

UNIVERSITY OF CAPE COAST

EFFECTS OF EXTERNAL DEBT ON ECONOMIC GROWTH IN GHANA

BY

NKANSAH SOLOMON

2017

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Dissertation submitted to the Department of Finance of the School of Business of the College of Humanities and Legal Studies, University of Cape Coast in partial fulfilment of the requirements for award of Master of business administration degree in Finance.

December 2017

DECLARATION

Candidate's Declaration

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

Candidate's Name: Solomon Nkansah

Signature:..... Date:

Supervisor's Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the university of Cape Coast.

Supervisor's Signature:..... Date:.....

Name: Dr. James Atta Peprah

ABSTRACT

This study revisits the relationship between external debt and economic growth in Ghana. Using annual data for the period 1986 to 2015, and applying Autoregressive Distributed Lag (ARDL) model and in line with the empirical literature, the study found a statistically significant positive relationship between external debt and economic growth in both the long run and short run for Ghana. The study also revealed that there was adjustment to equilibrium from the short-run. Besides, consistent with the endogenous growth predictions, the study found evidence between economic growth and external debt. The study, therefore, recommends that the government should strategically deepen the external debt of the economy in order to stimulate economic growth in Ghana.

ACKNOWLEDGEMENTS

I would like to express my sincerest gratitude and appreciation to my supervisor, James Attah Pehrah (PhD) for his support, encouragement and admonishment throughout this dissertation.

My deepest gratitude also goes to the Department of Finance-University of Cape Coast, the Head of Department and his hard-working members of staff for their guidelines and support for the completion of our studies ahead of schedule.

I would wish to acknowledge the support of my colleagues and friends, particularly Mr. Isaac Dabel, Justice Ekow Crentsil, Miss Eunice Mensah, Baidoo Solomon, and Elvis Prince Biney who supported me in diverse ways towards the completion of this dissertation.

Finally, I extend my appreciation to my parents and siblings, for their support throughout my education especially my sister Vida Nkansah

DEDICATION

To my wife and son, Gifty Owusu Boamah and Julius Nkansah, Asiedu.

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CHAPTER ONE

INTRODUCTION

Background of the Study

Raising sufficient funds to finance government projects within budget has been a major challenge all over the world, and implementing budgets devoid of deficits seems to be an illusion for most developing countries (Mailafiya, 2010). Besides, no country lives in isolation and no economy is self-sufficient. This leads to countries depending on each other on many grounds be it social, political and economic. Due to inadequacy of resources, countries are often faced with budget deficit. Hence, governments borrow to fill the vacuum created by the fiscal gaps in the proposed expenditure and expected revenue within a fiscal period (Ogunmuyiwa, 2011). Ogunmuyiwa (2011) further stated that when tax revenue is limited and government does not want to compromise macroeconomic stability by printing more money, then debt option becomes the only available avenue that the government can explore to provide infrastructures for the citizenry. External debt is an important source of finance mainly used to supplement the domestic sources of funds for supporting development and other needs of a country. Usually external debt is incurred by a country which suffers from shortages of domestic savings and foreign exchange needed to achieve its developmental and other national objectives. However, if the external debt is not used in income-generating and productive activities, the ability of a debtor nation to repay the debt is significantly reduced. It is often argued that the excessive debt constitutes an obstacle to sustainable economic growth and poverty reduction (Berensmann, 2004).

External debt is that part of the total debt in a country that is owed to creditors outside the country. The debtors can be the government, corporations or private households. Sustainable debt is the level of debt which allows a debtor country to meet its current and future debt service obligations in full, without recourse to further debt relief or rescheduling, avoiding accumulation of arrears, while allowing an acceptable level of economic growth (M. Hassan, 2013). But unsustainable external debt is a great threat to the economic prosperity because of the higher debt service charges which is the factor of the higher current account deficit which ultimately may result to debt overhang (Atique & Malik, 2012). Economic growth, on the other hand, is defined as the growth in individual human welfare, but on a practical level, Economic Growth is defined as the sustained increase in a country's real output or real gross domestic product overtime (Demetriades & Hussein, 1996). In this study, real GDP will be used as a proxy for economic growth instead of GDP growth rate or GDP per capita since it is the most popular measure of economic growth in the literature and mostly used too by the Breton Wood Institutions. This measure is preferred to other measures since, it nets out the effect of inflation on the price of the goods and service produced by adjusting inflation terms.

Researchers have long been interested in factors which cause different countries to grow at different rates and achieve different levels of wealth. One of such factors is external debt. Generally, many economists agree that external debt accelerates economic growth and development while others disagree that external debt accelerates economic growth and development. The relationship between external debt and economic growth has been a topic of

debate in the field of financial economics and finance. This debate follows the inconclusiveness of results which disputes the assumption of a strong positive correlation between external debt and economic growth in developing countries. Additionally, researches that have been done in this field have been noted to produce a mixed bag of results all over the world (Herath, 2010). Tahir, Haji, and Ali (2014) observed that the results in the literature are mixed because of the issue of measurement, endogeneity issue, sample selection and quality of data.

When Ghana gained independence in 1957, the country pursued a strategy of import substitution and implemented a series of restrictive trade policies including increasing tariffs, non-tariffs and exchange rate control inhibiting trade openness. This restricted trade coupled with the misaligned exchange rate eroded the competitiveness of exports while limitation on imported inputs and consumer goods also inhibited export production and production as a whole causing extremely low capacity utilization (Ghartey, 1987). The economy experienced negative growth rate for some of the years particularly between 1978 and 1983 where the annual average real GDP growth rate was -1.34% . The other years however, experienced positive growth rates though at declining rates (World Bank, 1995).

Over the 1970s and 1980s, the external debt levels of many developing countries rose to a level constituting a 'debt crisis.' The bulk of this debt is made up of public and publicly guaranteed debt (PPGD). The main source of the supply of external debt was the emergence of the Eurodollar market resulting from the surplus revenue generated by the OPEC through significant increases in the price of oil between 1973 and 1979. Cheap 'petrodollars' were

recycled to the countries which needed external debt. Unfortunately, many of the countries failed to use the external debt wisely and prudently. A number of interrelated factors contributed to the rise in external debt including macroeconomic policy, increases in the price of a number of primary commodities encouraging countries to borrow, low real interest rates and a favourable world environment. Unfortunately, the favourable conditions were short-lived and when they did change over the 1980s, heavily indebted countries experienced difficulty in servicing the debt (Ross, 2001; Clements, Garlan, Little, Nord and Stafford, 2003; and Siddique, 1996). In order to correct the imbalances in the economy created by the restrictive economic policies, Ghana adopted Economic Recovery Programme (ERP) as part of the reform and adjustment programme of the Breton Wood Institutions to halt the downward economic spiral. It must be noted that, from the full implementation of the reform program in 1986 up till now, Ghana has not recorded a negative growth rate as it used to be in the restrictive economic policies and exports and import volumes have increased continuously (World Bank, 2001). In 1996, the International Monetary Fund (IMF) launched the HIPC initiative in an attempt to reduce the external debt burden of low-income countries to sustainable levels in a reasonably short period of time. The HIPC initiative has generated a lot of attention and has been hailed by many as a significant event, promising economic opportunities for the debt ridden poor countries. How much benefit did this Initiative bring for the HIPC? Literature examining the relationship between reduction in external debt and economic growth gives mixed signals to the policy makers in both the developed and the developing countries. Claessens (1990) concludes that the actions taken by

creditors to reduce a debtor's burden of debt will benefit both parties. But Clements, Garlan, Little, Nord and Stafford (2003) suggest that debt relief may have detrimental effects on indebted countries and that reform may be more effective than relief. Similarly, Berensmann (2004) argues that debt relief is a necessary but not a sufficient condition for development.

Statement of the Problem

The effect of external debt on economic growth has been the subject of many discussions and studies. This is because economic theory does not provide a definite conclusion about the effect of external debt on economic growth and more so empirical studies conducted have yielded a mixture of results. While some studies find external debt to be beneficial such as Adegbite, Ayadi, and Felix Ayadi (2008), and (M. Hassan, 2013), others find external debt to be detrimental to economic growth such as (Clements et al., 2003), and (Atique & Malik 2012). According to Tahir et al. (2014), the results in the literature are mixed because of the issue of measurement, endogeneity issue, sample selection and quality of data. Sulaiman and Azeez, (2012) opined that the resultant effect of large accumulation of debt exposes the nation to high debt burden and its servicing is a major threat to the growth of the nation. It is in line with this that this study seeks to investigate whether external debt leads to the economic growth of Ghana and contributes to the controversy in the literature.

To add, most of the empirical studies on the effect of external debt on economic growth are mainly cross – country studies (Chowdhury, 1994; Metwally & Tamaschke, 1994; (Pattillo, Poirson, & Ricci, 2002); Jayaraman

& Lau, 2009; and (Siddique, Selvanathan, & Selvanathan, 2015) with the implicit assumption that developing countries share many common characteristics: low per-capita incomes and high illiteracy rate, poor transportation systems, lack of the culture of maintenance etc. Whereas this may be true to some extent, these countries differ largely in their exposure to economic problems, stabilization policy experiences and most importantly in their reactions to external shocks.

And so the findings and recommendations of these studies cannot be directly applied to country specific (say Ghana) since these findings may not accurately and adequately reflect country specific experience. Studies that have ventured to highlight the short-run and long-run effects of external debt on economic growth in country specifics are elusive. More specifically empirical studies in this area to serve as a guide to policymakers to the best of my knowledge are few (Hassan, 2013 and Adegbite et al., 2008). Given recent developments in Ghana's debt profile and the availability of recent data, this study intends to build upon the already existing studies by including other growth enhancing variables and also extend the time span of the data. Thus, the purpose of this study is to investigate the effect of external debt on economic growth in Ghana.

Objectives of the Study

The general objective of the study is to examine the effect of external debt on economic growth in Ghana from 1986 to 2015. This period is chosen because it was during this period that external debt policy actually took full effect and hence the motivation.

Specifically the study seeks amongst other things to;

- Investigate the long run relationship between external debt and economic growth.
- Explore the short run relationship between external debt and economic growth.

Hypotheses of the Study

H_N : There is no long run relationship between external debt and economic growth.

H_A : There is long run relationship between external debt and economic growth.

H_N : There is no short run relationship between external debt and economic growth.

H_A : There is short run relationship between external debt and economic growth.

Justification for/Significance of the Study

Since growth is the engine of economic prosperity of any nation, this study will contribute to the development of policies and strategies that seek to promote growth in Ghana. External debt is very crucial which is often hypothesised to raise growth through several channels from the literature such as making it possible to access a variety of inputs for production, access to advanced technology from abroad, possibilities of catch-up, and access to broader markets that raises the efficiency of domestic production through increased specialization. Economic growth is enhanced when the borrowed

resources or funds (External debt) are channeled in income-generating and productive activities. It therefore stands to reason that a better understanding of the link between external debt and economic growth is important for policies to attract the needed external debt to the various sectors of the economy in order to propel economic growth.

Scope of the Study

The study investigates the relationship between external debt and economic in Ghana using annual time series dataset from 1986 to 2015. The study employs the Auto-Regressive Distributed Lagged (ARDL) Model otherwise known as the bounds testing approach to cointegration developed by Pesaran & Pesaran (1997); Pesaran, Shin, & Smith (2001). The study employs seven variables – real GDP as a proxy for economic growth, external debt, foreign direct investment, real effective exchange rate, inflation, gross fixed capital formation as proxy for capital stock, and labor force as a proxy for labour force participation rate.

Organization of the Study

The study is organized into five main chapters with each chapter further divided into sections and sub-sections. The first chapter is the introductory chapter. Chapter two reviews both the theoretical and empirical literature on debt, external debt and economic growth. Chapter three focuses on the specification of the empirical model and estimation technique employed in conducting the study. The results of the data collected for the study will be

analyzed and discussed in the fourth chapter. The final chapter presents the summary, conclusions, and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter reviews both theoretical and empirical literature on the effect of external debt on economic growth. The chapter specifically starts by presenting some theoretical growth models. Proceeds to concepts on external debt, presents a theoretical analysis of the effect of external debt on economic growth and ends with an empirical evidence of the effect of external debt on economic growth.

Theoretical Literature

Concept of External Debt

Total external debt as defined by the World Bank is “the debt owed to non-residents which is repayable in foreign currency, goods or services”. As a consequence of normal activity most countries tend to have some kind of national debt. Sometimes, countries accumulate unmanageable levels of debt due to particular economic crises. According to Pattillo et al. (2002), when developing countries borrow at judicious echelons, economic theory suggests that economic growth is likely to improve. In general, two main factors according to Soludo (2003), motivates the decision to borrow; Either to increase investment opportunities, increase spending on education and health or to fund transient deficit in balance of payments in order to reduce the rates on nominal interest overseas, inadequate levels of domestic long-term funding sources, or to circumvent hard budget restraints. This means that countries

borrow to increase the growth potential of their economies and poverty reduction.

A country's poverty situation can probably improve if the economy grows at least at 5%. In an attempt to buoy up growth, developing countries such as Ghana with huge infrastructural deficit borrow to supplement their small levels of domestic capital stocks. This makes it possible for investment opportunities which can generate higher returns on capital compared to that of developed countries. This effect of borrowing is not automatic and can only be effectively realized if only and only if the borrowed amounts in addition to the locally available funds are invested in productive ventures capable of generating enough returns which can be used to service the debts and eventually pay back the debt. This allows the economy to grow and eventually retire the debts on a timely basis. When this is done over a considerable period of time the tangible benefits of improvements in income per capita which is a precondition for the reduction in poverty is realized.

Causes of Debt Crisis

The genesis of debt crisis stems from the first oil price shock in 1973. This was at the time the oil producing cartel Organization of Petroleum Exporting Countries (OPEC) laid an embargo on USA and some European countries. This had the adverse effect of leading to a quadrupling of crude oil prices on the world market. As a result OPEC member countries gained from a windfall and had to invest the surplus revenue generated in commercial banks. In the quest to seek investment sources for their largesse funds, these commercial banks made available funds for developing countries ignoring

their normal procedures of background checks to ascertain the credit worthiness and the repayment capability of developing countries. On the other hand developing countries and other industrial economies that depend so much on crude oil suffered from huge trade balance deficit.

Because no due diligence was carried out to ascertain the use to which these funds will be put to, much of these funds went into programs and projects that benefited the small elitist to the detriment of the greater impoverished majority. Inflation rates soared in United States and other developed countries. World crude oil prices soared again in 1979 triggered by OPEC. In the meantime, in attempt to control inflation, the United States adopted extremely contractionary monetary policies to reduce inflation. This led to a recession domestically.

This led to a spill over effect on other countries through rising rates and decreased demand for exported goods. The combined effect of all these led to a worldwide recession. Developing countries were not left out in this state of affairs. In fact they were the hardest hit. Exports were less competitive and thus declined due to high cost of domestic production as well reduction in production in import substitute goods. In the meantime the floating rates on borrowed funds were on the rise thereby leading to a rise of interest payment on borrowed funds especially in Latin American Countries.

In reaction to collapse in commodity prices, African governments, borrowed profoundly from other governments and many-sided banks at both market interest rates and concessional (very low) rates.

Causes of Ghana's External Debt

The economy of Ghana experienced a decline three decades after attaining independence according to (Osei, 1995). This decline in growth were very severe in the 1970s and early 1980s. Between 1960 and 1970, the growth rate of output averaged 2.2% per annum. Nonetheless this growth rate was short-lived as it reduced to 0.5% per annum a decade after. By 1970, Ghana transited from a medium income country to a low income due to high population growth rate. An attempt to change Ghana's Agricultural dominated economy contributed immensely to the abysmal growth performance as evidenced by the Governments effort and policies directed at social and economic stimulus through industrialization which was enhanced by producing commodities locally to substitute for imports.

