

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

**PUBLIC DEBT, PUBLIC INVESTMENT AND ECONOMIC GROWTH IN GHANA
(1980-2017)**

BY

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**A Thesis submitted to the Institute of Distant Learning, Kwame Nkrumah University of
Science and Technology in partial fulfilment of the requirement for the degree of**

MASTER OF SCIENCE IN ECONOMICS

MAY, 2019

DECLARATION

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

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DEDICATION

This work is dedicated to God almighty for seeing me through my masters successfully and finally to my mother, Mrs Olivia Tsekpo-Buatsi and Siblings for their unflinching love and support.

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ACKNOWLEDGEMENT

I am indebted to my supervisor, Dr. Jonathan D. Quartey for his tireless dedication during the supervision of this work. I am also highly indebted to Mr. Owusu Ansah, Mr Emil Mawutor Tsekpo and Miss Sedinam Katcher for their input and proof reading of this study.



ABSTRACT

Research shows that numerous studies have analyzed the impact of public debt on economic growth. However, existing empirical evidence provides mixed and inconsistent predictions about the effect of public debt on economic growth. This study however explores the critical turning point at which the excessive government debt levels have a positive or negative impact on economic growth in Ghana. It also assessed the trend of public debt in Ghana from 1980-2017, as well as the relationship between the public investment and public debt in Ghana. The research design adopted was the quantitative method. This study utilises models that are based on Pattillo, Ricci, and Poirson (2004) Growth and Debt models due to the existence of subcomponents working unitedly. The research heavily utilized secondary data gathered from the World Development Indicators (WDI) on Ghana from 1980 to 2017. Augmented Dickey-Fuller (ADF) test, Autoregressive Distributed Lag (ARDL), time series graph and pairwise correlations were used in presentation of results. The findings show that investment continues to significantly contribute to the increase of output growth. An increase in domestic investment in the short run also increases economic growth. The study shows that there is a negative effect of debt-to-GDP on growth which means that domestic borrowing from foreign capital was used, partially, to finance government expenditure and public investment, thus contributing to the increase in public spending, increases budget deficit and leading to higher public debt in order to finance these deficits. It was therefore recommended that Ghana should employ prudent financial and economic policies that will enhance efficient financial management, promote trade, Control the depreciation of exchange rate and control Inflationary pressure. This will go a long way to promote and sustain the level of Ghana's economic growth rate in the coming years.

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ABBREVIATION AND ACRONYMS



ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
CPI	Consumer Price Index
ECM	Error Correction Model
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GEX	Government Expenditure
GMM	Generalized Method of Moments
HIPC	Heavily Indebted Poor Country
IMF	International Monetary Fund
MOU	Memorandum of Understanding
OLS	Ordinary Least Square
PDEBT	Public Debt
PP	Phillips-Perron
REER	Real Effective Exchange Rate
RGDP	Real Gross Domestic Product

SBC	Schwarz Bayesian Criterion
SSA	Sub Saharan Africa
UECM	Unrestricted Error Correction Model
U.K	United Kingdom
U.S	United States
VAR	Vector Autoregressive
WDI	World Development Indicators



CHAPTER ONE

INTRODUCTION

1.1 Background of the study

In recent times, the most controversial economic problems in Ghana have been the rising public debt, as said of most emerging and developing economies in Africa. Newspapers, politicians and policy analysts alike have increasingly demanded the cause of the rising public debt (Mupunga & Le Roux, 2014). One major factor that affects public debt is fiscal adjustment. In 2017, a report by the International Monetary Fund and the International Development Association stated that the public debt of Ghana would rise further due to the lack of fiscal adjustment; it is also expected that there will be higher breaching of the public debt benchmark. The expectations are that under the baseline, which also encompasses fiscal adjustment, there will be improvement and stabilization in all debt indicators. Also, it has been projected that by 2022, under the IMF program of front-loaded fiscal adjustments, there will be a decrease in public debt below the 56 percent benchmark that has been set. Another factor that affects public debt is exchange rate. Shocks in exchange rate have been seen to have an effect on public debt sustainability. Historical evidence indicates unsustainable debt trajectories in Ghana.

In the context of this study, Ghana has adequate provisions in the Constitution; for instance, the Bank of Ghana Act, the Loans Act, and other laws to regulate the management of the public debt towards the attainment of economic objectives yet public debt keeps rising. Institutions like Parliament, National Development Planning Commission, Ministry of Finance, Bank of Ghana, the Statistical Service, the Controller and Accountant General among others play key roles in the governance processes associated with the public debt. The situation appears worrying and a concern for investigation. The rising debt of Ghana may be an indication of a problem in the debt

management strategies of the country. Therefore, the study examines public debt and how it impacts the Ghanaian economic growth.

Several studies analyzing the effect of public debt on economic growth have emerged. This has been proven through a large body of theoretical and empirical literature exploring the impact public debt has on economic growth (Reinhart and Rogoff, 2010; Patillo *et al.*, 2002; Checherita & Rother, 2010; Clements *et al.*, 2003). The empirical evidence makes available varied and inconsistent forecasts about the effect of public debt has on economic growth. Reinhart and Rogoff (2010) analyzed the correlation that exists between economic growth and public debt for from 1949 to 2009 for 20 developed economies. Their study discovered that increased levels of debt negatively correlate with economic growth; however, they realized that below 90 percent of GDP, there was no existing relation between debt and economic growth. Patillo *et al.* (2002) in examining how per-capita GDP growth is affected by external debt from 1969 and 1998 using a panel dataset of 93 developing countries. Their empirical outcomes revealed that per capita GDP growth is influenced negatively for the net present value of debt levels that falls above 35–40 percent of GDP. Clements *et al.* (2003) reported that there is a negative relationship existing between growth for panel date of 55 low-income economies for the period that covered 1970 to 1990 and external debt. Checherita and Rother (2010) in their evaluation of how Government debt affects economic growth for 12 different European countries from of 1970–2010 using panel fixed effects estimation technique. The study revealed that government debt has no linear influence on economic growth, indicating that at 90–100 percent of GDP the government debt-to-GDP ratio negatively affects long-term growth. Panizza and Presbitero (2012) using the instrumental variable approach in their study which analyzed the effect public

debt has on economic growth for a sample of OECD countries. Kumar and Woo (2010) examined how the growth of an economy is affected by public debt in the long-run by using time series data for four decades of some developed and emerging countries. They resolved that economic growth is negatively influenced by public debt in long-run. Tchereni *et al.* (2013) conducted a study which analyzed how Malawi's economic growth is affected by foreign debt using time series data from 1975–2003. They found out that there was a statistically insignificant negative correlation between Malawi's economic growth and foreign debt.

