	3.5264	0.104
$\Delta GCF_{(-3)}$	0.4022	0.031
$\Delta EE_{(-1)}$	3.0982	0.0015
$\Delta LF_{(-3)}$	3.6467	0.0132
DUM	0.0226	0.984
$ECT_{(-1)}$	-0.5138	0.0000
R-squared	0.724143	
F-statistic	6.562679	
Prob(F-statistic)	0.000066	
Durbin-Watson statistic	2.066629	

Note: Δ represents a first difference in the variable

RESET Test: $F(1, 36) = 1.43$; P-Values of 1.24

Normality Test: Jarque-Bera Statistic = 2.5, P-Value = 0.285

Serial Correlation: Breusch-Godfrey Serial Correlation LM Test Statistic = 0.11; P-value = 0.73

The result of the parsimonious dynamic model of economic growth are similar to those obtained from both OLS and 2SLS methods. In the present model, the institutional dummy still showed a positive sign but was not significant as in the other models. In this case, over the study period, the state, and extent of quality of institutions weakly contributes to the attainment of higher economic growth.

The link between the short and long runs or the adjustment from disequilibrium to equilibrium, $ECT(-1)$, showed the expected sign, significance and size. The error correction factor of -0.51 and probability of 0.000 (t-statistic of -5.38) indicates the speed of

adjustment. Thus, about 50% of the adjustment in the short run is corrected in each period. This means that it will take about two years for any deviation from the long run path to be corrected. Past GDP growth was found to be significant determinant of GDP growth in the short run. The coefficient of 0.46 for lagged GDP growth suggests the presence of substantial output inertial. As current GDP growth improves, it indicates there is high probability that future GDP growth would be enhanced.

The non-linear relationship between external debt and economic growth was revealed in the model as in the OLS and 2SLS results. But the significance of the square of external debt to GDP ratio was weaker relative to external debt to GDP ratio. The debt-GDP ratio was positive in sign while its square is negative. All other things being equal, the external debt threshold from the dynamic model is about 25% (i.e., solving $0.129431D - 0.00258D^2 = 0$). This serves as the level of debt that would hinder output growth in each period. In other words, about 25% of debt to GDP ratio is the worse that the country can accumulate in each year. But over a long time, the country needs to maintain about 46.2% of external debt to GDP ratio.

The other explanatory variables in the dynamic model show varied outcomes. The external sector although positive on economic growth, is significant at 10%. As expected, labour resource, captured by human capital development and labour force are both positive and significant to output growth. In the same way, capital is also an important factor in output growth over the short run. Government spending reflects Wagner's Law of ever-increasing

state activity. This shows that, as the economy grows, government expenditure tend to grow as well.

Statistical properties of the dynamic model were evaluated. This was done with a range of test statistics to validate the estimated results. There appears to be a relatively high explanatory power evidenced by R^2 and both F-statistic and its probability value (of 0.000066). In addition, there is no serial correlation as revealed by the Durbin-Watson test statistic of 2.066.

This was also further confirmed by a Breusch-Godfrey Serial Correlation LM test statistic of 0.11 with probability of 0.73, indicating the presence of no first order serial correlation in the residuals. Also, the RESET test shows that the model was well specified. The assumption of well specified model was not rejected. This is because, the F-statistic of the RESET test show a value of 1.43 with p-value of 0.24. The Normality test shows that, the error terms are normally distributed. The Jarque-Bera value of 2.5 has a P-value of 0.28, indicating we cannot reject the hypothesis of normality. Exclusion test was carried out to validate the variables that were dropped and they proved to be irrelevant.