As a result, the manufacturing industry experienced a rapid growth. Between 1957 and 1969 its contribution to GDP grew rapidly from 2% to 9%. The manufacturing sector also contributed immensely (14%) to exports in 1969. This notwithstanding, the quest for industrialization was biased against the agricultural sector. This is because; no clear cut policy was instituted to link the agricultural sector to the manufacturing sector. The latter relied solely on imported raw materials. This makes the industrialization attempt heavily reliant on foreign exchange. This resulted in the decline of the agricultural sector contribution to GDP from 60% in 1957 to 46% in 1969. The cocoa sector was particularly affected despite employing majority of the labour force. The economy's poor performance was therefore due to the neglect of the agricultural sector particularly the cocoa sub-sector which was a major

source of foreign exchange as well as tax revenues for the government (Osei, 1995).

The desire to industrialize the economy as fast as possible led to the accumulation of huge debts due to the reliance on borrowed funds to finance the hastened industrialization agenda. The nature of the borrowed funds was fast maturing and hence led to debt payment problems at the early stages of post-independence development agenda. By the end of 1965, nearly \$600 million worth of external debt was accumulated and was due for repayment. Nevertheless, external factors and the abandonment of cocoa sector affected Ghana's export earnings and were not able to generate enough revenues to settle the accumulated debts.

Therefore, Ghana had to resort to an agreement to reschedule debt in 1966, 1968 and 1970 all in attempt to deal with the debt repayment crises.

Effect of External Debt on Economic growth

When debt is accumulated within reasonable levels and used effectively it can lead to the enhancement of economic growth. According to Poirson, Ricci, and Pattillo (2004) this growth can be achieved through the accumulation of capital and productivity gains. In an attempt to buoy up growth, developing countries such as Ghana with huge infrastructural deficit borrow to supplement their small levels of domestic capital stocks. This makes it possible for investment opportunities which can generate higher returns on capital compared to that of developed countries. This effect of borrowing is not automatic and can only be effectively realized if only and only if the borrowed amounts in addition to the locally available funds are invested in

productive ventures capable of generating enough returns which can be used to service the debts and eventually pay back the debt.

The tendency of external debt accumulation resulting in lower economic growth on investment and economic growth can be better understood using the theory of debt overhang. A formal definition is provided by Krugman (1988) as the probability that expected debt service costs will dampen additional domestic and foreign investment debt if future debts are likely to be more than the repayment capability of a country. The implication of this is that investors will have the perception that they would have to be taxed by government to provide enough fiscal space in order to be able to service these accumulated debts as well service them. This makes the potential investors to postpone their investment decisions today to the future.

For Borensztein (1990) debt overhang is the situation where a country in debts gets very little value from the return to any additional investment because of the debt service obligations. Thus the problem of debt overhang according to Agénor and Montiel (1996) point towards the kind of dilemma faced by policy makers fixated on solving the debt crisis issue to ascertain whether it is problem of solvency or liquidity. In accordance with Ajayi (1991), countries face the problem of liquidity when they fail to generate sufficient amount of revenues to enable them service the interest on the debts. This is usually a temporary problem.

On the other hand, countries are faced with a solvency problem when their debt repayment capacity is far below their liabilities. This problem is long term in nature. This led Kletzer (1988) to conclude that most developing countries are faced with the solvency problem as evidenced in the fact that the

total debt obligations was much higher than the present value of their respective resources.

Savvides (1992) on the other hand posits that in the event that a country in debt fails to repay the accumulated debt, this state of affairs can be associated with the economic condition of the country. The country may have used/planned to use most of its export earnings to repay the debt that is due. The country therefore does not benefit much of its export revenues. In this instance the debt overhang mechanism is synonymous to imposing a marginal tax rate on the country. This will lead to a reduction in the rate of return on invested capital thereby serving as a disincentive to the formation of capital domestically. In a situation where Government is the sole accumulator of external debt, the mechanism remains the same. This implies that Government policies serve as a disincentive to the formation and domestic capital and leads to decreased consumption levels as most of the benefits accrued are used for the purposes of debt repayments.

Borensztein (1990) categorized the consequence of debt accumulated externally on investment into two broad areas. The debts overhang mechanism and the credit allocating effect. According to him, debt overhang situation occurs when the indebted country lacks the capacity to repay the debt or service the interest on the debt fully and would have to resort to mediation with creditors to determine actual debt payment which is connected to the economic circumstances of the country at hand. Consequently, most of the increase in output generated must be set aside to repay the debt that is due for repayment. This state of affairs has the tendency to serve as a disincentive to

investment by the private sector and charades as a deterrent on the part of government to put in place and pursue the right policy choices.

According to him, the second mechanism through which the accumulation of debts can affect investment level is through the credit allocating mechanism. This occurs when countries due to their inability or willingness to pay previous loan have been tagged as credit risky and therefore find it difficult to access new loan facilities. So far it appears that the debt overhang concept works through only the reduction in investment channel. It can also manifest itself through lower productivity growth. In that regard, many researchers have advanced for the wider clarification of this theory.

External debt and Solow Growth model

There is no a well published theoretical framework that gives light on the relationship between Solow growth model and external debt. But some empirical works on External debt used Solow growth model as a base to investigate its impact on economic growth. As we saw in the theoretical part, the Solow growth model is built on a closed economy which uses labour and capital as means of production. Under this situation the implication of foreign debt on growth can be seen using its effect on the public saving which in turn used as investment in a closed model. Before we move to see the general effect of external debt on Solow's growth model; it is better to see expected individual effect of debt overhang and debt crowding out effect on Solow growth model.

According to the debt overhang hypothesis, government, in an attempt to pay the accumulated debt, raises tax rate on the private sector (as means of

transferring resource to the public sector). This will discourage private sector investment; and more government public spending on infrastructure decreases (Road construction, Telecom, Electric power supply) as the available resource are used to pay debt obligation. As a result, overall investment (private and public investment) will decrease in the country. This will shift both the investment and production function curves in Solow growth model downward.

On the other hand, when countries are forced to pay part of their external debt they used their income from export and in some cases transfer resources including foreign aid and foreign exchange resources to service their forthcoming debt; this is the case for debt crowding out effect. Those countries which transfer income from export which can be used in investment towards debt payment will discourage public investment. This in turn will decrease economic growth and will shift both the investment and production function curves in Solow growth model downward, as the decrease in investment and production shown with inward movement of both curves.

As can be inferred from the above two paragraphs and the theoretical section of this chapter, the specific as well as the combined effect of debt crowding out and debt overhang effects will affect investment and economic growth negatively. Following this and the general hypothesis set in chapter one, we expect a negative impact of foreign debt on Solow's investment and production function.

Economic Growth

The phenomenon of economic growth is not new, and can be traced back several centuries to the ideas of "classical economists such as Smith (1776), Malthus (1798) and Ricardo (1817) as cited in Nahuis (2003) and

countless researchers since the 1950s, who identified the fundamental requirements for the growth of economies, without formulating specific models in this respect. However, in more recent times, neoclassical economists, for example, Young (1928), Ramsey (1928), Schumpeter (1934), Harrod (1939), Knight (1944), and Domar (1946), have favoured the use of rigorous models to analyse economic growth, and several theories have emerged from these „pioneers“ in economic modelling.

Ramsey (1928), Solow (1956), and Swan (1956) are considered to be the main contributors to neoclassical growth models, while later scholars Romer (1986) and Lucas (1988) formulated endogenous growth theories. These aimed to explain the rate at which a country's economy grows over time, economic growth is generally measured as the annual percentage rate of growth of the country's major national income accounting aggregates, such as the Gross National Product (GNP) or the Gross Domestic Product (GDP), with appropriate statistical adjustments to discount the potentially misleading effects of price inflation (Johnson, 2000).

All economies demonstrate quite frequent movement (from quarter to quarter, and year to year) in their growth rates, but the attention of economists is usually focused on fluctuations in the long term, or the average rate of economic growth over ten years, and often longer, periods. Consequently in Business cycle theory are often left with the explanations of the short-term fluctuations around the longer term trend because investigation has revealed that the predominant influence on short-term growth rates seem to differ in important ways from the determinant of an economy's long-term average growth performance (Zhang, 2005).

The Harrod-Domar Growth Model

Using mathematical modelling, the Harrod-Domar growth model demonstrates a direct relationship between savings and economic growth, and an indirect relationship between capital and economic growth. In attempting to integrate a Keynesian interpretation with aspects of economic growth, the model assumes economic growth to be a direct result of capital accumulation in the form of savings. Economists have used this model in efforts to estimate the finance gap of a developing economy, claiming, and as noted by (Effendi, 2001), that in a situation where an abundant stock of labour exists, the only constraint to production is lack of capital.

According to the Harrod-Domar model, growth is proportional to the rate of investment, being equal to investment divided by the Incremental Capital Output Ratio. The investment required to meet any target growth rate can be estimated by multiplying the target by the Incremental Capital Output Ratio. Hence, the financing gap represents the difference between available and required investment, and theoretically, when such a gap is plugged by the presence of foreign capital, the target growth rate should be achieved (Tiruneh, 2004).

In other words, the need for foreign borrowing finds its objective reason in closing the gap existing among the targeted investment needs and the available national savings; i.e. between the investment rate needed to be achieved to reach the targeted growth rate and the domestic saving rate achieved in the light of certain social, economic and political conditions (Rajan, 2009). It is usually called the “local resources gap” or “investment-saving gap”. Nonetheless, this theory is not supported by empirical evidence

since the tremendous external debt that has accumulated in developing countries since the 1960s has not been accompanied by a per capita income increase.

To illustrate the Harrod-Domar growth model, let savings (S) be some proportions, of national income (Y) such that $S = sY$. Investment (I) is defined as the change in capital stock, K , and can be represented by DK such that $I = DK$. Total capital stock, K , is directly related to national income, Y , as represented by the capital-output ratio, k , such that $K/Y = k$. This capital-output ratio can also be written in its marginal value as $DK / DY = k$, which is popularly known as the incremental capital-output ratio. Since the equilibrium saving, S , must equal total investment, I , it follows that $sY = kDY$ or in a more familiar expression, $DY / Y = s/k$. This equation tells that the rate of growth of output is determined jointly by the national savings ratio, s , and the national capital output ratio, k . It also says that the growth rate of national income will be directly related to the saving ratio and inversely related to capital-output ratio.

Theoretically, the Harrod-Domar growth model is limited in that it requires the equalization of warranted and natural growth rates, and uses production functions that do not have much suitability between the inputs, thereby rendering it unstable. The production function within the model is of the Leontief type, with a fixed proportion of inputs. Consequently, being aware of these shortcomings, economists tend to favour less rigid growth models that have greater applicability in empirical efforts (Salvadori, 2003).

The Neoclassical Growth Model

The weaknesses of the Harrod-Domar growth model were addressed by the Solow (1956) and Swan (1956), who both independently produced a response referred to as the neoclassical growth model. These researchers used production functions exhibiting constant returns to scale, diminishing returns to each input, and positive substitutability to inputs. In this model, the production function is assumed to be a function of capital, labour and technology, and it is assumed that through a constant rate of saving, growth in the long term is a function only of technical progress (not of saving or investment). It is acknowledged that saving influences income levels, but not growth rate. Consequently, growth will cease in an economy where there is no continuous improvement in technology.

Expressed in formal terms, the standard production function in the neoclassical growth model is

$$Y_t = f(A_t, K_t, L_t, \ell) \text{ and further into } Y_t = A_t K_t^\alpha L_t^\delta \ell^{\varepsilon t}$$

Where Y is the real gross domestic product, K is the stock of human and physical capital, L is labour, A is a constant reflecting the base level of technology, and represents the constant exogenous rate at which technology grows. In this formula α and δ represent the elasticity of output with respect to capital and labour, this is the percentage increase in gross domestic product from a one percent increase in capital and labour.

Empirically, α is measured as the share of capital in a country's national income accounts. This formulation of the neoclassical growth model yields diminishing returns to capital and labour since α is assumed to be less than one and private capital is assumed to be paid its marginal product. The

Leontif production function with two inputs is stated in a general form as $Y = \min(\alpha K, \delta L)$ where Y is national output, K is capital input; L is labour input, and α, δ are constants.

The Solow-Swan neoclassical model shows that an increase in saving, subsequently reflected in investment, generates additional temporal growth. However, as the ratio of capital to labour increases, the marginal product of capital will decline and the economy will move back to a steady state in which output, capital, and labour all grow simultaneously. Growth in per capita income will continue and will equal, which is the annual rate of productivity improvement. The constant, can be interpreted variously as the improvement of organizational knowledge, re-arrangement of the flow of materials in a factory, or better management of inventory. However, there is a central concern with this model, that being that the determinants of the size of, the rate of growth of per capita income are left unexplained, thereby introducing an implicit shortfall in its predictive ability (Salvadori, 2003).

It is suggested in neoclassical growth theory that countries possessing the same technology will experience the same steady per capita income growth, thereby implying that a country with a low capital-labour ratio will have a higher per capita growth rate than one with a high capital-labour ratio, resulting in what is referred to as absolute convergence. In contrast, conditional convergence arises where a country experiences a growth rate despite having a lower starting level of real per capita income relative to the steady state position or long-run (Barro & Sala-i-Martin, 1992). There has been much exploitation of the conditional convergence prediction emanating from the neoclassical model, and the results are mixed. Barro and Sala-i-

Martin (1992), for example, were able to report convergence among the 50 states of the US in respect of per capital income and per capital gross state product income rates. Romer (1986) and

Lucas (1988) on the other hand, reported an absence of convergence of the growth rates of different countries. Barro and Sala-I-Martin (1992), however, argue for the likelihood of greater conditional convergence in homogeneous environments.

Adding to the neoclassical growth model provided by Swan and Solow, is that offered by Ramsey, which was in fact developed much earlier (in 1928), but which has undergone various refinements over the years. One of the key features in Ramsey's framework is the assumption that households optimize their utility over time, and this fundamental premise allows the model to operate dynamically.

However, within it, the saving rate is exogenous, and continues to be so in the Solow-Swan model, whereas Cass (1965) and Koopmans (1965) in re-visiting the Ramsey theory amended this to become endogenous. That said the dependence of the long-term growth rate on exogenous technological progress is not eliminated in this later refinement, which, in effect, finalizes the efforts from the neoclassical growth school.

Endogenous Growth Models

Since then, renewed attention has been directed to growth theory, through the emergence of research that uses endogenous variables to explain growth rates. Romer (1986) and Lucas (1988) marked the onset of such investigations; carrying forward the arguments by Cass (1965) and Koopmans

(1965) that long-term economic growth rate is determined by an exogenous technological progress.

Essentially, endogenous growth models share similarities with neoclassical frameworks but their underlying assumptions and suggested conclusions vary substantially, and three main deviations are clear, these being: firstly, the models reject the neoclassical assumption of diminishing marginal returns to capital; secondly, increasing returns to scale in aggregate production are envisaged; and thirdly, they appreciate the role of externalities in determining the rate of return on capital.

Endogenous growth theory can be expressed in a simple equation $Y = AK$, where

A represents any factor that influences technology, and K represents both human and physical capital. There are no diminishing returns to capital, a feature that can be achieved by invoking some externality that offsets any propensity to diminishing returns. Investment of any kind (physical or human capital), leads to an increase in productivity that exceeds the private gain.

This model embodies the potential for an increase in the investment rate (physical or human capital), to precipitate sustained growth if strong external economies are generated by the investment itself so that in the neoclassical model becomes unity (Todaro & Smith, 2009). In this case, the growth equation reduces to the endogenous equation. Sustained long-term growth resulting from increasing returns to scale is the net result. As is clear, there is no consideration of diminishing returns or of any sustained impact on growth, characteristic of the basic neoclassical growth model.