This study however explores the critical turning point at which Ghana's economic growth is influenced either positively or negatively by the extreme government debt level. The study also provided a comparison for the Ghanaian economy with previous studies both within Ghana and other countries which may aid in the improvement of decision-making by policy makers in recent years. It also assessed the trend of public debt in Ghana from 1980-2017, as well as the correlation between the public investment and public debt in Ghana.

1.2 Statement of the problem

Data given by the Bank of Ghana supports the assertion of Égert, (2015) that, excessive borrowings by governments to finance programs and activities affect economic growth negatively (Serrão, 2016). According to the IMF (2017) report, the risk of external debt distress is still high in Ghana. The public debt-to-GDP ratio remains high although there was no market disruption during the 2016 general election. Thus, excessive borrowing will not only constrain economic development but will virtually make it impossible to pay the loans (Égert, 2015). The current debt crisis, especially in developing countries like Ghana has received a public debate on

the effect public debt has on economic growth. Although in recent times there has been proliferation in studies exploring the correlation that exists between public debt and economic activity, empirical literature exploring this relationship is still scarce and there is still a deficiency in the systematic evidence on the effect public debt has on potential economic growth (Owusu-Nantwi and Erickson, 2016). In view of the background, there are countless reasons for this lack of interest in the formal investigation of how public debt impacts economic growth and these include: deficient and unavailability of data on public debt in most countries for comparison (especially in developing countries); the consideration of public debt as an endogenous variable instead of an exogenous variable that may be utilized as an instrument for controlling the macro-financial outcome; and the lack of acknowledgement of public debt as a problem in most developing countries, including Ghana, its size is relatively small (Greiner, 2014).

One of the macroeconomic problems faced by developing countries has been the issue of debt crisis since the 1980s. Several researches, as a result, have been conducted to find out the cause, consequences with the view of finding an amicable possible solution to this crisis. Ghana as one among the developing countries has debt that is very crucial in terms of future debt repayment. In the year 2000, out of the 6,062 million US dollars external debt, 87.8% represented the long term component of the external debt stock, 4.7% also represented short term debt, and 7.5% on the other hand represented medium term debt. Between 2000 and the second quarter of 2015 increased from US\$6,0621 million in 2000 to US\$13552.65 million as at the end of the second quarter in 2015. The high ratio of the total external debt of Ghana in relation to Gross Domestic Product (GDP) stood the risk of having accumulated debt, which may not be sustainable in the

long run. According to MOFEP (2015), the total public debt of the country at the end of 2014 was GH¢79.6 billion (US\$24.8 billion). Out of this amount, the external debt of the country was GH¢44.5 billion (US\$13.9 billion) representing 55.96% whereas the domestic debt amounted to GH¢35.0 billion (US\$10.9 billion) representing 44.4%. The public debt profile of Ghana has been on the ascendency. According to MOFEP (2015), the total debt stock as at the end of May, 2015 stood at GH¢90.0 billion representing 67.53% of GDP. Though there is high debt to GDP ratio in Ghana over the years, there is still controversy surrounding the effect of external debt accumulating on economic growth. External debt can influence economic growth either positively or negatively. Therefore, against this background, this study assessed how public debt affects the economic growth of Ghana. Specifically, it addressed the concern of the impact of public debt on public investment and economic growth.

1.3 Objectives of the study

The focal objective of the study is to provide an assessment of public debt, public investment and economic growth of Ghana.

The specific objectives used for the study includes:

1. To assess the trend of public debt in Ghana from 1980-2017.
2. To assess the relationship between the public investment and public debt in Ghana.
3. To determine the effect of public debt on economic growth in Ghana.

1.4 Research Questions

1. What is the trend of public debt in Ghana from 1980-2017?
2. What is the relationship between the public investments and public debt in Ghana?

3. What is the effect of public debt on economic growth in Ghana?

1.5 Definition of Terms

- Budget Deficit: This is a situation where the estimated expenditure exceeds the estimated revenue.
- Economic growth: This can briefly be explained as an increase in the Gross Domestic Product or per capital income of a country.
- Internal Debt: This is regarded as debts obtained from local citizens or institutions.
- External Debt: This is simply defined as the borrowings from foreign lenders. It is the debt a country owes other countries or institutions abroad. It is usually denominated in foreign currency (Senibi, et al., 2016).
- Public Debt: This is the borrowings of government which can be internal or external. In other words, it is the aggregate of domestic and foreign debt.

1.6 Significance of the study

This study is very important and would go a long way to notify the Government and bank of Ghana, on the need to assess issues of public debt since they affect the growth of the Ghanaian economy.

The outcome of the study can shed more light on the debt-economic growth nexus and hence inform their contributions and debate on the issue on formal and informal forums. Politicians can use the results from this study to mobilize the electorate for or against debt as a budget deficit fixing policy.

Lastly, the final report would be a useful reference source to future researchers, academia and policy makers like the Bank of Ghana since it since it aid in the formulation of policies that can be used to regulate public debt issues and their effect on economic growth.

1.7 Scope of the study

The study is limited to public debt and the effect it has on economic growth in Ghana. These include the roles of Ministry of Finance, Bank of Ghana, Statistical Service, National Development Planning Commission and Controller and Accountant-General among others. The study was conducted in the Ministry of Finance, considering loans from both internal and external sources.

1.8 Limitations

The challenge faced in conducting this study was that the study did not cover other sectors to reflect the entire response rate to public debt issues and the effect they have on the economic growth of Ghana.

1.9 Organization of the study

The study comprises of five inter-related chapters which are built upon each other.

The first chapter introduces the study; the chapter presents the background information on the research topic, problem statement, objectives of the study, and questions, significance of the study, scope, and limitations of the study and the organization of the study.

In Chapter two, relevant existing literature relating the research topic is reviewed.

Chapter Three presents the Methodology adopted for the study. This chapter comprises of Empirical model specification, Data type, and source, Estimation Technique, Stationarity test, and Autoregressive Distributed Lag (Bound Test) Approach to Cointegration.

In The Chapter Four, data obtained from secondary sources is analysed.

Chapter Five presents the summary, conclusions, and recommendation.



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Chapter two of this chapter provides discussion of relevant definitions, concepts and theories that examine how economic growth is influenced by public debt. The first section defined the concepts of public debt and economic growth and further looked at a number of empirical works done on the influence public debt has on economic growth. Theoretically, the study reviewed various theories on how economic growth is affected by public debt as well as public debt on public investment and savings. It also provided theoretical background of the effects of other relevant factors on the growth of the economy.