Another way of obtaining an equation like is to posit that increased quality and/or variety of machinery or intermediate inputs offsets the predisposition to diminishing returns.

Basically then, diminishing returns are not present in endogenous growth models, since any such appearance is counteracted by other forces. Hence, this type of growth theory is valuable in explaining anomalous international flows of capital that exacerbate wealth disparities between developed and developing countries (Salvadori, 2003). Potentially, developing countries have a high rate of return on investment due to the law of diminishing returns. This is, however, evaporated by lower levels of complementary investment in human capital, infrastructure, or research and development, with the consequence that these economies do not benefit as much as advanced economies, from the broader social gains associated with each of these alternative forms of capital expenditure.

Endogenous growth models also imply a proactive role for public policy in the promotion of economic development through direct and indirect investment in human capital formation and foreign private investment (Todaro & Smith, 2009).

It is assumed in such models that productive services that bring increases in the marginal product of private capital, and consequently impact upon economic growth are supplied by government. In this respect, if government investment is endogenous, and the production function is simultaneously homogeneously linear in public and private capital, this approach yields an endogenous rate of growth. The first researchers to

introduce productive public capital in growth models were Arrow and Kurz (1970), but they still used endogenous factors as determinants of growth.

Later, their approach was adapted by Barro (1990) who presented a model with both endogenously determined growth rates, and a balanced budget. He, moreover, assumed that government spending enters the macroeconomic production function as a flow variable, whilst Arrow and Kurz (1970) presumed the stock of public capital to show productive effects.

Another endogenous growth model, formulated by Futagami, Morita, and Shibata (1993) assumes the stock of public capital to have positive effects on the marginal product of private capital, thereby precipitating endogenous growth. Working at the same time, Van Ewijk and Van de Klundert (1993) investigated the influence of different budgetary regimes for the dynamics of public debt and growth in a conventional growth model. They found that where the government keeps the budget deficit constant is less favourable with regards to productivity growth as compared to a regime where the government varies the budget deficit (Greiner & Semmler, 2000).

Despite their attraction, endogenous growth models have two important limitations, these being that they do not predict convergence either in absolute or conditional terms, and empirical evidence in support of their claims is minimal.

Solow Growth Model

Solow's growth model was published in 1956 as a seminar paper on economic growth and development under the title "A contribution to the theory of economic Growth". Solow won Noble prize in Economics in 1987 for his valuable contribution for the understanding of economic growth. The

Solow growth model tried to give an answer for one of the great mysteries of growth economics i.e. why rich countries are so rich and why the poor ones are so poor?

Like that of many economics models, Solow growth model is built on assumptions:

- Countries will produce and consume only a single homogenous good (output)
- Technology is exogenous in the short run

And the model is developed based on Cobb - Douglass production function given by the form

$$Y = F(K, L) = K^\alpha L^{1-\alpha}$$

Where

Y = out put

K = Capital input

L = Labour input

α and $1 - \alpha$ are output elasticity's of capital and labour respectively., and “ α ” is a number between 0 and 1.

Mathematical manipulation of the above equation will give:

$$y = k^\alpha$$

If the above production function is expressed with the corresponding output per worker,

$y=Y/L$ and capital per worker, $k = K/L$. we will have this equation:

$$y = k^\alpha$$

According to this equation, a country that uses more capital per worker will produce more output per worker, subjected to the law of diminishing returns to capital per worker (Jones, 2002).

The other important equation from the Solow growth model is the capital accumulation equation expressed in the form:-

$$\dot{K} = sY - dK$$

Where

\dot{K} = change in capital stock

sY = gross investment

dK = depreciation during the production process

And with mathematical manipulation Solow derives the capital accumulation equation in per worker terms i.e.

$$\dot{k} = sy - (n+d)k$$

As per the above equation, the change in capital per worker is a function of investment per worker, depreciation per worker and population growth. Of these three variables only investment per worker positively related with change in capital per worker.

The Solow Diagram and the production function

The Solow diagram can be drawn using the two key equations of the Solow model in terms of output per worker and capital per worker. These equations are

$$y = k^\alpha \text{ and}$$

$$\dot{k} = sy - (n+d)k$$

The diagram consists of three curves, the first one, $y = k^\alpha$, is the production function curve. The second curve which has the same shape with the production curve is the investment per person curve, sy . It is translated down by a factor “ s ”. The third curve $(n+d)k$ is the linear sum of depreciation per worker, “ dk ” and population growth, “ nk ”; both variables will decrease the amount of capital per person in the economy.

By no coincidence, the difference between the investment per person curve and the third curve is the change in the amount of capital per worker. If the difference between the two curves is positive, the change will be positive and the economy will increase its capital per worker and capital deepening occurs. When this per worker change is zero but the actual capital stock K is growing (because of population growth), we say that only capital widening is occurring. The steady state point is the point at which the change in capital worker equals zero, this happen when the investment rate, “ sy ” equals with $(n+d)k$ (Jones 2002).

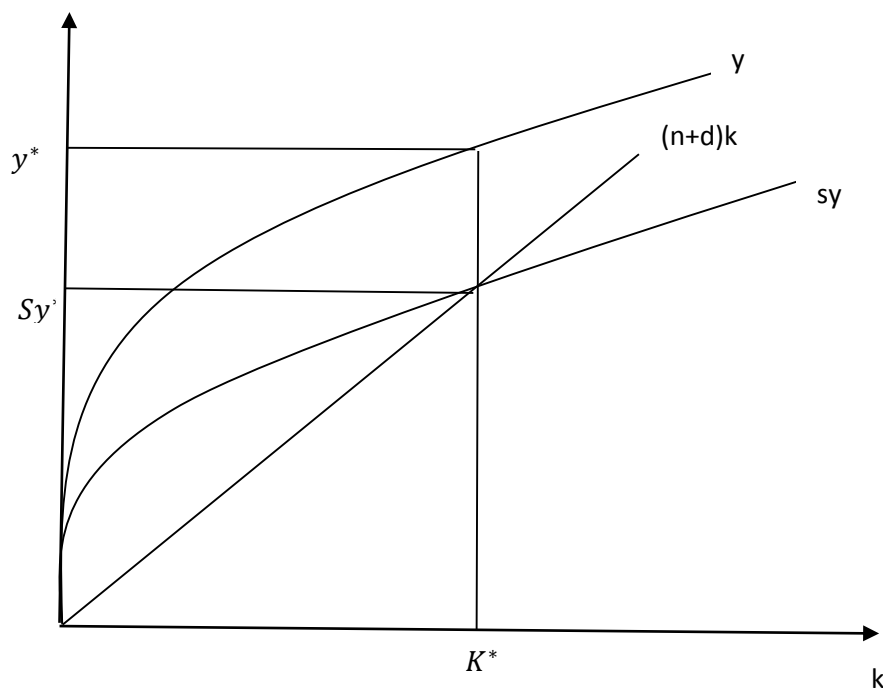


Figure 1: Solow production

The corresponding steady state quantity of capital per worker and steady state quantity of output per worker can be expressed:

$$k^* = (s/n + d)^{1/(1-\alpha)}$$

$$y^* = (s/n + d)^{\alpha/(1-\alpha)}$$

Where:-

k^* = steady state quantity of capital per worker

y^* = steady state quantity of output per worker

Based on the above equation Solow concludes that: keeping other things constant countries that have a higher saving and investment rate become richer; because they can accumulate a large amount of capital per worker, and this will let them to produce more output per worker. In the other hand countries that exhibit a high population growth rate will tend to be poorer (Jones 2002).

Empirical Literature

Following the inception of the debt crisis of the 1980, numerous amounts of researches were carried out to empirically scrutinize the effect of external debt on economic growth. The main findings of these studies have been mixed with some revealing positive effects while others revealing negative consequences of external debt on the growth of the economy.

In Turkey, Bauernfreund (1989) made use of a computable general equilibrium (CGE) model to investigate the effect of foreign debt cost on the Turkish economy. Drawing on two measures of debt overhang which was independently developed by Sachs (1986) and Feldstein (1986), the author used a multi sector, non-linear general equilibrium model to clarify the

concept of debt overhang by adopting two measures of debt overhang. Sachs (1986) was of the view that when faced with high debt servicing problems, private businesses tend to suffer because countries who are in debt resort to forceful imposition of tax on these businesses with the main objective of securing enough funds or transferring funds to the public sector. The returns on private investment tend to decrease due to the hike in taxes thereby leading to the collapse of the private sector and ultimately reducing investments. Feldstein (1986) on the other hand holds the view that the payment of accumulated debt requires the transfer of hard earned foreign exchange. The study established a negative relationship between payment of external debts and investments. The author attributed the findings to economic policies both internally and externally.

Hofman and Reisen (1991) compare responses to debt overhang from countries facing liquidity constraints to those with access to new investment opportunities. They find that direct debt reduction from the creditor would lead to a greater boost to the debtor nation than new investment, but note that countries constrained by liquidity require new sources of funds to be able to take advantage of profitable investment opportunities when they arise. They conclude that in such circumstances, reducing the stock of external debt without compensating with new lending will not lead to a tangible improvement to investment.

Krugman (1988) examines the choice of creditors to either finance or forgive a debt overhang as a trade-off. He argues that while financing provides creditors with an option value should the debtor nation do well in the future, it also weakens the incentive for the debtor nation to attempt to improve the size

of its debt stock, as the potential positive benefits would go largely to the creditors. Krugman also finds that the trade-off is improved if both approaches, financing and forgiving, are made contingent on factors that are beyond the direct control of the debtor nation, such as prices of relevant commodities or world interest rates.

Cunningham (1993) also attempted to empirically scrutinize the nature of the relationship between the burden of accumulated debt and economic growth. The study was conducted on sixteen (16) countries covering the period of 1971-2007. The author found out that, the burden of accumulated debt has negative consequences on the growth of an economy. His argument stemmed from the fact that foreign debt accrued has negative consequences on the productivity of both labour and capital.

Using cross-sectional data on ninety-nine (99) countries Elbadawi, Ndulu, and Ndung'u (1996) also investigated the subject matter to lend empirical support to theory. Based on their findings the authors hold the view that the inflow current debts as a share of GDP, the accumulation of debt in the past, the servicing of debt all influence the economy to grow negatively.

In Sub-Saharan Africa, Iyoha (1999) employed a yearly time series data spanning over the period 1970-1994 to empirically explore the connection concerning external debt and economic growth. The results of the study vividly indicates that the accumulation of external debt adversely affect investment. Furthermore, the reduction in the amount of debt accumulated was found to enhance investment decisions and therefore the growth of the economy. In order to buttress the findings of Iyoha (1999), Bulow and Rogoff (1990) Fosu (1999) also investigated the subject matter by employing an

augmented production function in Sub-Saharan Africa. The data span of the study was however limited to the period 1980 to 1990. The results confirm that of Iyoha (1999) and moved on to that the effect on investment levels was very weak.

Chowdhury (1994) refuted the debt overhang argument based on empirical evidence. The paper contends that the cause of decline in economic growth in developing countries cannot be attributed to accumulated external debts. This assertion was buttressed by a study conducted by Bulow and Rogoff (1990) who suggested that the debt overhang argument was merely an exaggeration and suggested the abolishment of debt relief institutions. Their findings however did not receive a warm reception and was therefore ignored. The debt overhang argument was widely accepted. This led to the establishment of Highly Indebted Poor Countries (HIPC) Initiative by the World Bank in 1996 all in attempt to provide and other donors to provide relief to indebted poor countries.

In an IMF Working Paper, Pattillo et al. (2002) analyse the effect debt burden has on developing economies. Their empirical work covers 93 developing countries over the period 1969 to 1998. They estimate both linear and non-linear regressions controlling for a set of variables common in the growth literature, including trade openness, schooling, population and government budget. For robustness, they use four different definitions of debt burden, namely the ratios of nominal and net present values of external debt to both exports and gross domestic product. They conduct estimations by ordinary least squares, two-stage least squares, fixed effects and system

generalised method of moments, and their results are appropriately consistent throughout.

In summary, they find that for a country with average indebtedness, a doubling of the debt ratio would reduce annual per capita growth by between a half and a full percentage point. They find that the average impact of debt only becomes negative at debt ratios above 160-170 percent of exports or 35-40 percent of gross domestic product, and that the marginal impact of debt starts becoming negative at about half of these levels. Their results are robust to different period length samples, the inclusion of time effects, and the removal of both investment as a control variable and outliers of observations. The removal of investment as an explanatory variable also implies that high debt levels appear to reduce growth by lowering the efficiency of investment more so than the volume of investment.

In another IMF Working Paper, Clements et al. (2003) seek to analyse the channels through which external debt impacts economic growth in low-income countries. They estimate a reduced form growth equation for 55 low-income countries from 1970 to 1999, using both fixed effects and system generalised method of moments. Like their colleagues at the IMF, Pattillo et al. (2002), Clements et al. (2003) adjust their sample into 3 year averages to net out any short-term fluctuations and also try four different definitions of debt burden (nominal debt over exports and gross domestic product, and net present value debt over exports and gross domestic product).

Both estimation procedures and all four debt burden definitions give broadly similar results. Namely, their estimation results support the debt overhang hypothesis; however they estimate a threshold level of debt to

exports of 100-105 percent and a threshold level of debt to gross domestic product of 20-25 percent. Clements *et al.* also seek to examine the relationship investment has on raising per capita growth. They first disaggregate the investment control variable in their initial growth equation into private and public investment, and find that it is public investment that impacts growth in low-income countries. They then run a separate regression with public investment as the dependent variable and assess the impact that debt service has on it. Essentially, they conclude that a reduction in debt service of about 6 percentage points of gross domestic product would raise public investment by between 0.75 and 1 percentage point of gross domestic product, which would hence raise per capita income growth by about 0.2 percentage points.

Contrary to the above findings, Jayaraman and Lau (2009) find that higher debt levels can promote higher economic growth. Their study involves six Pacific island countries between 1988 and 2004 and is based on regressing external debt stock, exports and the budget deficit (all as a percentage of gross domestic product) against gross domestic product. Jayaraman and Lau estimates a regression model by the panel group mean fully modified ordinary least squares, and find that a 1 percent increase in the external debt stock leads to a 0.25 percent increase in national output. Jayaraman and Lau also test for causality by a panel-based vector error correction model with a dynamic error correction term, and find that whilst there is no Granger causality relationship between real gross domestic product and external debt in the long-run, there is a significant causal relationship running from external debt to gross domestic product in the short-run.

Hameed, Mahmoud, and Ahmad (2008) analyse the relationship between external debt and economic growth in Pakistan. By using a production function model for time series data of gross domestic product, debt service, capital stock and labour force from 1970 to 2003, the study examines the dynamic effects that these variables have on economic performance. Multiple cointegration procedures were employed to identify long-run relationships between the variables. The long-run relationship shows that debt service affects gross domestic product negatively, most likely through its adverse impacts on capital and labour productivity. Granger causality was also estimated through a vector error correction model, and further indicates that short-run and long-run negative causality runs from debt service to gross domestic product.

In another single country study, Adegbite et al. (2008) investigate the impact that Nigeria's huge external debt stock had on its economic growth between 1975 and 2005. They use a Solow-type neoclassical growth model to regress the ratio of external debt to gross domestic product (along with several other macroeconomic and external sector exogenous variables) against the annual gross domestic product growth rate. Using both ordinary least squares and generalised least squares and estimating both linear and non-linear relationships, they study the debt overhang theory for Nigeria. Their results find that external debt contributes positively to growth up to a certain point, after which its contribution becomes negative. They also investigate the "crowding out" effect of debt servicing by regressing debt service requirements against private investment and find that Nigeria's large debt burden did indeed "crowd out" private investment.

Fonchamnyo (2009) studies the effect of economic and social performance in 60 low-income countries to assess the relative effectiveness of the HIPC Initiative. He divides the 60 low-income countries into four groups based on their 2005 HIPC status: non HIPCs, pre-decision point, decision point and completion point HIPCs. He hypothesises that those countries included in the HIPC Initiative will show better improvement in economic and social development than those countries not included. To regress this he estimates an investment function and an economic growth function, both by generalised method of moments, and finds that his HIPC dummy is positive and significant in both. Thus, he concludes that this shows that investment and growth have improved in HIPCs since the institution of the HIPC Initiative, and there is also evidence that health care and education enrolment experienced some improvement in countries that had reached the completion point of the HIPC Initiative.

Fosu (1999) studies the effect of external debt on the growth of 35 countries in sub-Saharan Africa using World Bank data for the period 1980 to 1990. By regressing GDP growth on the growth rates of labour, capital, exports, and external debt, Fosu shows that net outstanding debt has a negative effect on economic growth (for given levels of production inputs). Furthermore, he also finds that growth across these sub-Saharan African nations would have been 50% higher during the period of study in the absence of the debt burden. Fosu also finds little evidence of a negative correlation between external debt and investment levels.

Faini and Melo (1990) assess the success of adjustment packages to developing countries supported by loans from the World Bank and IMF,

which focus on a series of microeconomic reforms to assure supply-side improvement whilst simultaneously pursuing sharp real exchange rate depreciation. The authors find that high external debt burdens, in conjunction with macroeconomic instability, impede investment in developing countries. They argue that, for such adjustment packages to result in the levels of investment necessary for the packages to succeed, appropriate relief of external debt is required.

Froot (1989) compares different market-based debt reduction schemes, and argues that the optimal approach to debt relief is a package that is part debt forgiveness, and part new lending. In particular, Froot finds that debtor nations that finance buybacks using current resources can impede incentives for new investment, and can therefore prolong the debt relief process.

Fry (1989) examines the effect of foreign debt accumulation on the balance of the current account using data from 28 countries identified to be heavily indebted to the World Bank in 1986. He argues that as long as an increase in foreign debt increases investment by less than it increases saving – or reduces investment by more than it reduces saving – then the current account will enter a state of equilibrium with a maintainable ratio of foreign debt to gross national product. In particular, Fry identifies public and publically guaranteed debt as reducing saving by more than it reduces investment, hence worsening the current account deficit over time.

Frimpong and Oteng-Abayie (2006) investigated the influence of external debt on Economic growth in Ghana. The authors were motivated by the fact that most of the studies conducted on the subject rely basically on cross-country regressions and thus have the weakness of not reflecting or

explaining enough the actual happenings in a particular country. The authors utilized data covering the period 1970-1999. The methodology applied was based on Johansen cointegration approach and Vector Error Correction Model (VECM). The results of the cointegration test revealed the presence of a long run relationship among the variables. The study revealed that external debt inflows affect growth in GDP positively whiles debt servicing negatively influence GDP growth. This finding reveals the presence of crowding out effect. The study also revealed the existence of a debt overhang effect through the negative impact of domestic investment on economic growth.

Most of these studies reviewed and many others have analysed the effect of external debt on economic growth by adopting the cross country approach. Their results therefore only imply the average effect on those countries considered in their studies. Also studies that considered a Ghana in isolation has been have carried out with data spanning relatively short periods. Given recent developments in Ghana's debt profile and the availability of recent data, this study intends to build upon the already existing studies by including other growth determining variables and also extend the time span of the data.

CHAPTER THREE

RESEARCH METHOS

Introduction

This chapter presents the methodology employed in the study. It gives detailed description of the theoretical and empirical model specification, definition and measurement of variables in the model, estimation technique, sources of the data for the study, and the tools for data analysis.

Research Design

Following the objectives of the study, the study adopted the positivist philosophy within the framework of neoclassical economics. The positivist believes that reality is stable and can be observed and described from an impartial viewpoint without interfering with the phenomena being studied (Levine, 1997). Thus, positivist philosophy enables the researcher to study social processes in an objective fashion and be able to explain relationships between variables. More importantly, the positivist philosophy predicts the use of quantitative approach to research as used in this study. Positivist philosophy is suitable for development of mathematical models to investigate the relationship between quantitative measurements. Based on the positivist philosophy, this study employed the quantitative method.

The quantitative approach is appropriate for this study, because of the objective of the study to examine the effect of external debt on economic growth. The quantitative approach enables the researcher to put the social world into a structure of causality and nullifies the role of human effect through the use of quantitative instrument such as multivariate statistical

analysis in analyzing data as used in this study. More specifically, since the objective of the study is explanatory in nature, the study adopted the explanatory research under the quantitative approach.

Theoretical Model Specification

The study adopted the neoclassical growth model which maintains that growth can arise when capital and labour are augmented by additional inputs in the production function. The Solow growth model explains economic growth as resulting from the combination of capital (K) and labour (L)

$$Y_t = f(K_t, L_t) \quad (1)$$

The question that arises from equation (1) is how much of the increase in output can be attributed exclusively to changes in capital and labour. This is because it is possible for other factors, other than labour and capital to influence output. To resolve this problem, Solow (1956) disintegrates increase in output into three components: physical capital accumulation, growth of labour force and growth of total factor productivity (TFP).

The growth of TFP captures the increase in output that is not accounted for by an increase in physical inputs (labour and capital) in the model. Thus, the TFP may be interpreted as the effect of exogenous technological progress that can also be reflected in increasing productive efficiency. To account for this, Solow employed the Cobb-Douglas production function expressed as:

$$Y_t = f(A_t, K_t, L_t, \ell) \quad (2)$$

where Y is output or real GDP at time t, A is total factor productivity, K is

capital stock, L is labour stock and ℓ represents the naperian “e”. Applying the Cobb-Douglas production function, Solow stated the equation

$$Y_t = A_t K_t^\alpha L_t^\delta \ell^{\epsilon_t} \quad (3)$$

It is important to note that A is not fixed, but varies with different production functions based on the factors being studied.

Empirical Model Specification

The neoclassical production function described above is used as the basis for specifying the empirical model for this study. This is augmented with an error term. It is important to mention that, literature on economic growth indicates that, there are multitudes of potential variables that can affect the TFP (A). Following Mansouri (2005); Asiedu (2013); Sakyi (2011); and Durlauf, Johnson & Temple (2005) the TFP was specified as:

$$A_t = f(EXD_t, FDI_t, REER_t, INF_t) \quad (4)$$

Where EXD is external debt, FDI is foreign direct investment, $REER$ is real effective exchange rates, and INF is inflation. This implies that:

$$A_t = EXD_t^{\beta_1}, FDI_t^{\beta_2}, REER_t^{\beta_3}, INF_t^{\beta_4} \quad (5)$$

Substituting equation (5) into equation (3) gives:

$$Y_t = \varpi EXD_t^{\beta_1} FDI_t^{\beta_2} REER_t^{\beta_3} INF_t^{\beta_4} K_t^\alpha L_t^\delta \ell^{\epsilon_t}$$

(6)

Consistent with the objectives of the study and in accordance with the literature, the study applied natural logarithm to equation (6) and estimated a log-linear model of the following form:

$$\ln Y_t = \ln \bar{Y} + \beta_1 \ln EXD_t + \beta_2 \ln FDI_t + \beta_3 \ln REER_t + \beta_4 \ln INF_t + \alpha \ln K_t + \delta \ln LF_t + \varepsilon_t \ln \ell \quad (7)$$

Let $\ln \bar{Y} = \beta_0$, $\alpha = \beta_5$, $\delta = \beta_6$ and $\ln \ell = 1$, equation (7) can therefore be written as:

$$\ln Y_t = \beta_0 + \beta_1 \ln EXD_t + \beta_2 \ln FDI_t + \beta_3 \ln REER_t + \beta_4 \ln INF_t + \beta_5 \ln K_t + \beta_6 \ln LF_t + \varepsilon_t \quad (8)$$

Where the coefficients; β_1 , β_2 , β_3 , β_4 , β_5 and β_6 are parameters of the respective variables, β_0 is the intercept, t denotes times and ε is the error term.

The following are expected:

$$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 < 0, \beta_5 > 0, \text{ and } \beta_6 > 0$$

To convert equation (8) to growth rate, the study employs growth accounting methodology to re-specify the model as:

$$\begin{aligned} \frac{\ln Y_t - \ln Y_{t-1}}{\ln Y_{t-1}} = & \beta_0 + \beta_1 \left(\frac{\ln EXD_t - \ln EXD_{t-1}}{\ln EXD_{t-1}} \right) + \beta_2 \left(\frac{\ln FDI_t - \ln FDI_{t-1}}{\ln FDI_{t-1}} \right) + \\ & \beta_3 \left(\frac{\ln REER_t - \ln REER_{t-1}}{\ln REER_{t-1}} \right) + \beta_4 \left(\frac{\ln INF_t - \ln INF_{t-1}}{\ln INF_{t-1}} \right) + \beta_5 \left(\frac{\ln K_t - \ln K_{t-1}}{\ln K_{t-1}} \right) + \\ & \beta_6 \left(\frac{\ln LF_t - \ln LF_{t-1}}{\ln LF_{t-1}} \right) + \varepsilon_t \end{aligned} \quad (9)$$

Equation (9), therefore, now becomes:

$$\begin{aligned}\ln Y_t - \ln Y_{t-1} = & \beta_0 + \beta_1(\ln EXD_t - \ln EXD_{t-1}) + \beta_2(\ln FDI_t - \ln FDI_{t-1}) \\ & + \beta_3(\ln REER_t - \ln REER_{t-1}) + \beta_4(\ln INF_t - \ln INF_{t-1}) \\ & + \beta_5(\ln K_t - \ln K_{t-1}) + \beta_6(\ln LF_t - \ln LF_{t-1}) + \varepsilon_t\end{aligned}\quad (10a)$$

$$\begin{aligned}\Delta \ln Y_t = & \beta_0 + \beta_1 \Delta \ln EXD_t + \beta_2 \Delta \ln FDI_t + \beta_3 \Delta \ln REER_t + \beta_4 \Delta \ln INF_t + \\ & \beta_5 \Delta \ln K_t + \beta_6 \Delta \ln LF_t + \varepsilon_t\end{aligned}\quad (10b)$$

The long run growth model to be estimated in this study is:

$$\begin{aligned}\ln Y_t = & \beta_0 + \beta_1 \ln EXD_t + \beta_2 \ln FDI_t + \beta_3 \ln REER_t + \beta_4 \ln INF_t + \\ & \beta_5 \ln K_t + \beta_6 \ln LF_t + \varepsilon_t\end{aligned}\quad (11)$$

The short run model to be estimated for this study is given as:

$$\begin{aligned}\Delta \ln Y_t = & \sum_{i=1}^h \theta \Delta \ln Y_{t-i} + \sum_{i=1}^g \beta_1 \Delta \ln EXD_{t-i} + \sum_{i=1}^p \beta_2 \Delta \ln FDI_{t-i} \\ & + \sum_{i=1}^k \beta_3 \Delta \ln REER_{t-i} + \sum_{i=1}^z \beta_4 \Delta \ln INF_{t-i} + \sum_{i=1}^w \beta_5 \Delta \ln K_{t-i} \\ & + \sum_{i=1}^q \beta_6 \Delta \ln LF_{t-i} \\ & + \rho EC_{t-1} + \varepsilon_t\end{aligned}\quad (12)$$

Where K_t and LF_t are already defined. Y_t refers to real gross domestic product growth ($RGDP_t$), EXD_t is external debt, FDI_t is foreign direct investment, $REER_t$ is real effective exchange rate, and INF_t is inflation. 'ln' is natural logarithm operator, Δ is the difference operator, and EC_{t-1} is the error correction term lagged one period. β_i , where $i = 1, \dots, 6$ represents the elasticity coefficients of the respective variables, with ρ showing the speed of

adjustment. β_0 is the drift component, t denotes time and finally ε is the stochastic error term.

Definition, Measurement of Variables and Sign Expectations

For the purpose of this study, the following measurement and operational definitions were used for the variables being examined. The variables included in the study are real GDP (Economic Growth), external debt, FDI, real effective exchange rate, inflation, gross fixed capital formation (capital), and labour force. The choice of the variables was based on extant literature, economic theory, available data and their significance to the study. The basis for the signs of the respective coefficient of the variables is explained in the description of the variables below.

Economic Growth

Economic Growth is defined as the sustained increase in a country's real output or real gross domestic product overtime (Demetriades & Hussein, 1996). In this study, real GDP will be used as a proxy for economic growth instead of GDP growth rate or GDP per capita since it is the most popular measure of economic growth in the literature and mostly used too by the Breton Wood Institutions. Besides, this measure is preferred to other measures because, it nets out the effect of inflation on the price of the goods and service produced by adjusting inflation terms. Economic growth is used as the dependent variable in the model. Thus, real GDP is used as a proxy for Economic growth. Ayadi and Ayadi (2008) employed real gross domestic product as a proxy of economic growth.

External Debt

External debt is that part of the total debt in a country that is owed to creditors outside the country. The debtors can be the government, corporations or private households. Total external debt as defined by the World Bank is “the debt owed to non-residents which is repayable in foreign currency, goods or services”. Economic growth is enhanced when the borrowed resources or funds (External debt) are channeled in income-generating and productive activities. It is thus expected that external debt will have a positive relationship with economic growth, thus, $\beta_1 > 0$. Following the works of Lipsey (2001) and Frimpong and Oteng-Abayie (2006), this study uses total external debt stock as a measure of external debt.