2.1 Definition of Concepts

2.1.1 Public Debt

Debt has been defined by Likita (1999) as an obligatory contractual owing or borrowing where repayment at a future date has been promised. To ensure development and sustainable production in every economy, capital is required. There is relative scarcity of capital although it is essential for production in economies of most developing countries, including Ghana. Hence, most developing countries including Ghana have to resort to borrowing as a means of raising adequate capital for national development. Hence, borrowing from foreign countries is a means of supplementing domestic saving in most developing countries. Although Ghana has a long history of foreign borrowing, yet borrowing with the inability to generate enough savings results in several challenges that bedevil growth, redistribution and sustainability (Serrão, 2016).

Public finance, including government borrowing or the public debt, has been defined as a fiscal science which involves fiscal policies and fiscal problems (Senibi, Oduntan, Uzoma, Senibi, &

Oluwaseun, 2016). This, among other things, requires government financial business and plans to be organized and implemented in a scientific, cost-effective and disciplinary manner towards the achievement of stated policy objectives and outputs. The public debt or government borrowing forms an integral part of public finance by which all governments, in addition to revenue generated from their respective tax regimes, raise money on behalf of their citizens to finance programs and activities approved by the legislature towards economic growth (Sen, Kasibhatla & Stewart, 2017). Despite increasing levels of government spending worldwide, issues of public finance, including government borrowing towards economic growth, have not attracted adequate academic research and studies. Priestley & Bax (2009) noted the lack of academic research into public financial administration in the introductory section of their joint publication headed Ghana's Audit Department 1910-1978. The authors, in this regard, pointed out that despite phenomenal increase in government spending from the mid-twentieth century, the growing demands of the public for socio-economic growth in the face of limited monetary resources of governments, "development specialists have not paid more attention to the study of public financial administration and to its many different aspects as a working mechanism". Priestley & Bax (2009) wondered whether the bureaucratic institutions of government in both developing and developed nations have acquired the capability to manage the modern public financial business.

Also, due to the recent crisis, particularly in Euro Zone countries, there has been an immense revival in how the economy is affected by public debt both academically and politically with research efforts now focusing on non-linearity in the correlation that exists between growth and debt (Baum, Westphalia, & Philipp, 2012). Debt that is acquired to help in the acquisition or

investment in infrastructure or assets such as building of factories can be described as being 'reproductive'. Domestic debt refers to government borrowing within its boundaries; this often consists of treasury bills and bonds. On the other hand, foreign debts involve borrowing from external nations or financial institutions. Hence, when a country is not able to fully pay for funds or money borrowed from external sources for national growth and development, the unpaid part of the money is referred to as the external debt (Senibi, *et al.*, 2016).

2.1.2 Economic growth

According to Economic theory, there is an increased tendency towards the growth in the economies of developing countries when there are reasonable levels of borrowing. The enhancement of economic growth, with a growth rate of at least more than 5%, is likely to reduce poverty levels in most developing countries (Tajudeen, 2012). According to Peterson (1988), economic growth occurs when a country expands its production capabilities to meet the needs and wants of its citizens. Similarly, economic growth has been described by Todaro and Smith (2003) as the gradual process of increasing the productive capacity of a nation or country's economy over time, which results in higher levels of national output and income. Economic growth can also be defined as an increase in the per-capita or national income and products (Gillis *et al.*, 1987). In this scenario, income-per-capita is obtained by dividing the gross national product (the value of the annual production of all goods and services by a country's economy) by the total population.

According to Gale and Samwick (2016), the definition of economic growth is broader than the above definitions which describe it just in terms of the level of a nation's output and income.

Thus from their point of view, the definition of economic growth should additionally include the main structural changes such as how social and institutional conditions have been particularly modified to achieve the rise in output or income (Gale & Samwick, 2016). Thus in the influential work by Gale and Samwick (2016), economic growth has been described as long-term increase in the capability of a nation to provide increasingly varied economic goods to its people or citizens, where by the growth as the capability or capacity to do so stems from its ability to successfully utilize modern advancing technology, as well as the institutional and ideological adjustments required. Essentially, economic growth for any nation as specified by Bowden (1992), hinges on the organization and development of a better labour force (better utilization of labour, education, attitudes, skills etc.) and getting more and better capital (building more power plants, factories, and producing or importing more machines and equipment). Traditionally, there are three main components of economic growth. These components include capital accumulation, growth in the labour force and improved technology. Capital accumulation is raising the stock of capital in an economy while growth in labor force generally occurs as the level of the population in the economy increases. The enhanced application of novel scientific knowledge, with regard to innovations and inventions, relating to both human and physical capital can be regarded as improvement in technology.

In literature, the terms economic growth and economic development are closely related as well as similar and most scholars often use these two terms interchangeably (Reinhart and Rogoff, 2012). While economic growth in simple terms refers to an increase in output, economic development has a greater depth. Economic development is made up of multiple dimensions and processes; these include primary modifications of national institutions,

popular attitudes and social structures; increased rate of growth of the economy; poverty alleviation and elimination; and declining rates of inequality (Todaro, 1992). Therefore economic growth can be seen as a subset of economic development.

2.2 Determinants of Economic growth

Although the body of literature on economic growth is immense, no consensus has been reached when it comes to exact link between policy settings and growth of the economy (Padoan, Sila and van-den-Noord, 2012). In the neo-classical traditional growth model, economic growth is not impacted much by policies in the long term. This is because in this model, economic growth leads to population growth and technological advancement. When such considerations are made, the growth rate of richer countries is slower than that of poorer countries like Ghana adjusted for demographic differences and vice versa. However, according to Herndon, Ash and Pollin (2013), in most cases growth rates across countries varies over long periods of time. Economic policy usually accounts for the variation.

2.2.1 Exports

A major section of economic theory has been dedicated for the analysing the interrelationship that exists between exports and the growth of an economy. According to Easterly and Rebelo (2008), a major contributing factor of the growth of an economy in any country is exports. There exists a positive link between exports and the growth of an economy, where rise in the levels of exports results in a similar rise in economic growth (Easterly and Rebelo, 2008). It is noteworthy to state that the relationship between these two factors is not that simple and that there is the existence of indirect factors that affect this causal relationship. According to Ricardo (2014), a

greater level of national wealth is achieved by trade because trade aids in the facilitation of output of products and also offers a country comparative advantage over its competitors. The causal correlation that exists between exports and growth of an economy has been brought into refutation recently in literature. However, foremost of the current literature available, the main objective was on the processes used in the achievement of economic growth in relative to trade expansion. Expansions in exports have been found to significantly lead to economic growth, as well as leading to a rise in the gross fixed capital formation (Dritsakis, 2003). According to Atique and Malik (2012), the expectation is that marginal productivities factors in the export sectors will be at a higher level than the other sectors if there is the provision of incentives investments technology advancement and growth.