Foreign Direct Investment (FDI)

Foreign direct investment (FDI) is defined as investment made to acquire a lasting management interest possibly 10 percent or more of voting stock in enterprises operating outside of the economy of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown on the balance of payments. It is expressed as a ratio to GDP. Foreign Direct Investment is considered as an inflow of foreign capital to complement domestic investment and production and hence improving economic performance. Following the works of Lipsey (2001), Frimpong and Oteng-Abayie (2006); Asiedu (2013), and Ezzo (2010), this study uses FDI as a share of GDP to measure foreign direct investment. Thus, its coefficient β_2 is expected to be positive. Thus $\beta_2 > 0$

Real Effective Exchange Rate (REER)

Real Effective Exchange Rate is the weighted average of a country's currency relative to an index or basket of other major currencies adjusted for

the effects of inflation. When real effective exchange rate increases, it is an indication of real depreciation of local currency relative to other foreign currencies. Depreciation of the local currency stimulates exports and hence growth rate is also influenced positively. Even though import volume decreases, the value of imports increases in domestic currency terms because the currency has depreciated. An appreciation of the domestic currency makes exports from the home country more expensive and so decreases demand for home country's exports and foreign exchange earnings and hence hampering economic growth. Thus, the study anticipates a positive relationship between real effective exchange rate and economic growth. Thus $\beta_3 > 0$

Inflation (INF)

Inflation is defined as a sustained increase in the general prices of goods and services over a period of time. A host country's economic instability can be a major deterrent to economic growth. Price stability is an indicator of a stable macroeconomic environment of a country. Usually, high rate of inflation in a country can reduce the return on investment and an indicator of macroeconomic instability and considered a sign of internal economic tension and unwillingness of the government to balance its budget and failure of the central bank to conduct appropriate monetary policy (Schneider & Frey, 1985). Inflation (INF) as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services that may be fixed or changed at specified intervals, such as yearly. Inflation rate is a reflection of macroeconomic instability. A high rate of inflation is generally harmful to growth because it raises the cost of borrowing and thus lowers the rate of

capital investment. However, at low levels of inflation, the likelihood of such a trade-off between inflation and growth is minimal. Inflation is therefore used as an indicator to capture macroeconomic instability, (Asiedu & Lien, 2004; Asiedu, 2013; and Ayibor, 2012). It is expected that $\beta_4 < 0$

Gross Fixed Capital Formation (K)

Gross fixed capital formation (K) formerly gross domestic fixed investment includes plants, machinery and equipment. It also includes the construction of roads, railways, and others such as schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings and all these are necessary for economic growth. The variable is used as a proxy for capital stock. Gross fixed capital formation as a proxy for capital has been used in several other studies such as Balasubramanyam, Salisu, and Sapsford (1996), Kohpaiboon (2006), Mansouri (2005), Njindan Iyke & Takumah, (2015). Gross fixed capital formation as a percentage of GDP (a proxy for capital stock) is expected to positively affect real GDP growth. The higher the rate of investment the higher the growth rate of the economy, *ceteris paribus*, therefore $\beta_5 > 0$

Labour Force

Labour force (labour participation rate) is chosen instead of population growth because it denotes a proportion of the total population aged between fifteen (15) and sixty-four (64) years and is the active and productive population in the country. Solow (1956) and Swan (1956) advised that labour force should be included in the growth model because of its effect on the work force and this has been proven empirically in many researches that included

labour force to be a good measure of economic growth. Labour force as a proxy for labour participation rate has been used in several other studies such as Frimpong and Oteng-Abayie (2006), Sakyi (2011) and Ayibor (2012). It is expected that $\beta_6 > 0$

Data Source and Estimation Technique

The study employed secondary data. Annual time series data which span from 1986 to 2015 were used. The series were drawn from World Development Indicators (World Bank, 2015). The study employed the maximum likelihood estimation technique to examine the relationship between external debt and economic growth. The MLE technique is a statistical method for estimating population parameters (such as the mean and variance) from sample data, which selects as estimates, those parameter values maximizing the probability of obtaining the observed data. The major advantages associated with this estimation technique are that: the maximum likelihood estimation procedure can be applied to a wide variety of models and it generally yields estimators with excellent asymptotic properties (Davidson & MacKinnon, 2004). In addition, several statistical software packages provide excellent algorithms for maximum likelihood estimates and for many commonly used distributions. This helps to mitigate the computational complexity of the MLE.

In order to examine effects between external debt, other explanatory variables, and economic growth the study applied test estimations within the framework of cointegration and error-correction models. The empirical procedure involves the following steps. First of all, the study investigated the

time series properties of the data by using the Augmented Dickey–Fuller (ADF) and the Phillip-Perron (PP) tests. The unit roots test was used to check the stationarity property of the data. In the second step, it tested for cointegration using the autoregressive distributed lag (ARDL) procedure developed by (Pesaran, Shin, & Smith, 2001). Also, the stability and diagnostic test statistics of the ARDL model is examined to ensure the reliability and the goodness of fit of the model.

Unit Root Tests

It is very important to test for the statistical properties of variables when dealing with time series data. Time series data are rarely stationary in level forms. Regression involving non-stationary time series often lead to the problem of spurious regression. This occurs when the regression results reveal a high and significant relationship among variables when in fact, no relationship exist. Moreover, Stock and Watson (1988) have also shown that the usual test statistics (t , F , DW , and R^2) will not possess standard distributions if some of the variables in the model have unit roots.

A time series is non-stationary if its mean, variance and autocovariances are not constant overtime or independent of time. However, a time series is stationary when its mean, variance and autocovariances are independent of time. The study employed a variety of unit roots tests. This was done to ensure reliable results of the test for stationarity due to the inherent individual weaknesses of the various techniques. The study used both the PP and the ADF tests. These tests are similar except that they differ with respect to the way they correct for autocorrelation in the residuals.

The PP nonparametric test generalises the ADF procedure, allowing for less restrictive assumptions for the time series in question. The null hypothesis to be tested is that the variable under investigation has a unit roots (non-stationary) against the alternative that the variable under investigation has no unit roots (stationary). In each case, the lag-length is chosen using the Akaike Information Criteria (AIC) and Swartz Information Criterion (SIC) for both the ADF and PP test. The sensitivity of ADF tests to lag selection renders the PP test an important additional tool for making inferences about unit roots. The basic formulation of the ADF is specified as follows:

$$Y_t = \mu + \alpha Y_{t-1} + \gamma t + \varepsilon_t \quad (13)$$

Subtracting Y_{t-1} from both sides gives:

$$\Delta Y_t = \mu + (\alpha - 1)Y_{t-1} + \gamma t + \varepsilon_t \quad (14)$$

Letting $(\alpha - 1)$ be represented by ρ gives equation (15) that is:

$$\Delta Y_t = \mu + \rho Y_{t-1} + \gamma t + \varepsilon_t \quad (15)$$

The t-test on the estimated coefficient of Y_{t-1} that is ρ provides the DF test for the presence of a unit-root. The Augmented DF (ADF) test is a modification of the DF test and involves augmenting the above equation by lagged values of the dependent variables. It is made to ensure that the error process in the estimating equation is residually uncorrelated, and also captures the possibility that Y_t is characterised by a higher order autoregressive process. Although the DF methodology is often used for unit roots tests, it suffers from a restrictive assumption that the error processes are independent and identically distributed (i.i.d). Therefore, letting $(\alpha - 1)$, to be equal to ρ and

by controlling for serial correlation by adding lagged first differenced to equation (16) gives the ADF test of the form:

$$\Delta Y_t = \mu + \rho Y_{t-1} + \gamma t + \sum_{i=1}^p \beta_i \Delta Y_{t-1} + \varepsilon_t \quad (16)$$

Where Y_t denotes the series at time t , Δ is the difference operator, μ , γ , and β_i are the parameters to be estimated and ε is the stochastic random disturbance term.

The ADF and the PP test the null hypothesis that a series contains unit roots (non-stationary) against the alternative hypothesis of no unit roots (stationary). That is:

$$H_0: \rho = 0 \text{ (} Y_t \text{ is non-stationary)}$$

$$H_1: \rho < 0 \text{ (} Y_t \text{ is stationary)}$$

If the tau statistic is less negative than the critical values, the null hypothesis is accepted and the conclusion is that the series is non-stationary. Conversely, if the tau value or t-statistic is more negative than the critical values, the null hypothesis is rejected and the conclusion is that the series is stationary.

Tests for Cointegration

Most time series data are non-stationary with a unit roots at levels, first differencing appears to provide the appropriate solution to the problems. However, first differencing has the tendency of eliminating all the long-run information which economists are invariably interested in. Granger (1986) identified a link between non-stationary processes and preserved the concept

of a long-run equilibrium. Two or more variables are said to be cointegrated (there is a long-run equilibrium relationship), if each of the series taken individually is non-stationary with $I(1)$, while their linear combination is stationary with $I(0)$.

Autoregressive Distributed Lag (ARDL) Approach to cointegration

In order to analyse the long-run relationships as well as the dynamic interactions among the various variables of interest empirically, the autoregressive distributed lag cointegration procedure developed by (Pesaran et al. (2001) was used. The choice of ARDL to estimate the model was informed by the following reasons:

First, The ARDL cointegration procedure is relatively more efficient in small sample data sizes as is the case in this study. This study covers the period 1986–2015 inclusive. Thus, the total observation for the study is 30 which is relatively small.

Second, The ARDL enables the cointegration to be estimated by the ordinary least square (OLS) method once the lag of the model is identified. This is however, not the case of other multivariate cointegration techniques such as the Johansen Cointegration Test developed by (Johansen & Juselius, 1990). This makes the ARDL procedure very simple.

Third, The ARDL procedure does not require the pretesting of the variables included in the model for unit roots compared with other techniques such as the Johansen approach. It is applicable regardless of whether the

variables in the model are purely I(0), purely I(1) or mutually cointegrated. The procedure will however crash in the presence of I(2) series.

Last but not the least, traditional cointegration methods such as Johansen (1988), Johansen-Juselius (1990), may experience endogeneity problem, however, the ARDL method can distinguish between dependent and explanatory variables and eradicate the problems that may arise due to the presence of autocorrelation and endogeneity. ARDL cointegration estimates short run (SR) and long run (LR) relationship simultaneously and provide unbiased and efficient estimates.

Following Pesaran et al (2001) as summarized in Choong, Yusop, and Liew (2005), this study applies the bounds test procedure by modeling the long-run equation that is equation (11), as a general autoregressive (AR) model of order p , in z_t :

$$z_t = \alpha_0 + \beta t + \sum_{i=1}^p \phi_i Y_{t-i} + \varepsilon_t \quad t = 1, 2, \dots, T \quad (17)$$

With α_0 representing $(k + 1)$ – a vector of intercept (drift), and β denoting $(k + 1)$ – a vector of trend coefficients, Pesaran et al (2001) further derived the following vector error correction model (VECM) corresponding to (17):

$$\Delta z_t = \alpha_0 + \beta t + \Pi z_{t-1} + \sum_{i=1}^p \Gamma_i \Delta z_{t-i} + \varepsilon_t \quad t = 1, 2, \dots, T \quad (18)$$

Where $(k+1) \times (k+1)$ -matrices, $\Pi = I_{k+1} + \sum_{i=1}^p \Psi_i$ and $\Gamma = -\sum_{j=i+1}^p \Psi_j$,

$i = 1, 2, \dots, \rho - 1$ contain the long-run multipliers and short-run dynamic coefficients of the VECM. z_t is the vector of variables y_t and x_t respectively; Y_t is an I(1) dependent variable defined as $\ln Y_t$ (in this case $\ln RGDP_t$); x_t ($EXD_t, FDI_t, REER_t, INF_t, K_t, LF_t$) is a vector matrix of 'forcing' I(0) and I(1) regressors as already defined with a multivariate independent and identically distributed (i.i.d) zero mean error vector $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})'$, and a homoscedastic process.

Further assuming that a unique long-run relationship exists among the variables, the conditional VECM now becomes:

$$\Delta z_t = \alpha_{y0} + \beta t + \delta_{yy} y_{t-1} + \delta_{xx} x_{t-1} + \sum_{i=1}^{p-1} \lambda_i \Delta y_{t-i} + \sum_{i=1}^{p-1} \xi_i \Delta x_{t-i} + \varepsilon_{yt} \quad t = 1, 2, \dots, T \quad (19)$$

On the basis of equation (19), the conditional VECM of interest can be specified as equation (20). Let Y in equation (11) equal to RGDP

$$\begin{aligned}
\Delta \ln \text{RGDP}_t &= \alpha_0 + \delta_1 \ln \text{RGDP}_{t-1} + \delta_2 \ln \text{EXD}_{t-1} + \delta_3 \ln \text{FDI}_{t-1} \\
&+ \delta_4 \ln \text{REER}_{t-1} + \delta_5 \ln \text{INF}_{t-1} + \delta_6 \ln \text{K}_{t-1} + \delta_7 \ln \text{LF}_{t-1} \\
&+ \sum_{i=1}^p \beta_{1i} \Delta \ln \text{RGDP}_{t-i} \\
&+ \sum_{j=1}^q \beta_{2j} \Delta \ln \text{OPEN}_{t-j} + \sum_{k=1}^q \beta_{3k} \Delta \ln \text{FDI}_{t-k} \\
&+ \sum_{l=1}^q \beta_{4l} \Delta \ln \text{REER}_{t-l} + \sum_{m=1}^q \beta_{5m} \Delta \ln \text{INF}_{t-m} + \sum_{n=1}^q \beta_{6n} \Delta \ln \text{K}_{t-n} \\
&+ \sum_{p=1}^q \beta_{7p} \Delta \ln \text{LF}_{t-p} + \varepsilon_t \tag{20}
\end{aligned}$$

Where δ_i are the long run multipliers, α_0 is the drift, and ε_t are white noise errors.

Bounds Testing Procedure

The first step in the ARDL bounds testing approach is to estimate equation (20) by ordinary least squares (OLS) in order to test for the existence of a long-run relationship among the variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables, that is, $H_N: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = 0$ against the alternative

$$H_A: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq 0.$$

The test which normalizes on RGDP is denoted by F_{RGDP} (LRGDP|LEXD, LFDI, LREER, INF, LK, LLF). Two asymptotic critical values bounds provide a test for cointegration when the independent variables are $I(d)$ (where $0 \leq d \leq 1$): a lower value assuming the regressors are $I(0)$, and an upper value assuming purely $I(1)$ regressors. If the F-statistic is above the

upper critical value, the null hypothesis of no long-run relationship can be rejected irrespective of the orders of integration for the time series. Conversely, if the F-statistic falls below the lower critical value the null hypothesis cannot be rejected.

Finally, if the statistic falls between the lower and upper critical values, the result is inconclusive and depends on whether the underlying variables are $I(0)$ or $I(1)$. This necessitates the testing for unit root on the variable under investigation (Pesaran & Pesaran, 1997). The approximate critical values for the F-test can be obtained from Pesaran and Pesaran, 1997, p.478). However, given that Pesaran's critical values are based on simulated large sample size, this study will use the critical values developed by (Narayan, 2004) since it is more appropriate for small samples.

After the confirmation of the existence of long run relationship between the variables in the model, the ARDL methodology estimates $(m + 1)^{k+1}$ number of the regressors. Where m is the maximum number of lags and k is the number of the variable in the equation (Shrestha & Chowdhury, 2005; Pesaran & Pesaran, 1997). The orders of lags of the ARDL models are selected using, either, Schwarz-Bayesian Criteria, Akaike's Information Criteria the $\overline{R^2}$ criteria or the Hannan and Quinn criteria. The SBC uses the smallest possible lag length and is considered as most parsimonious model whereas the AIC chooses the maximum necessary lag length (Shrestha & Chowdhury, 2005).

In the second stage of the ARDL bounds approach, once cointegration is established the conditional ARDL ($p, q_1, q_2, q_3, q_4, q_5, q_6$), the long-run model for Y or $RGDP_t$ can be estimated as:

$$\begin{aligned} \ln RGDP_t = & \alpha_0 + \sum_{i=1}^p \delta_1 \ln RGDP_{t-i} + \sum_{i=1}^{q_1} \delta_2 \ln EXD_{t-i} + \sum_{i=1}^{q_2} \delta_3 \ln FDI_{t-i} \\ & + \sum_{i=1}^{q_3} \delta_4 \ln REER_{t-i} + \sum_{i=1}^{q_4} \delta_5 \ln INF_{t-i} + \sum_{i=1}^{q_5} \delta_6 \ln K_{t-i} \\ & + \sum_{i=1}^{q_6} \delta_7 \ln LF_{t-i} \\ & + \varepsilon_t \end{aligned} \quad (21)$$

This involves selecting the orders of the ARDL ($p, q_1, q_2, q_3, q_4, q_5$) model in the seven variables using Akaike Information Criterion (Akaike, 1981).

The third and the last step in the ARDL bound approach is to estimate an Error Correction Model (ECM) to capture the short-run dynamics of the system. The ECM generally provides the means of reconciling the short-run behaviour of economic variable with its long-run behaviour.