An open economy index refers to the ratio of exports to gross domestic product; hence a higher ratio usually exists in economies that are comparatively more open. Lower ratios of exports to gross domestic product economies are more closed and have more stringent trade policies (Baum, Checherita-Westphal and Rother, 2012).

2.2.2 Investment, saving rate, and foreign direct investment

A study conducted by Tyler (2008) across 55 developing countries revealed that the major contributing factors of economic growth are exports and investments. The cumulative capital per worker is dependent on investment and savings rate, and thus a rise in investment and saving rate results in a corresponding rise in cumulative capital per worker (Solow, 2011). According to the new growth theories economic growth is reliant on the priority placed investments, human and physical capital. Long-term economic growth is dependent on the growth rate and the efficiency

investments which are also dependent on the policies governing growth and investments (Baum *et al.*, 2012).

Theoretically, the effect of gross capital formation on economic growth can occur by either a direct increment in the physical capital stock in domestic or indirectly by the promotion of technological advancement Levine and Renelt (1992). Both public and private investments play diverse roles in the promotion of economic growth. When private investments are complemented by public investments, it results in augmentation of domestic economic growth rate due to increment in the marginal product of the private capital. According to Khan and Kumar (2007), the productivity obtained from private investments is more than that of public investments, and the impact of private investments on economic growth differ significantly from that public investments. During the period of 1982-2010, the positive effect of public investment in infrastructure on economic growth was further confirmed by studies carried out by Knight, Loyaza, and Villanueva (2013) and Nelson and Singh (1994). This positive correlation that exists between public investment and economic growth was further confirmed by Easterly and Rebelo (1993), during a study performed to examine public investments in transportation and communications. However, the study revealed a negative correlation between investments made in businesses owned by the state and the growth of the economy (Easterly & Rebelo, 1993).

The influence made on the growth of the economy by foreign direct investment (FDI) is not direct. There exists indirect relationship and is dependent on the host economy's advancement in technology, the stability of the economy of the host economy, the investment policy of the host country and how open the country is. FDI inflows a source of formation of capital and financing

and hence it is one of the factors affecting the growth of an economy. The increase in the productivity of a host country and hence its competitive advantage may occur due to inward FDI. FDI may affect both economic growth and exports when productivity growth is export biased. A nation's institutional characteristics such as its property rights enforcement and legal system may influence the extent of FDI inflows and capital formation simultaneously.

In a study conducted by Blomstoern, Lipsey, Zejan (2004) to examine the time period from 1990-2000, it was revealed that in developing countries, there exists unidirectional causal correlation between FDI inflows as a percentage of GDP and the growth of per capita GDP. In Easterly and Rebelo (1993) study conducted in 10 African countries (including Ghana, Nigeria, Ivory Coast and South Africa) to examine the fundamental correlation that exists between foreign direct investment and the growth of the economy using Granger causality, the results revealed that there is a unidirectional causality relationship between foreign direct investment and economic growth with direction from FDI to GDP. The study also revealed a unidirectional causality between exports and economic growth (Easterly & Rebelo, 1993). According to Borensztein, De Gregorio and Lee (1998), it is only in the presence of a sufficient absorptive capability that FDI has the capability to serve as an essential tool for the advancement of economic growth. In order for the FDI to promote economic growth, a minimum threshold of human capital has to be achieved. According to a study conducted for the period of 1982-1996 in European Union countries by Moudatsou (2003), it was seen that the growth of the economy is directly and indirectly affected positively by the inflows of FDI.

2.3 Public debts and economic growth

There exist a negative relation between public debt and the growth of an economy according to theoretical literature. According to Checherita and Rother (2010), especially in a neoclassical environment, the augmentation of growth models with issuing of debt to finance consumption by public agents or capital goods indicates that the correlation that exists between the growth of the economy and public debt is negative.

The U.S. financial crisis that surfaced in 2007, shook the banking sector and resulting in the bankruptcy of many banks including Lehman Brothers. This led to fiscal imbalances in many European countries, beginning in Greece, which resulted in sovereign debt crisis. The countries that were most affected were Greece, Spain, Portugal, Ireland and Italy. The 2010 controversy that arose from results of the study by Reinhart and Rogoff (2010) on government debt and its effects on economic growth compounded this bleak economic performance.

According to Mankiw (2013) Economic theory, for developing countries, reasonable levels of borrowing may aid in the acceleration of infrastructural development and this may ultimately lead to enhanced growth of the economy. Although Malaysia can be regarded as a country that is developing over the past decades, this country has had a budget deficit. In order to enhance economic growth, the Malaysian government may borrow from both domestic and external markets to finance domestic investment and government expenditure. It worth noting, that if borrowing is not carried out at a reasonable level, it may result in additional debt which may harm the growth of the Malaysian economy negatively. A government debt burden which is a component of public debt is created when past borrowings from both international and domestic

sources become accumulated. Inability of government holding securities to finance previous budget deficits results in public debt (Rahman, 2012).

According to Martin (2009), household's compliance to the substitution of goods that are being taxed by inflation is the main determinant of the level of debt. From Wigger's (2009) point of view, Ponzi schemes for issuing debt may be beneficial to generations; however this is dependent on their preferences and on technology. This beneficial effect is not dependent on the welfare in an economy, although in effect an economy with a lower debt may have better welfare than that with a higher debt (Wigger, 2009). In 2012 Greiner concluded that; a smaller long-run growth rate is expected in any economy with a high public debt ratio Greiner (2012). In contrast, in 2013 a different conclusion was reached when an assumption of wage rigidity was made; the results revealed that long-run economic growth and employment are not affected by public debt but instead, public debt affects economic stability (Greiner, 2013).