The ECM is specified as follows:

$$\begin{aligned} \Delta \ln RGDP_t = & \alpha_0 + \sum_{i=1}^p \beta_{1i} \Delta \ln RGDP_{t-i} + \sum_{j=1}^q \beta_{2j} \Delta EXD_{t-j} + \sum_{k=1}^q \beta_{3k} \Delta FDI_{t-k} \\ & + \sum_{l=1}^q \beta_{4l} \Delta REER_{t-l} + \sum_{m=1}^q \beta_{5m} \Delta INF_{t-m} + \sum_{n=1}^q \beta_{6n} \Delta K_{t-n} \\ & + \sum_{p=1}^q \beta_{7p} \Delta LF_{t-p} + \rho ECM_{t-1} \\ & + \varepsilon_t \end{aligned} \quad (22a)$$

From equation (22a), β_i represent the short-run dynamics coefficients of the model's convergence to equilibrium and ECM_{t-1} is the Error Correction Model. The coefficient of the Error Correction Model, ρ measures the speed of adjustment to obtain equilibrium in the event of shocks to the system. The residual from the cointegration equation lagged one period is given as:

$$\begin{aligned}
 ECT_t = \ln RGDP_t - \alpha_0 - \sum_{i=1}^p \beta_{1i} \Delta \ln RGDP_{t-i} - \sum_{j=1}^q \beta_{2j} \Delta EXD_{t-j} \\
 - \sum_{k=1}^q \beta_{3k} \Delta FDI_{t-k} - \sum_{l=1}^q \beta_{4l} \Delta REER_{t-l} - \sum_{m=1}^q \beta_{5m} \Delta INF_{t-m} \\
 - \sum_{n=1}^q \beta_{6n} \Delta K_{t-n} \\
 - \sum_{p=1}^q \beta_{7p} \Delta LF_{t-p} \tag{22b}
 \end{aligned}$$

Engle and Granger (1987) argued that when variables are cointegrated, their dynamic relationship can be specified by an error correction representation in which an error correction term (ECT) computed from the long-run equation must be incorporated in order to capture both the short-run and long-run relationships. The error correction term indicates the speed of adjustment to long-run equilibrium in the dynamic model. In other words, its magnitude shows how quick the variables converge to equilibrium when they are disturbed. It is expected to be statistically significant with a negative sign. The negative sign implies that any shock that occurs in the short run will be corrected in the long-run. The larger the coefficients of the error correction term in absolute terms, the faster the convergence to equilibrium.

To ensure the goodness of fit of the model, diagnostic and stability tests are conducted. The diagnostic test examines the serial correlation, functional form, normality and heteroscedasticity associated with the selected model. Pesaran and Pesaran (1997) suggested that conducting a stability test is of great importance and must not be ignored. This technique is also known as cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ). The CUSUM and CUSUMSQ statistics are updated recursively and plotted against the break points. If the plots of the CUSUM and CUSUMSQ statistics stay within the critical bounds of five percent level of significance, the null hypothesis of stable coefficients in a given regression cannot be rejected.

Data Analysis

The study will employ both descriptive and quantitative analysis. Charts such as graphs and tables will be employed to aid in the descriptive analysis. Unit roots tests will be carried out on all variables to ascertain their order of integration. Furthermore, the study will adopt ARDL econometric methodology for cointegration introduced and popularized Pesaran et al (2001) to obtain both the short and long-run estimates of the variables involved. All estimations will be carried out using E-views 9.0 package.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents and discusses the estimation results. The results of the descriptive statistics of the relevant variables, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests and Autoregressive Distributed Lag (ARDL) approach to cointegration are presented and discussed. These results are discussed in relation to the various hypotheses of the study.

Descriptive statistics

The study computed the descriptive statistics of the relevant variables involved in the study. From Table 1, the variables have positive average values (means). It can also be seen from Table 1 that, real gross domestic product (RGDP), a proxy for economic growth, foreign direct investment (FDI), real effective exchange rate (REER), labour force (L) and inflation (INF) are positively skewed implying that the majority of the values are less than their means. On the other hand, external debt (EXD) and capital (K) are negatively skewed implying that majority of the values are greater than their means. The minimal deviations of the variables from their means as indicated by the standard deviations demonstrate that taking the logs of variables minimizes their variances.

Table 1: Summary Statistics of the Variables

	RGDP	EXD	FDI	REER	EXDK	INF	K	L
Mean	1.26E+10	23.4948	2.5739	291.5835	4.4354	32.6922	0.1726	54.4236
Median	6.17E+09	23.8420	1.5681	119.9000	4.7180	24.8703	0.2030	54.3147
Maximum	4.86E+10	34.1083	9.5170	1957.2000	9.4066	122.8745	0.3098	57.6588
Minimum	2.77E+09	11.3050	-0.6604	60.2000	0.4252	8.7268	0.0353	51.3279
Std. Dev.	1.33E+10	6.8448	3.0318	418.7465	2.8418	29.0861	0.0803	2.1880
Skewness	1.49341	-0.1617	1.0730	2.6890	0.2467	1.9277	-0.229	0.0574
Kurtosis	3.72052	1.8061	2.7164	9.6818	1.8050	6.1469	1.7498	1.5852
Sum	5.16E+11	963.2861	105.5307	11954.9200	181.8531	1340.3810	7.0758	2231.3680
SumSq.Dev.	7.09E+21	1874.0330	367.6742	7013945.0000	323.0319	33840.1100	0.2577	191.4858
Observations	30	30	30	30	30	30	30	30

Note: Std. Dev. represents Standard Deviation while Sum Sq. Dev. represents Sum of Squared Deviation.
Source: computed by author using Eviews 9.0 Package

Unit Root Test Results

Even though the bounds test (ARDL) approach to cointegration does not require the pretesting of the variables for unit roots, it is however important to perform this test to verify that the variables are not integrated of an order higher than one. The purpose is to ascertain the absence or otherwise of $I(2)$ variables to extricate the results from spurious regression. Thus, in order to ensure that some of the variables are not integrated at higher order, there is the need to complement the estimated process with the unit root tests.

For this reason, before applying Autoregressive Distributed Lags approach to cointegration, unit root tests will be conducted in order to investigate the stationarity properties of the data. As a result, the ADF tests and Phillips-Perron (PP) unit root tests were applied to all the variables in levels and in first difference in order to formally establish their order of integration. To be certain of the order of integration of the variables, the test was conducted with intercept and time trend in the model. The optimal number of lags included in the test was based on automatic selection by Schwarz-Bayesian Criteria (SBC), Akaike Information Criteria (AIC) the $\overline{R^2}$ criteria or the Hannan and Quinn (H-Q) criteria. The study used the P-values in the parenthesis to make the unit root decision, (that is, rejection or acceptance of the null hypothesis that the series contain unit root) which arrived at similar conclusion with the critical values.

The results of ADF and PP test for unit root with intercept and trend in the model for all the variables are presented in Table 2 and Table 3 respectively. The null hypothesis is that the series is non-stationary, or

contains a unit root. The rejection of the null hypothesis is based on the MacKinnon (1996) critical values as well as the probability values.

Table 2: Results of Unit Root Test with constant and trend: ADF Test

Levels			First Difference			
Variables	ADF-Statistics	Lag	Variables	ADF-Statistics	Lag	$I(0)$
LRGDP	-0.2905[0.9870]	1	Δ LRGDP	-4.4510[0.0064]***	0	I(1)
LEXD	-2.2492[0.4507]	1	Δ LEXD	-6.4814[0.0000]***	0	I(1)
LFDI	-2.3107[0.4154]	1	Δ LFDI	-4.8552[0.0029]***	0	I(1)
LREER	-3.9604[0.0220]**	1	Δ LREER	-5.6730[0.0004]***	0	I(0)
INF	-3.8989[0.0252]**	1	Δ INF	-5.7068[0.0005]***	1	I(0)
LK	-3.2476[0.1953]	0	Δ LK	-5.6425[0.0005]***	1	I(1)
LLF	1.9180[0.2997]	2	Δ LLF	-5.1868[0.0014]***	0	I(1)

Table 3: Results of Unit Root Test with constant and trend: PP Test

Levels			First Difference			
Variables	PP-Statistics	BW	Variables	PP-Statistics	BW	$I(0)$
LRGDP	-0.4472[0.9804]	1	Δ LRGDP	-4.4038[0.0071]***	2	I(1)
LEXD	-1.6656[0.7405]	2	Δ LEXD	-5.2659[0.0002]***	1	I(1)
LFDI	-1.9405[0.6079]	3	Δ LFDI	-7.7675[0.0002]***	4	I(1)
LREER	-3.9741[0.0213]**	4	Δ LREER	-7.7749[0.0000]***	4	I(0)
INF	-4.3029[0.0102]**	3	Δ INF	-15.3249[0.0000]***	5	I(0)
LK	-3.1342[0.1175]	4	Δ LK	-17.1182[0.0000]***	5	I(1)
LLF	-2.0784[.1554]	0	Δ LLF	-5.2553[0.0012]***	4	I(1)

Note: ***, **, * indicates the rejection of the null hypothesis of non-stationary at 1%, 5%, 10% level of significance respectively, Δ denotes the

first difference, BW is the Band Width and $I(0)$ is the lag order of integration. The values in parenthesis are the P-values.

Source: Computed by author using Eviews 9.0 package

From the unit root test results in Table 2, the null hypothesis of the presence of unit root for most of the variables in their levels cannot be rejected since the P-values of the ADF statistics are not statistically significant at any of the three conventional levels of significance with the exception of Real Effective Exchange Rate and inflation which were stationary at 5 percent significant levels. However, at first difference, the variables become stationary. This is because the null hypothesis of the presence of unit root (non-stationary) is rejected at 1 percent significant levels for all the estimates.

The PP test results for the presence of unit root with intercept and time trend in the model for all the variables are presented in Table 3. From the unit root test results in Table 3, the null hypothesis of the presence of unit root for majority of the variables in their levels cannot be rejected since the P-values of the PP statistics are not statistically significant at any of the three conventional levels of significance with the exception of log of Real Effective Exchange Rate and Inflation which were stationary at 5 percent significant levels. However, at first difference, the variables become stationary. This is because the null hypothesis of the presence of unit root (non-stationary) is rejected at 1 percent significant levels for all the estimates. The PP unit root test results in Table 3 are in line with the ADF test in Table 2, suggesting that most of the variables are integrated of order one, $I(1)$, when intercept and time trend are in the model.

It is therefore clear from the unit root results discussed above that all the variables are integrated of order zero, $I(0)$, or order one, $I(1)$. Since the test results have confirmed the absence of $I(2)$ variables, the ARDL methodology is used for estimation.

Cointegration Analysis

Since the object of this study is to establish the relationship between external debt and economic growth, it is important to test for the existence of long-run equilibrium relationship between these variables within the framework of the bounds testing approach to cointegration. Given that the study employs annual data, a lag length of 2 for annual data is used in the bounds test. Pesaran, Shin and Smith (1999) suggest a maximum lag of two for annual data in the bounds testing to cointegration. After the lag length was determined, an F-test for the joint significance of the coefficients of lagged levels of the variables was conducted. Thus, each of the variables in the model is taken as dependent variable and a regression is run on the others. For instance, RGDP is taken as the dependent variable and it is regressed on the other variables. After that another variable for instance external debt is taken as the dependent variable and it is also regressed on the other variables. This action is repeated for all the variables in the model. When this is done the number of estimated regressions would be equal to the variables in the model.

Pesaran and Pesaran (1997) indicates that “this OLS regression in the first difference are of no direct interest” to the bounds cointegration test. It is however, the F-statistics values of all the regressions when each of the variables is normalized on the other which are of great importance. This F-statistics tests the joint null hypothesis that the coefficients of the lagged levels

are zero. In other words, there is no long run relationship between them. The essence of the F-test is to determine the existence or otherwise of cointegration among the variables in the long run. The results of the computed F-statistics when RGDP is normalized (that is, considered as dependent variable) in the ARDL-OLS regression are presented in Table 4.

From Table 4, the F-statistics that the joint null hypothesis of lagged level variables (i.e. variable addition test) of the coefficients is zero is rejected at 1 percent significance level. Further, since the calculated F-statistics for $F_{RGDP}(\cdot) = 8.7026$ exceeds the upper bound of the critical value of band (4.26), the null hypothesis of no cointegration (i.e. long run relationship) between economic growth and its determinants is rejected.

Table 4: Bounds Test Results for Co-integration

Critical Value Bound of the F-statistic: intercept and no trend						
K	90% Level		95% Level		99% Level	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
7	2.03	3.13	2.32	3.50	2.96	4.26
Calculated F-Statistics:						
$F_{RGDP} (RGDP EXD, FDI, REER, INF, K, L)$					8.7026(0.0000) ***	

Note: Critical values are obtained from Eviews 9; *** denotes statistical significance at the 1% level and K is the number of regressors in the bound tests equation

This result indicates that there is a unique cointegration relationship among the variables in Ghana’s economic growth model and that all the determinants of economic growth can be treated as the “long-run forcing” variables for the explanation of economic growth in Ghana. Since this study is

based on growth theory, RGDP is used as the dependent variable. Thus, there is existence of cointegration among the variables in the growth equation and hence we, therefore, proceed with the growth equation.

Long-run results (Economic growth is dependent variable)

Table 5 shows results of the long run estimate based on the Schwartz Bayesian criteria (SBC). The selected ARDL (1, 2, 2, 2, 2, 1, 2, 2) passes the standard diagnostic test. The coefficients indicate the long run elasticities.

Table 5: Estimated Long Run Coefficients using the ARDL Approach

ARDL (1, 2, 2, 2, 2, 1, 2, 2) selected based on SBC Dependent Variable: RGDP				
Regressor	Coefficient	Standard Error	T-Ratio	P-values
EXD	0.0703	0.0059	11.9152***	[0.000]
FDI	0.4298	0.0648	6.6327***	[0.000]
REER	-0.2111	0.1511	-1.3971	[0.200]
INF	-0.0032	0.0013	-2.4615**	[0.042]
K	2.9107	0.4217	6.9023***	[0.000]
L	0.2024	0.0295	6.8610***	[0.000]

Source: Computed by author using Eviews 9.0 package. Note: ***, **, * imply significance at the 1, 5, and 10 percent levels respectively.

From Table 5, the long run results show that external debt, foreign direct investment, capital stock and labour force exerted a positive and statistically significant effect on economic growth. Inflation and real effective exchange rate, however, exerted a negative effect on economic growth but inflation is statistically significant but that of real effective exchange rate is statistically insignificant. From the results in Table 5, the coefficient of

external debt is statistically significant at 1 percent significance level, indicating that if the country were to increase her external debt by 1 percent, economic growth measured as real gross domestic product will increase by approximately 0.0703 percent in the long run. The results obtained in this study in the long run does not absolutely resolve the conflicting results in the extent literature but contribute to the controversy in the literature by aligning itself with those studies such as Frimpong and Oteng-Abayie (2006) Hassan and Mamman (2013), Cordella et al (2005) which believe that external debt positively affects real GDP.

The estimate for external debt in Table 5 is in line with the first objective of the study which is to investigate the long run relationship between external debt and economic growth. The results obtained for external debt in Table 5, answers the first hypothesis of the study which states that there is no long run relationship between external debt and economic growth. The null hypothesis is rejected at 1 percent significance level which implies that there is a long run relationship between external debt and economic growth and that the relationship is positive according to the results in Table 5. This means that external debt or borrowing when channeled to the right places or real sectors is likely to improve the economy for its impact to be felt at the aggregate level over particularly over the study period. This is consistent with theoretical expectation of the classical views on the role of external debt in the macro economy. It is also consistent with other empirical studies such as Frimpong and Oteng-Abayie (2006) Hassan and Mamman (2013), Cordella, Ricci, and Ruiz-Arranz (2005) who found a positive impact of financial deepening on economic growth.

According to economic theory, external debt induces economic growth by enhancing capital formation and efficiency, and by increasing the supply of scarce resources which hitherto was not available. For Ghana, the results obtained suggests that the external debt policy adopted as part of the structural reforms in the 1986 in Ghana has helped open the economy and raised output. This emphasizes the fact that external debt enhances competition and efficiency as well as transfer of technology and knowledge and hence enhancing growth.

The results however contradict the findings of Ali and Abdullah (2015) in their study ‘Impact of Trade Openness and external debt on the Economic Growth of Pakistan: 1980-2010’ and Githanga (2015) for Kenya. The findings by Ali and Abdullah (2015) showed a negative and statistically significant long-run relationship between trade openness and for that matter financial deepening and economic growth for Pakistan. Pattillo et al (2002) on the other hand also found a negative and statistically significant long-run relationship between external debt and economic growth implying that trade openness and financial deepening are growth hampering in the long-run.

Furthermore, the coefficient of foreign Direct Investment (FDI) carried the expected positive sign and is statistically significant at 1 percent significance level. Thus, if the country’s FDI increases by 1 percent, real GDP will increase by approximately 0.4298 percent in the long run. That is, the economic rationale for offering special incentives to attract FDI frequently stems from the belief that foreign investment produces externalities in the form of technology transfers and spillovers. Romer (1993), for example, argued that there are important “idea gaps” between rich and poor countries.

Romer noted that foreign investment can ease the transfer of technological and business know-how to poorer countries. These transfers may have substantial spillover effects for the entire economy and hence leading to economic growth. Rappaport (2000) observed that foreign direct investment boosts the productivity of all firms, and not just those receiving foreign capital.

Most macroeconomic studies that used aggregate FDI flows for a broad cross-section of countries, generally suggest a positive role for FDI in generating economic growth especially in particular environments (De Gregorio, 1992). For instance, Alfaro, Kalemli-Ozcan, and Sayek (2009) found that FDI promotes economic growth in economies with sufficiently developed financial markets. To continue with the argument Borensztein et al., (1998) argue that FDI has a positive growth-effect when the country has a highly educated workforce that allows it to exploit FDI spillovers. While Wang and Blomström (1992) find no evidence that education is critical, they argue that FDI has a positive growth-effect when the country is sufficiently rich. The result also supports most findings of empirical studies in the literature. Particularly, it agrees with studies by Dava (2012) who found a positive and significant effect of FDI on economic growth for a sample of seven Southern Africa Development Community (SADC) countries in his studies 'the effect of trade liberalization on the growth of real GDP'.

The results however contradict the findings of Frimpong and Oteng-Abayie (2006) for Ghana, Atique, Ahmad, Azhar, and Khan (2004) for Pakistan and Falki (2009) too for Pakistan. These studies found a negative and statistically significant effect of FDI on economic growth. In the case of Ghana, Frimpong and Oteng-Abayie (2006) argued that most of the FDI

inflows into the country go to the mining and construction sectors of the country. This however, does not generate direct growth impact on the economy as a whole and hence the negative effect.

Moreover, the coefficient of Real Effective Exchange Rate (REER) did not have its expected sign. It had a negative effect on economic growth and is statistically insignificant at the three traditional significance levels, that is, 10, 5 and 1 percent respectively. The coefficient (-0.2111) of REER indicates that there is no relationship between REER and economic growth. This means that if the country's currency depreciates, it will not have any impact on economic growth measured as real GDP per the study in the long run. Thus, as expected a depreciation of the domestic currency makes Ghanaian exports relatively cheaper and as such leads to increase in demand for exports and by extension economic performance where as an appreciation of the domestic currency makes exports more expensive and as such reduces economic performance in the long run. However, per the result of the study for REER, this cannot happen for Ghana within the study period. The result contradicts Aksoy and Salinas (2006) who found a positive and a significant relationship between REER and economic growth. Aksoy and Salinas (2006) found that the overvaluation of the real exchange rate was an important factor limiting the supply response of trade reforms. They further argued that real depreciation/devaluation enhances a country's international competitiveness, leading to increase exports and foreign exchange supplies and, thereby, increasing official capacity to imports needed inputs for industrial production and therefore economic performance. The result is also not in line with findings of (Anwar and Nguyen (2010); Fidan (2006); and Majeed and Ahmad

(2007)) who found a significant relationship between REER and economic growth. The real exchange rate which reflects the underlying relative movement of prices at home and abroad and also competitiveness of exports has a significant effect on economic performance. A fall in the relative domestic prices due to exchange rate depreciation makes exports cheaper in the international markets resulting in increased demand for exports which eventually leads to economic growth and vice versa (Majeed & Ahmad, 2007).

Besides, the results show that the coefficient of inflation (INF) is negative and statistically significant signalling a negative influence on economic growth. With a coefficient of -0.0032, it can be explained that a 1 percent increase in inflation leads to approximately -0.0032 percent decrease in economic growth (real GDP). The coefficient of INF is statistically significant at 5 percent significance level as can be seen in Table 4. The impact of inflation on economic growth, however, is relatively minimal given the size of the coefficient. High INF affects the economy as well as the society significantly and adversely. Improper price regulation and imperfect information about aggregate price level causes inflationary situation in the economy. A high rate of inflation causes many economic problems like poverty, unequal distribution of wealth, market imperfections, deficit in balance of payments and unemployment as well as non-economic problems like social evils such as smuggling and hoarding etc. Inflation also disturbs the very important role of smoothness of price mechanism. Moreover, high inflation rate has more volatility over time. The volatility of inflation rate is a hindrance for future economic planning and project evaluation and productive

use of resources. High and unpredictable inflation slows down the process of economic growth and hurts the economy (Afzal, Malik, Butt, & Fatima, 2013).

Stockman (1981) argued that individual's welfare falls whenever there is an increase in inflation. The negative effect of inflation real GDP is an indication that inflation causes economic growth in the long-run which is in tandem with the finding of Gylfason (1999) who finds a negative relationship between inflation and economic growth for low, middle and high income countries. Gylfason (1999) argued that higher rates of inflation leads to overvaluation of national currencies in real terms which affects the exchange rate and distorts production by driving a wedge between returns to real and financial capital and consequently reducing savings. This leads to lower returns to production and investments which invariably reduces economic performance. The finding in this study is line with the findings of (Gokal and Hanif, 2004); Ahmed and Mortaza (2005); Samimi and Shahryar (2009); and Bittencourt (2012). Ahmed and Mortaza (2005) found a statistically significant long-run negative relationship between inflation and economic growth for Bangladesh. Gokal and Hanif, (2004) also found a statistically significant negative effect of inflation on output for Fiji. Bittencourt (2012) found out that inflation has a negative but significant effect on economic growth for four Latin American Countries (Argentina, Bolivia, Brazil and Peru).

The results however contradict the findings by Mallik and Chowdhury (2001), Khan and Ssnhadji (2001), Chimobi (2010) and (Erbaykal & Okuyan, 2008). Mallik and Chowdhury (2001) found a positive relationship between inflation and output for four South Asian Countries (Bangladesh, India, Pakistan and Sri Lanka). Khan and Ssnhadji (2001) argued that inflation per se

is not harmful to growth. Their study suggested that there is a threshold beyond which inflation is harmful to growth (i.e. inflation negatively affects economic growth). Additionally, to them when inflation is creeping it is not harmful to growth. Chimobi (2010) found no cointegrating relationship between inflation and output for Nigeria implying no long-run relationship between the two variables. Also, Erbaykal and Okuyan (2008) showed no statistically significant long-run relationship between inflation and economic growth for Turkey.

The coefficient of capital of 2.9107 shows that a 1 percent increase in capital input would result in a 2.9107 percent increase in real GDP, holding all other factors constant and is statistically significant at 1 percent significance level. The sign of the capital variable support the theoretical conclusion that capital contributes positively to growth of output since the coefficient of capital in this long-run growth equation is positive and significant. This positive relationship between capital stock and economic growth is consistent with the expectation of the classical economic theory who argued that capital plays a vital role in the growth of an economy. The finding is line with the findings of (Shaheen, Ali, Kauser, & Bashir (2013); Falki (2009) and Khan & Qayyum (2007). It is also consistent with conclusions reached by Ibrahim (2011) and Asiedu (2013) in the case of Ghana. Ibrahim (2011) and Asiedu (2013) found positive and statistically significant effect of capital on economic growth for Ghana.

Finally, the results show that the coefficient of labour force (L) is positive and statistically significant signalling a positive influence on economic growth in the long run. Labor force is positive and significant at 1

percent with a coefficient of 0.2024 indicating that an increase in economic growth by this amount (0.2024) if there is a 1 percent increase in the labor force (L). This is consistent with the argument of (Jayaraman, Singh, & Others, 2007) and Ayibor (2012) who asserted that there can be no growth achievement without the involvement of labour as a factor input, hence, the positive and significant coefficient. This result however contradicts the works of Frimpong and Oteng-Abayie (2006), and Sakyi (2011) who found a negative effect of labour on economic growth.

The long-run results indicate that any disequilibrium in the system as a result of a shock can be corrected in the long run by the error correction term. Hence, the error correction term that estimated the short-run adjustments to equilibrium is generated as follows.

$$ECM = RGDP - 0.0703*EXD - 0.4298*FDI + 0.2111*REER + 0.0032*INF - 2.9107*K - 0.2024*L$$

Short Run Estimates (DLRGDP is the dependent variable)

The existence of a long run relationship among economic growth and its exogenous variables allows for the estimation of long run estimates. Some descriptive statistics can be obtained from Table 6. From the Table, it can be observed that the adjusted R^2 is approximately 0.99. It can therefore be explained that approximately 99 percent of the variations in economic growth is explained by the independent variables. Also, a DW-statistics of approximately 2.05 reveals that there is no autocorrelation in the residuals.

The results also showed that the coefficient of the lagged error correction term ECM (-1) exhibits the expected negative sign (-0.8113) and is statistically significant at 1 percent. This indicates that approximately 81 percent of the disequilibrium caused by previous years' shocks converges back to the long run equilibrium in the current year. According to Kremers, Ericsson and Dolado (1992) and Bahmani-Oskooee (2001), a relatively more efficient way of establishing cointegration is through the error correction term. Thus, the study discerns that the variables in the model show evidence of high response to equilibrium when shocked or disturbed in the short-run.

Table 6: Estimated Short-Run Error Correction Model using the ARDL Approach

ARDL (1, 2, 2, 2, 2, 1, 2, 2) selected based on SBC Dependent Variable: DRGDP				
Variable	Coefficient	Standard Error	T-Ratio	P-Value
D(EXD)	0.0547	0.0048	11.3311***	0.000
D(EXD(-1))	-0.0131	0.0030	-4.3116***	0.003
D(FDI)	0.1788	0.0297	6.0243***	0.000
D(FDI(-1))	-0.1946	0.0330	-5.9045***	0.000
D(REER)	0.8072	0.0852	9.4698***	0.000
D(REER(-1))	1.0435	0.1320	7.9060***	0.000
D(INF)	-0.0016	0.0006	-2.6253**	0.030
D(K)	1.3623	0.2124	6.4134***	0.000
D(K(-1))	-1.0810	0.1816	-5.9544***	0.000
D(L)	-0.0728	0.0713	-1.0213	0.337
D(L(-1))	-1.3545	0.1559	-8.6855***	0.000
C	-2.3764	0.2134	-11.137***	0.000
ECM (-1)	-0.8113	0.0362	-22.413***	0.000
R-squared	0.9985	Mean dependent var	10.0445	
Adjusted R-squared	0.9946	S.D. dependent var	0.3558	
S.E. of regression	0.0261	Akaike info criterion	-4.3051	
Sum squared resid	0.0055	Schwarz criterion	-3.2775	
Log likelihood	86.5764	Hannan-Quinn criter.	-3.9764	
F-statistic	255.2428	Durbin-Watson stat	2.0577	
Prob(F-statistic)	0.000			

Source: Computed by author using Eviews 9.0 package. Note: ***, **, * imply significance at the 1, 5, and 10 percent levels respectively.

Theoretically, it is debated that an error correction mechanism exists whenever there is a cointegrating relationship among two or more variables. The error correction term is thus obtained from the negative and significant lagged residual of the cointegration regression. The ECM stands for the rate of

adjustment to restore equilibrium in the dynamic model following a disturbance. The negative coefficient is an indication that any shock that takes place in the short-run will be corrected in the long-run. The rule of thumb is that, the larger the error correction coefficient (in absolute terms), the faster the variables equilibrate in the long-run when shocked (Acheampong, 2007).

Table 6 reports the short run dynamic coefficients of the estimated ARDL model. Consistent with the long run results, the coefficient of external debt has the theorized positive impact on economic growth in the short run. The coefficient of external debt is statistically significant at 1 percent. From the results, the coefficient of external debt is statistically significant at 1 percent significance level, indicating that if the country were to increase her external debt by 1 percent in the short run, economic growth measured as real gross domestic product will increase by approximately 0.0547. This clearly showed the important role external debt play in the economy particularly in the short run. The results obtained in this study in the short run does not absolutely resolve the conflicting results in the extent literature but contribute to the controversy in the literature by aligning itself with those studies such as Hassan and Mamman (2013) Torruam, Chiawa and Abur (2013), Nwanna and Chinwudu (2016), Ali and Abdullah (2015) and Falki (2009) which believe that external debt positively affects real GDP in the short run.

The estimate for trade openness in Table 6 is in line with the second objective of the study which is to explore the short run relationship between trade openness and economic growth. The results obtained for external debt in Table 6, answers the second hypothesis of the study which states that there is no short run relationship between financial deepening and economic growth.

The null hypothesis is rejected at 1 percent significance level which implies that there is a short run relationship between financial deepening and economic growth and that the relationship is positive as shown in Table 6. This means that financial deepening has the potential of stimulating economic growth in Ghana at the aggregate level over the study period in the short run. This is consistent with theoretical expectation of the classical views on the role of trade in the macro economy. In the empirical literature the results in the study is consistent with the findings by (Torruam et al., 2013), Nwanna and Chinwudu (2016) Ali and Abdullah (2015), Shaheen et al., (2013); Falki (2009); Khan and Qayyum (2007), Sarkar (2008), and Dollar & Kraay (2003) who found a positive and statistically significant effect of external debt on economic growth in the short run.

According to economic theory external debt has an impact on economic growth. This implies that channeling external debt and funds to the strategic sectors in Ghana, improves financial structures and ensures efficient delivery of financial services and funds to both the public and private sector to invest to attract more private sector participation for increase output. Improved external debt induces economic growth by enhancing capital formation and efficiency, and by increasing the supply of scarce resources. For Ghana, the results obtained suggests that the external debt policy adopted as part of the structural reforms in the 1986 in Ghana has helped open the economy and raised output in the short run. This emphasizes the fact that external debt enhances competition and efficiency as well as transfer of technology and knowledge and hence enhancing growth in the short run. This clearly indicates the crucial role that external debt plays in Ghana's growth process through the

economic sector as its coefficient is positive in the dynamic model just as in the long run model.

However, the result contradicts the findings of Babu, Kiprop, Kalio, and Gisore (2014), Pattillo et al (2002) Clements et al (2003) who found and negative association between economic growth and external debt in the short run. To add, the lag of external debt in the short run is statistically significant, however, it did not have the expected sign. Its negative value of 0.0131 shows that a 1 percentage point increase in last year's external debt lead to approximately 0.0131 percent decrease in economic growth in the current year or period. Its coefficient is statistically significant at 1 percent level of significance.

From Table 6, it can be observed that foreign direct investment (dFDI) exerts a positive influence on economic growth. Its coefficient of (0.1788) suggests that, a 1 percent increase in FDI leads to approximately 0.18 percent increase in economic growth at 1 percent level of significance. The positive effect of FDI reemphasizes the fact that Ghana has benefited positively from the spillover effect of foreign investors in the country. The study is consistent with the work of De Mello (1997). De Mello (1997) argued that FDI influences economic growth by serving as an important source of capital, which complements domestic private investment in developing productive capacity. He further observed that FDI has the potential to generate employment and raise factor productivity via knowledge and skill transfers, adoption of new technology which helps local firms to improve their productive capacity thereby enhancing economic performance. To add, Lall (1985) argued that foreign investments come to host country with a package,

including capital, technology, and management and marketing skills. They can, thus, improve competition, efficiency; provide additional jobs and financial resources in an economy and hence leading to robust economic performance. The finding however contradicts the findings of Asiedu, 2013; Frimpong and Oteng, 2006 for Ghana respectively and Falki (2009) in the case of Pakistan). These studies found a negative and statistically significant effect of FDI on economic growth in the short run. In the case of Ghana, Asiedu (2013) argued that most of the FDI inflows into the country go to the mining and construction sectors of the country. This however, does not generate direct growth impact on the economy as a whole and hence the negative effect observed in the short run. However, coefficient of the lag FDI is negative and did not have the expected a prior sign. This shows that when last year's FDI increases by 1 percent, economic growth decreases by 0.1946 in the current year or period.