Countries might differently display public debt levels as a result of specific institutional characteristics (when characteristics point towards different levels of fiscal uncertainty created by an increased public debt level), when it is assumed that countries have similar levels of institutional quality. Generally at similar debt levels, three main overlapping sources of fiscal uncertainty are seen to determine how public debt influences long-run growth, and these three overlapping sources may account for heterogeneity across different countries. Lack of Fiscal Flexibility is one of sources of fiscal uncertainty. Fiscal flexibility may be directly influenced by a welfare state regime that has a specific spending focus, and subsequently may serve as a basis for heterogeneity in the debt-growth correlation. When two countries possess similar public debt

levels, countries with high state activity such as high government expenditure on unproductive economic activities such as subsidies, pensions or unemployment benefits, have a higher probability of having higher risk premia by investors. In such countries, the achievement of successful fiscal consolidation is much difficult because they are more likely to have stronger opposition against such consolidation efforts; also there is greater implicit future liabilities particularly population ageing is considered (Meier & Werding, 2010; Tagkalakis, 2009). Hence generally, countries that possess high state activity with subsidies and transfers as their main spending focus have lower fiscal flexibility. This results in higher fiscal uncertainty which negatively affects the investment climate and leads to a deterioration in the long-run economic growth.

In developing countries like Ghana where public debts have reached alarming high levels recently, governments remain in a state of dilemma with regards to whether to borrow more so as to foster economic growth or if unreasonable borrowing may pose a burden of responsibility on future generations. This is because economic development is negatively affected by high debt (Reinhart & Rogoff; 2010). In Malaysia the development of an expansionary fiscal policy has triggered growth in the economy due to increased consumption; this has resulted in fiscal deficits financed by increasing debts for the duration of the past decades.

Empirical evidence from the study conducted by Schclarek (2004) in both developing and developed countries to examine both linear and non-linear correlation between growth and government spending revealed that; in developed countries there is no relationship between these two variables. In another empirical study conducted by Reinhart and Rogoff (2010), it was

revealed that there is a weak correlation existing between growth and low levels of debt. This study was carried out to examine how possible it is for there to be a continuous correlation between the growth of the economy, high debt levels of central government and inflation.

In a study carried out by Gnegne and Jawadi (2013) to look at the dynamics of public debt in the UK and the USA, the study findings revealed that several threshold effects may affect public debt. Hence, structural breaks in public debt dynamics may be affected by factors such as debt, financial crisis, economic slowdowns, and even oil shocks. In a study designed to study the heterogeneity causalities of public debt on the growth of the economy using a structural threshold regression methodology, it was established that there exists an inverse link between degree of democracy and threshold effects (Kourtellos *et al.*, 2013).

In an interactive session carried out in Ghana, Bawumia (2014) stated that due to increasing domestic debt the nation's total debt still remains high. Government bonds which have maturity ranging from 3-20 years account for majority of Ghana's internal debt (Bawumia, 2014). The current government of Ghana is on a mission to make this nation one of the largest 20 economies in Africa, however domestic debt growth rate still remains high. Thus there is an urgent desire to investigate how public debt affects the growth of the economy in Ghana. The debate on which type of debt (foreign or domestic) affects economic growth or both debts affect economic still remains, no consensus has been reached by scholars and researchers (Senibi, *et al.*, 2016). Audu and Abula (2001) opine that economic growth is only influenced by domestic debt and not foreign debt. This is why it is essential that more research is conducted on this subject matter, both globally and in Ghana to aid in proper

policy formulation.

The debt burden in Ghana was significantly reduced when HIPC was declared, due to the debt relief and the associated monetary and fiscal policy stance. Despite all the advantages that came with the declaration of HIPC, as at 2016 the nation's debts had still not been serviced sustainably. The 2008 annual report by the Statistical Service of Ghana revealed a total public debt of GH¢9.5 billion (33% of GDP), this dramatically increased to GH¢49.9 billion (57.7% of GDP) over the next five years (Bawumia, 2014).

This increased debt stock represents GH¢40.4 billion or its equivalent of \$20 billion when using the 2009-2013 average exchange rate. This data reveals that over the period of five years, debt stock has increased by 426% (hence on the average, stock of debt by 85% annually) which is alarming.

Interests paid on debts pose a major financial burden on the debt of Ghana due to the increased debt. Ghana's interest payments on domestic and external debts declined from 2000 to 2008 from 7.5% of GDP to 2.3 % of GDP respectively. However between 2013 and 2014, there was an increment in interest payment from 5.1% of GDP to 6.5% of GDP respectively. As suggested by Economic theory, developing countries are expected to experience enhanced growth of their economy when borrowing is done at reasonable levels (Pereira and Xu, 2000). The enhancement of the economic growth by least more than 5% growth rate, is likely to help in poverty alleviation in any nation's economy (Amakom, 2003). According to Alagidede, Baah and Nketia (2013), developing countries like Ghana that want to achieve economic growth carry out borrowing to aid in the augmentation of

small stocks of capital they usually have, therefore such countries are more prone to having opportunities of investment which yields higher returns in comparison to the economies of developed countries. The proper utilization of funds for productive investment, absence or reduction in macroeconomic instability, lack policies that distort economic incentives and the absence of significant adverse shocks are the determinants of how effectively the borrowed and domestic funds will be properly utilized. Hence, there is likelihood of increased and hence timely debt repayments. According to Amassoma (2011), maintaining this cycle for a time period, growth may have a positive affecting per capita income which may eventually result in poverty reduction. Even when with more realistic assumptions that inability of countries to freely borrow because of the probability of debt denial are made, the above predictions still hold.

The implication that enormous levels of debts reduce growth by partially causing a reduction in investment affects poverty negatively still holds, in the debt overhang models although such models do not explicitly analyse the effects debt has on growth. However, the expected benefits associated with policy reforms that lead increased growth and efficiency (which includes fiscal adjustment and trade liberalization) usually reduce as a result of the incentive effects associated with debt stocks. In the presence of this, most governments are unwilling to accumulate current debts if the perception is that foreign lenders are more likely to benefit higher output. According to Fosu (2007) investments are crowded out when there is excessive government borrowing and this leads to reduction in future wages and output leading to vulnerability in the welfare of the citizens. The two main factors leading to borrowing in most countries according to Omotoye, Sharma, Ngassam and Eseonu (2006) are macroeconomic reasons and finance transitory balance

of payments deficits. The macroeconomic motives include; greater investment, greater health and education related consumption. The finance transitory balance of payments deficits are aimed at reduction in nominal interest rates overseas, lack of domestic long-term credit, or prevention of hard budget constraints. Hence, the implication is that poverty reduction and the boosting of economic growth are the main reasons why economies indulge in debt (Fosu, 2007). Fosu (2007), also stated that countries find it difficult to service an initial stock of debt once it reaches a threshold; such countries find themselves in the wrong side of the debt-laffer curve. This leads to the crowding out of growth and investment by the debt (Omotoye, *et al.*, 2006). Currently Ghana is in that position; there is sporadic movement of investment in both positive and negative directions, thus stalling growth and poverty reduction.