Real effective exchange rate (dREER) did have the expected a prior sign. The coefficient of real effective exchange rate is positive and statistically significant at 1 percent level of significance. With a positive coefficient of 0.8072, it is expected that a 1 percent increase in the coefficient of dREER leads to approximately 0.80 percent increase in economic growth meaning that real effective exchange rate is growth enhancing in the short run in Ghana. And the possible explanation could be that, though, real depreciation/devaluation enhances a country's international competitiveness, leading to increases in exports and foreign exchange supplies and, hence, increasing official capacity of a country to import the needed inputs for production. The immediate effect of these vital inputs may be realized or felt

immediately in the economy as it does not take more time for it to be felt in the economy hence accounting for the positive effect of real effective exchange rate on economic growth in the short run. This finding is consistent with the findings of Prasad (2000) who found that short run changes in real effective exchange rate leads to increased exports and economic growth for Fiji. Also, the lag of real effective exchange rate {dREER (-1)} has the expected a prior sign and has a significant influence on economic growth in the short run. Thus, with a positive value of 1.0435, it can be explained that a 1 percent increase in last year's real effective exchange rate leads to approximately 1.04 percent increase in economic growth in the current year or period. Its coefficient is statistically significant at 1 percent level of significance. This finding is, however, consistent with the findings of Prasad (2000) who found that short run changes to real effective exchange rate leads to increased exports and economic growth in the short run for Fiji.

Again, the coefficient of inflation also maintained its negative sign and it is statistically significant at 5 percent significance level which is consistent with the long run results. The result therefore suggests that if inflation goes up by 1 percent, economic growth will decrease by approximately 0.0016 percent in the short run. Thus, the short run and long run results indicate that inflation has been a discouragement for economic growth in Ghana. The negative effect of inflation on economic growth seem less severe in the short run (-0.0016) than in the long run (-0.0032). The results indicate how important it is to control inflation in the Ghanaian economy by putting in the appropriate policies. Its impact in both the short run and long run appear to be debilitating as inflation generally proxy macroeconomic instability. In the empirical literature the

results supports the findings by (Gokal and Hanif, 2004; Ahmed and Mortaza, 2005; Mallik and Chowdhury, 2001; Samimi and Shahryar, 2009; Bittencourt, 2010; and Gylfason, 1999). Gylfason (1999) found evidence in support of a negative effect of on economic growth in the short run for countries that export primary commodities. The result in this study is, however, inconsistent with the findings by Asiedu, (2013) for Ghana who found a positive and insignificant effect of inflation on economic growth. The result also contradicts that of Mallik and Chowdhury (2001) who found a positive relationship between inflation and economic growth for South Asian Countries (Bangladesh, India, Pakistan and Sri Lanka).

Besides, consistent with the findings of Falki, 2009; (Khan and Qayyum (2007), Githanga (2015) for Kenya; and Ibrahim (2011) for Ghana, the coefficient of capital stock maintained its positive sign and is statistically significant at 1 percent significance level which is consistent with the long run result. This means that in the short run, a 1 percentage point increase in capital stock will induce economic growth to increase by approximately 1.36 percent. This indicates the crucial role that capital stock plays in Ghana's growth process. The sign of capital stock variable supports the theoretical conclusion that capital contributes positively to growth of real GDP both in the short run and in the long run since the coefficient of capital in these two periods is positive and significant. Interestingly, the lag of capital $\{dK (-1)\}$ did not have the expected a prior sign and has a significant influence on economic growth in the short run. Thus, with a negative value of 1.0810, it can be explained that a 1 percent increase in last year's K leads to approximately 1.08 percent

decrease in economic growth in the current year or period in the short run. Its coefficient is statistically significant at 1 percent level of significance.

Finally, labour force did not maintain its expected positive sign as in the long run although it is statistically insignificant. This result, however, contradicts the findings of Frimpong and Oteng-Abayie (2006), and Sakyi (2011) who found a negative and statistically significant effect of labour on economic growth in Ghana. Frimpong and Oteng-Abayie (2006) argued that labour force variable is negatively signed and statistically significant. To them, this is an indicative of the growing unemployment problem and the low productivity of labour in Ghana. They further argued that the economy of Ghana is based on land intensive agriculture, capital intensive mining, and labour intensive petty trading all of which have limited employment and income generation benefits for the country. Also, from Table 6, the lag of labour force $\{dL (-1)\}$ did not have the expected a prior sign but has a significant influence on economic growth in the short run. Thus, with a negative value of 1.081, it can be explained that a 1 percentage point increase in last year's labour force leads to approximately 1.08 percent decrease in economic growth in the current year or period. Its coefficient is statistically significant at 1 percent level of significance. This finding is, however, consistent with the findings of Frimpong and Oteng-Abayie (2006), and Sakyi (2011) who found a negative and significant effect of labour force on economic growth in Ghana.

Diagnostic Tests

Diagnostics test were conducted for the ARDL model. The tests, as reported, in Table 7 indicate that the estimated model passes the Langrangean multiplier test of residual serial correlation among variables. Also, the estimated model passes the tests for Functional Form Misspecification using square of the fitted values. The model also passed the Normality test based on the Skewness and Kurtosis of the residuals. Thus, the residuals are normally distributed across observations. Finally, the estimated model passes the test for heteroscedasticity test based on the regression of squared residuals on squared fitted values.

Table 7: Diagnostic Tests

Test Statistics	LM Version
Serial Correlation	CHSQ (1) = 1.9953[0.2166]
Functional Form	CHSQ (1) = 0.2527[0.8048]
Normality	CHSQ (2) = 0.3693[0.8314]
Heteroscedasticity	CHSQ (1) = 2.1756[0.1295]

Source: Computed by author using Eviews 9.0 package

Stability Tests

Pesaran and Pesaran (1997) suggests that the test for the stability for parameters using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) plots be conducted after the model is estimated. This is done to eliminate any bias in the results of the estimated model due to unstable parameters. Also, the

stability test is appropriate in time series data, especially when one is uncertain about when structural changes might have taken place.

The results for CUSUM and CUSUMSQ are depicted in Figure 1 and Figure 2 respectively. The null hypothesis is that coefficient vector is the same in every period and the alternative is that it is not Bahmani-Oskooee and Nasir (2004). The CUSUM and CUSUMSQ statistics are plotted against the critical bound of 5 percent significance level. According to Bahmani-Oskooee and Nasir (2004), if the plot of these statistics remains within the critical bound of the 5 percent significance level, the null hypothesis that all coefficients are stable cannot be rejected.

Figure 2 depicts the plot of CUSUM for the estimated ARDL model. The plot suggests the absence of instability of the coefficients since the plots of all coefficients fall within the critical bounds at 5 percent significance level. Thus, all the coefficients of the estimated model are stable over the period of the study.

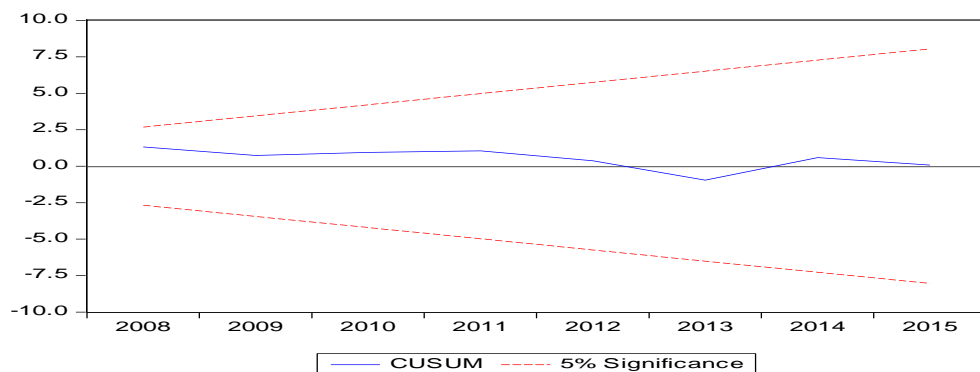


Figure 2: Plot of Cumulative Sum of Recursive Residual

Figure 2: Plot of Cumulative Sum of Recursive Residuals. The straight lines represent critical bounds at 5 percent significance level. Source: Computed by Author using Eviews 9.0 package

Figure 3 depicts the plot of CUSUMSQ for the estimated ARDL model. The plot also suggests the absence of instability of the coefficients since the plots of all coefficients fall within the critical bounds at 5 percent significance level. Thus, all the coefficients of the estimated model are stable over the period of the study.

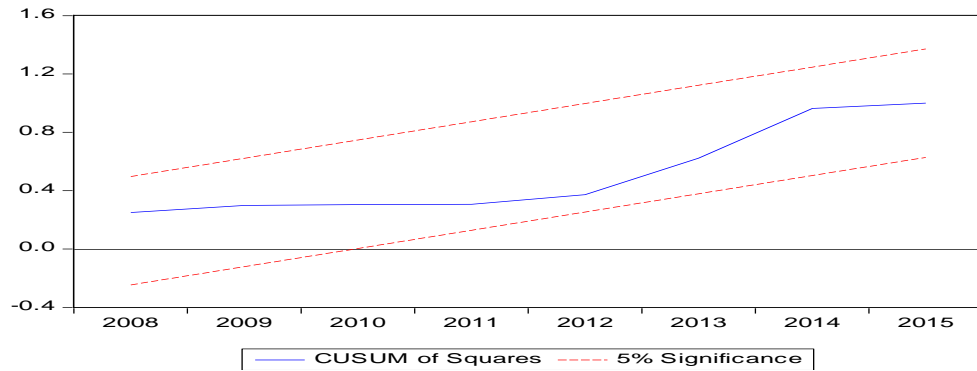


Figure 3 Plot of Cumulative Sum of Squares of Recursive Residual

Figure 3: Plot of Cumulative Sum of squares of Recursive Residuals. The straight lines represent critical bounds at 5 percent significance level. Source: Computed by Author using 9.0 package

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The aim of this chapter is to elaborate on the findings of the study, draw conclusions upon these findings and also to provide policy recommendations. The chapter begins with a summary, then concludes and makes policy recommendations.

Summary of Findings

The study sought to examine, as the main objective, the relationship between external debt and economic growth in Ghana using annual time series from 1986 to 2015. The study set out to examine the possible existence of long run and short run relationship between external debt and economic growth. In view of this, the Autoregressive Distributed Lagged Model (ARDL) approach to bounds testing developed by Pesaran et al. (1999) was adopted to examine the long run and short run dynamic parameters of the model.

The study began with the descriptive statistics then with the tests for unit roots in the variables used in the study. This was done to check for the stationarity properties of the variables or series employed in the study. Thus, the study employed Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) tests for unit roots testing. These tests for the presence of unit roots were done in levels and in first difference with constant and trend. The variables employed in the study included real GDP, external debt, foreign direct investment, real effective exchange rate, inflation, capital and labour force. All

tests and estimations were conducted using econometric view (Eviews) 9.0 package.

The study observed that, the debate on the nature of the relationship between external debt and economic growth is still ongoing in the literature and has been characterized into The Dual Gap Analysis, Debt Overhang Theory and The Liquidity Constraint Hypothesis. However, empirical evidence especially time series studies have generally been mixed and inconclusive.

The results of the cointegration analysis showed the presence of one long-run relationship among real GDP, external debt, foreign direct investment, real effective exchange rate, inflation, capital and labour force. External debt, FDI, capital stock and labour force in the long-run model exhibited positive and statistically significant relationship with economic growth (real GDP) except for inflation which was negative and statistically significant. Real effective exchange rate was negative but statistically insignificant. This result answers the first hypothesis.

The empirical evidence from the ARDL showed that most of the variables except the lags of most of the variable exhibited both positive and negative effect on economic growth in the short-run with the positive impacts being dominant, the share of external debt which served as a policy variable was significant and positively impacted on growth. The speed of adjustment, though significant did carry its expected negative sign. The implication is that economic growth followed its own path to stability in the short-run when disturbed.

Conclusions

This study, in line with the empirical literature, revealed a positive long-run relationship and short run relationship between external debt and economic growth. There was also adjustment to equilibrium from the short-run. Consistent with the endogenous growth predictions, the study found evidence between economic growth and external debt. This suggests that growth can stimulate development of external debt through financial resources and financial deepening which could spur growth. This implies that economic growth in the real side of the economy creates demand for financial services which in turn leads to financial deepening and by extension economic growth.

Recommendations

Based on the findings from the study, the following recommendations are proposed.

The positive long-run relationship between external debt and economic growth indicates that external debt plays an important role in growth of the economy. In respect of this, government in conjunction with the Bank of Ghana and other stakeholders in the economy should make an effort to foster a growing and well managed external debt so as to stimulate economic growth.

Also, as indicated in the conclusions above, an increase in well thought through external debt to boost economic growth can be considered as both a long run and short term policy instrument. That is, economic growth will increase just as in the long run and short run period. On the basis of the findings, it is recommended that policy makers should focus on policy that encourages the judicious use of borrowed funds. In contrast, efficient

utilization of capital goods should be promoted/ ensured and reliance on non-capital goods should be less in order to ensure high domestic production in the country.

Besides, from the study, FDI inflows are crucial for boosting economic growth in Ghana; to this end government needs to provide incentives to facilitate attraction of FDI. Thus, it is recommended that government policy should focus on encouraging and directing foreign direct investors to invest in the industrial and agricultural sectors as this could be growth enhancing. These may include tax holidays and tax relieves to investors who wish to go to these sectors as well as improvement in the infrastructural base of the country such as roads, railways, and communications, among others particularly in the rural areas. When this is done, it would complement domestic investment in those sectors so as to accelerate GDP and its impact will consequently be trickled down to the vast majority of people in the economy. The emphasis is placed on the manufacturing and agricultural sectors because of their contributions in the economy in terms of employment creation, income generation, foreign exchange generation, revenue generation, GDP growth, among others.

Last but not the least, from the study, inflation was growth hampering; it is therefore recommended that effort should be made by the government to cut down 'wastage' in the economy and rigorously tackle corruption. On the basis of this, it can be recommended to keep inflation at stable level in the economy. Therefore, policy makers and Bank of Ghana should concentrate on those options which keep the inflation rate stable and below the level which has been found helpful for the achievement of sustainable economic growth. Stable and moderate inflation is also helpful for minimizing the uncertainties

and fluctuations in the financial sector of economy, which, in turn, boost the capital formation activities in the country. So that it may exert its positive effects on the economy. So, maintaining price stability will ultimately be the best policy recommendation to stable and sustained economic growth of the economy.

Suggestion for future research

External debt on economic growth involves the interaction of many activities and institutions. Consequently, it cannot be captured by a single or two measure (s). As such, further research could consider using many more measures of external debt and consider the possibility of interacting external debt with other variables and see its impact for both cointegration and causality tests in addition to using improved econometric techniques and long span of annual time series data. External debt could also be looked at in terms of both the market based and the bank based perspectives to ensure a better and rigorous analysis. Again, given the possibility of bidirectional causality between economic growth and external debt, two separate models could be estimated. The argument that external debt can affect economic growth indirectly through its impact on foreign direct investment and real interest rate can also be explored in future studies.

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