A critical predictor of future economic growth is public debts. Hence, the increase in the empirical research aimed at investigating the relationship that exists between the public debts variables and the growth of the economy in recent decades. In contrast to the classical and neoclassical frameworks, many current empirical studies (Barro, 2015; Abu-Bader and Abu-Qarn, 2014) have rejected the claim that government spending and tax policies only affect economic growth temporarily. Examples of such studies have been by Barro (2015) using cross-sectional data, Amin (2008) using data sets from Cameroon, M'Amanja, and Morrissey (2005) using data from Kenya and Adefeso, Hakeem and Salawu (2010) from Nigeria. Recent empirical works affirm that the Keynesian and endogenous growth arguments show that in both the short and long time interval, the level and nature of both government taxes and expenditure significantly affects economic growth. However, these studies have shown both varying and contradictory results mainly due to the countries and periods analyzed. The similarity shared by

most of the recent studies is that almost all are based on similar objectives and lines of study. That is to say, they pursue testing causal relationships between the public debts variables and the growth of the economy to aid in the evaluation of extent and direction of the impact.

Hseih and Lai (2004) found that government spending contributes a small proportion to the growth of an economy. Relying on Alagidede *et al.* (2013) endogenous growth model, the authors carried out a research, with data obtained from the G-7 countries (United States of America, Canada, Japan, United Kingdom, Germany, France and Italy), to determine the relation that exists between economic growth and spending by government. An analysis of the level of responsiveness and the causal pattern of the relationship was done with the aid of vector autoregressive and other multivariate time series analysis. Their findings suggested that the link existing between the growths of an economy and spending by government varies significantly across time and across countries while the responsiveness of economic growth to government spending does not exhibit any consistent pattern across countries as well as across time.

Also in Indonesia, Ramayandi (2003) used a sample of time series data over thirty year's period to consider the impact of government size (in terms of the spending) on economic growth. The author applied the cointegration and error correction methods in analysing how government spending influences the growth of the economy in Indonesia. In an endogenous growth model, Ramayandi classified the expenditure items into productive and unproductive expenditures. The outcome of his study suggested that the share of government's unproductive expenditure affects economic growth negatively. Contrary to economic theory, the results of Ramayandi's regressions also uncovered that the share of productive government expenditure in Indonesia has

been negatively connected to economic growth. This, the author declared that it was because the Indonesian government budget was not efficiently managed during the period under study.

Abu-Bader and Abu-Qarn (2003) examined the causal relationship that exists between government expenditure and the growth of the economy with evidence from Egypt, Israel, and Syria. They employed the multivariate cointegration and variance decomposition approach to analyzing the correlation that exists between the expenditures made by government, military spending and the growth of the economies for Egypt, Israel and Syria for the period 1975-1998, 1967-1998 and 1973-1998 respectively for each of the countries. The authors observed a bi-directional and a long-run negative relationship between government spending and the growth of the economies when variables were tested within a bivariate system. In addition, the causality test within a trivariate system (where government spending was broken down into a share of government civilian expenditures in GDP and military expenditure) showed that the military expenditure harmfully affects the growth of the economies of all the three countries analyzed. Also, they found that the expenditures made by civilian governments affected the economic growth of Israel and Egypt positively. In general, studies on public debts suggest that its influence on the growth of an economy is negative.

2.3.1 The context of Ghana

With respect to developing countries, the IMF and the World Bank, have drawn attention to the reasons behind the introduction of HIPC and noted that in spite of the importance of this initiative, “policymakers and economist worldwide still only have a limited understanding of fundamental questions on the matter (Baksay, Karvalits, & Kuti, 2012). The questions identified

by the IMF and World Bank relate, among other things to the level at which debt weakens economic growth, determination of the quantitative effect of debt on economic growth should be expected from strategies aimed at reducing debt under the HIPC initiative (Alagidede, Baah & Nketia, 2013).

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Whereas international standards have been established and accepted by governments for the preparation and submission of financial statements (International Public Sector Accounting Standards/International Financial Reporting Standards) and also for auditing (International Standards on Auditing/ International Standards of Supreme Audit Institutions), no standards have been developed for the budgetary process for governments to adopt. Borrowings by governments to provide financing gaps between expected tax revenue and projected expenditure are therefore left to the discretion of governments because of sovereignty issues. In the absence of internationally recognized standards on budget formulation, to be adhered to by governments, there is the need for a delicate balance to be established between the sources and limits of tax revenue available to government to finance current activities, including loans due for repayment on one hand, against borrowings, on the other hand, considered necessary for the implementation of government programs and activities. This poses a big challenge to most governments of the developing world in particular in their desire to fulfil electoral promises and also to meet targets set under global initiatives such as the Millennium Development Goals.



Siddiqui and Malik (2001) iterated that even though traditionally the major sources of government revenue are derived from taxation and borrowings, some developing nations have been receiving substantial financial support, in the form of aid, grants and trust money from

foreign governments and other sources, to add to the traditional sources of revenue and still fall into unsustainable debt. According to Tasos (2014), some of the governments of developed and developing nations are unable to raise sufficient revenues from tax to carry out their development programs because citizens in both rich and poor countries are generally reluctant to pay for tax increases to cover government spending. A number of governments, therefore, resort to borrowings because their settlements including interest are not directly paid by individuals and therefore receive less resistance from the citizens.

In Ghana, Public debts involve all kinds of obligations by the government which includes currency obligations (Bawumia, 2014). Some of these obligations the author mentioned included short term-debt like the Treasury Bills, Treasury Deposit Receipts and borrowing from the large corporates such as financial institutions. Another category of obligation consists of permanent or funded debt and has a maturity period of more than one year. For instance, Bhatia (1994) concluded that the above-mentioned obligations may be due for settlement to foreign governments, institutions, firms, and individuals. Thus, Debt unsustainability is not peculiar to developing nations like Ghana but covers also the economies of developed nations like Greece and Italy.

Throughout the economic history of Ghana, increasing and higher public debt has always been one of the main economic challenges the economy has faced. More importantly, during these periods of higher public debt, the country has often recorded higher levels of inflation as well as a fast depreciating exchange rate. For instance, in the 1990's, the public debt had increased from 31.979% to a huge 123.346% as at the end of 2000 (IMF World economic outlook, 2014). Over

this same period, annual inflation had increased from 10.1% in 1992 to 25.2% in 2000. The year on year inflation had reached a huge 40.5% at the end of 2000. The decade also recorded a continuous depreciation of the cedi, with the cedi depreciating in nominal terms by 57% against the US dollar in 2000 (Asiama, Akosah & Owusu-Afriyie, 2014). For example, the debt at the end of 2009 of the Greek government shot up from 269.3 billion Euros representing 113% of its gross domestic product to 299.7 billion Euros representing 139% of its gross domestic product (The Economist, 2010). As a result rating, the Greek economy was downgraded to junk status by agencies. According to the World Bank and IMF a national debt can be described as being sustainable when the nation has the ability to fully fulfil its external debt service obligations currently and in future, without the compromise of growth, accumulation of arrears or resorting to debts scheduling (Teles and Mussolini, 2014). This is where Ghana appears to find itself and the basis for this investigation.

Current indications are that Ghana's debt of 67.5 per cent of GDP as at December 2014 is above the average of 61.96 from 1990 to 2014 and almost near the HIPC threshold of 70 percent (Daily Graphic, 2015). Ghana has approached the IMF for a bailout as HIPC can be accessed only once. This has generated public debates with calls among other things on the government to limit its spending and to establish ceilings for government borrowing. (Daily Graphic, 2015). Furthermore, the Government has issued the 4th Eurobond of US\$1.5 billion repayable in 15 years out of which \$1.0 billion has been earmarked for matured debt and \$0.5 billion for capital or development expenditure for 2015. This is an indication of difficulties of government to generate sufficient revenue from its investment in economic activities to pay for its debt.

2.4 Debt overhang and economic growth

Although many terms are defined with respect to research underlining debt and economic growth relationship, debt overhang is the most commonly defined term used by many (Cherif and Hasanov, 2012). Debt overhang has been referred by many scholars and researchers as the debt overhang paradox. Myers first discussed this theory in 1977. Companies' decision of borrowing formed the basis for the formulation of this concept. The debt overhang hypothesis proposes that in the presence of high levels of debt, there is no incentive by government to develop macroeconomic reforms or policies (Clements *et al.*, 2003). According to Clements *et al.* (2003), this is due to the fact that the returns obtained by the introduction of macroeconomic policies will solely be utilised in the payment of outstanding debts. Also, this might result in negative economic growth because there might be a reduction in the motivation for investments by the private sector. Debt overhang can be defined as when a nation's expected ability to repay debt lies below the contractual value of the debt (Krugman, 1988).

Hence, when the stock of a nation's external debt surpasses its ability to repay with some future probability then there is the occurrence of debt overhang. A nation's output level determines the expected debt service. According to Krugman (1988) and Sachs (1989), the inability of a country to service a very heavy debt burden leads to majority of its output accruing to foreign lenders this serves as a deterrent to invest and debt overhang occurs. Hence, countries with large debts have difficulty in obtaining new borrowings to fund new investments and service debts that already exist. Previous literature has established conclusive evidence on debt overhang and the negative impact of debt on economic growth (Atique & Malik, 2012; Sen *et al.*, 2007).

According to Clements et al. (2005) and Fonchamayo (2009), debt service can be regarded as an implicit tax; this usually leads to slow economic growth and decreased investment with the resultant frustration of efforts aimed at poverty alleviation by highly indebted countries. According to Alagidede, *et al.* (2013), the presence of the possibility of a larger external debt in comparison to the country's ability to repay the debt in the future, serves as a source of discouragement to both foreign and domestic investment and this hampers economic growth. It has been postulated that the occurrence of debt overhang is at the peak of the debt Laffer curve. There is a drop in private investment when high debt service burden results in an increment in expected future taxes. In such situations, the serving of debts exhausts almost all the resources that might have been used to fund investments. Deterioration of economic outlook by altering investment quality may occur in the presence of debt overhang. Economic growth is enhanced when debt relief leads to the release of resources from debt service to investments in infrastructure and institutions. Private foreign investment and domestic investment are enhanced when such investments occur.

2.5 Theoretical review

The focal point of most theoretical justifications for the possible negative growth effects of public debt is on fiscal deficits. According to Greiner (2014), in the presence of high public debt levels, market participant expectations changes and results in a decline in national savings and investment, high levels of interest rates, and high risk premia. This ultimately serves as impediments to economic growth in the long-run (Greiner, 2014). These also result in a rise in uncertainty and reduction in fiscal flexibility for productive government spending which with bad consequences on growth (Teles and Mussolini, 2014).

This current study mainly adopts two main theories; the debt overhang theory and the financing gap theory. In both theories there exist a positive link between public sector expenditure and the growth of the economy. Thus, as public sector expenditure increases, growth of the economy also increases and vice versa. Freeman and Webber (2009) are in the support of these theories and their studies have revealed that public service expenditure especially in health and education results in economic returns in the long-term. For example, social welfare improvements directly occur when expenditure is made on education. Also, expenditure on education may result in the formulation of educational programs that are beneficial and are associated with enhanced labour productivity leading high growth of the economy. However, channelling expenditure into counter or unproductive sectors or activities such as pensions and subsidies, negatively affects economic growth (Teles & Cesar-Mussolini, 2014; Rahman, 2012).

2.5.1 The Debt Overhang Theory

In the area of economic growth, capital formation is an important determining factor of growth and development of economies. However, the incidence of lower capital formation is due to external borrowing, which is undated with the perceived negative relationship between investments and foreign debt. This negative relationship is termed as debt overhang, where the possibility of repaying outstanding loan facilities falls below the signed value (Krugman, 1988). The debt overhang theory suggests that high debt serves as a disincentive for the introduction of macroeconomic policies or reforms due to the fact that any returns must be used in the repayment of outstanding debt (Clements *et al.*, 2003). This also results in a decline in economic growth due to resultant reduction in private investment. In a clear and simple way, debt overhang slows down the growth of an economy, and this eventually causes the interests of private

investors to wane. This invariably leads to inability of indebted to service their debts and fund novel investments due to challenges associated with securing new borrowings (Cochrane, 2011). Thus in conclusion, debt negatively affects economic growth (Atique & Malik, 2012; Sen *et al.*, 2007).

Relating this theory (debt overhang) to the current study, it suggests that public debt will continue to rise because the government of Ghana is not able to grab investment opportunities due to already existing huge outstanding debts. This has a negative influence on economic growth because if the government should take up the investment opportunities, a large part of the gains will be acquired by the debt holders.

2.5.2 The Financing Gap Theory

The financing gap theory dates as far back as Domar's (1946) work "Capital Expansion, Rate of Growth, and Employment" which theorized that there was a proportional relationship between the total growth of gross domestic product, or for that matter, economic growth and investment spending. The financing gap theory appeared again but this time in Rostow work in 1960, "The Stages of Economic Growth" which also postulated that there is an existence of correlation between investment and economic growth. In light of these views, the financing gap theory comes about when there is no proportional relationship, or for that matter, consistency in investment requirements and funds available from domestic resources (Abdullahi, Bakar & Hassan, 2016). When this happens, external borrowing becomes the alternative solution to closing the gap (Abdullahi *et al.*, 2016), and this ultimately has undesirable effect on economic growth in the long-term. Papers modelling optimal public debt level such as the one by Gocer,

Akin and Alatas (2016) support this assertion by saying that the financing gap model has a negative influence on the growth of the economy. This means that debts will keep rising, and the greater the public debt, the higher the negative effects it has on economic growth due to increases in inflation and taxes. There are papers such as the one by Checherita-Westphal, Hallett and Rother (2014) support this assertion while papers such as Greiner's (2014) rejects this assertion and are of the view that there is an existence of a monotone and impacts negatively on the correlation that exists between growth debt. However in both assertions, they agree that the negative consequence of public debt in long-run on the growth of the economy is dependent on uncertainty and future fiscal policy expectations. Relating this theory to the current study suggests that if a country or government does not have sufficient domestic resources for investments, they (government) must address this gap or problem by borrowing from outside. This always results in the need to have funds to cover the repayment of the loan, including interest, and this has negative effects on economic growth. The theory seems to put forward that rising public debt affects economic growth.

2.6 Theories on the Effect of Public debt on Public Investment

The Keynesian model specifies that when debt levels are high, taxes increase which in turn negates positive impacts of public spending by decreasing investment, decreasing consumption, increasing unemployment and decreasing the growth rate of the economy. Even so, at reasonable levels, public debt may affect the growth rate of an economy positively (Kamudia, 2015).

Creation of debt for investments that are productive can be utilized by government to increase national income and also encourage the growth the economy. If public debt is directed otherwise, some challenges might arise as a result. For instance, an increase in government expenditure

stimulates economic activity domestically and brings about the crowding in of private investment (Biza, Kapingura, & Tsegaye, 2013). As the closed economy theory by crude of Keynesian claims, increases in higher national output is connected to government spending, which results in increases in employment (Makin, 2015). Nonetheless, government spending may crowd out the availability of investment funds. To fill the saving–investment gap, foreign investment or foreign aid is required as provided by the Keynesian framework (Kamudia, 2015).

The following channels amongst others initiate the effect that public debt has on the growth of the economy: private saving, public projects investment, real interest rates and the aggregate of factor productivity. As emphasized by (Kamudia, 2015), investment and domestic savings are channels through which public debt determines economic growth. Also, excessive public debt poses a threat to investment and savings made domestically through the effect of crowding out, and these results in the shrinking of the economy. The emergence of the arguments on these theoretical views came from the Ricardian equivalence theory which maintains that economic growth has no influence from public debt. The controversies stems from the view that when private saving is increased as a result of extra tax cut financed through large amount borrowed, the public saving drop will offset (Makin, 2015). Therefore, according to Baaziz (2015), economic growth is affected in a positive manner with minor public debt; nonetheless, at certain limits of public debt, it will negatively influence economic growth.

2.7. Theories on the other possible determinants of Economic Growth

2.7.1 Theoretical Relationship between inflation and Economic Growth

Economic theories come to diverse conclusions about how responsive inflation is to output growth. Theories are useful, in that they justify some observed phenomenon. Historically, earlier inflation growth theories were built on cyclical observation due to the absence of what is termed ‘persistent inflation’. (Kamudia, 2015). The Traditional Keynesian model consists of the Aggregate Demand (*AD*) and Aggregate Supply (*AS*) curves, which aptly illustrates the inflation – growth correction. The model suggests, in the short run, the (*AS*) curve is slopes upward rather than vertical, which is its critical feature. If the *AS* curve is vertical, changes on the demand side of the economy affect only prices. However, if it is upward sloping, changes in *AD* affect both prices and output, (Kamudia, 2015). This holds with the fact that many factors drive the inflation rate and the level of output in the short-run. These include changes in: expectations; labour force; prices of other factors of production, fiscal and/or monetary policy. In moving from the short-run to the hypothetical long-run, the above-mentioned factors, and its ‘shock’ on the ‘steady state’ of the economy are assumed to balance out. In this ‘steady state’ situation, ‘nothing is changing’, as the name suggests. The ‘dynamic adjustment’ of the short-run *AD* and *AS* curves yields an ‘adjustment path’ which exhibits an initial positive relationship between inflation and growth, however, turns negative towards the latter part of the adjustment path (Kamudia, 2015).

The linkage between economic growth and inflation by Quantity Theory of Money is by simply equating the total amount of money in existence to the total amount of spending in the economy. Friedman proposed that inflation was the product of an increase in the supply or velocity of money at a rate greater than the rate of growth in the economy (Makin, 2015). Friedman also

challenged the concept of the Phillips Curve. He argued based on the evidence of an economy in which the cost of everything doubles. The payment of goods and services was twice as, but they don't mind, because their wages are also twice as large. Individuals anticipate the rate of future inflation and incorporate its effects into their behavior. As such, employment and output is not affected. Economists call this concept the *neutrality of money*. Neutrality holds if the equilibrium values of real variables -including the level of GDP – are independent of the level of the money supply in the long-run. Superneutrality holds when real variables - including the rate of growth of GDP - are independent of the rate of growth in the money supply in the long-run. If inflation worked this way, then it would be harmless. In reality however, inflation does have real consequences for other macroeconomic variables. Through its impact on capital accumulation, investment and exports, inflation can adversely impact a country's growth rate (Makin, 2015). In summary, Monetarism suggests that in the long-run, prices are mainly affected by the growth rate in money, while having no real effect on growth. If the growth in the money supply is higher than the economic growth rate, inflation will result.

2.7.2 Relationship between international trade, exchange rate and economic growth

Although the interconnections that exist between trade and development are evident, the two binomial terms have been studied mostly separately. Thus there was an emergence of two different sequences of macroeconomics: international trade theory and economic development theory. The first theory assumed as a subject of studying the defining of the international specialization criteria, foreign trade benefit evaluation, explaining benefit distribution between the trade policy substantiation which enhances their maximization and the exchange partners. The second theory deals with the study of economic growth determinants and development,

materialized mainly in: equipment with outputs, physical capital and infrastructure investment, technological progress, education and training introduced in economic analysis by the generic term of human capital, etc.

Interference between these two sequences was recorded from the moment of their crystallization and they generated in time in what we now call “the new foreign trade and economic growth theories”. The correlation that exists between foreign trade-economic developments, although in an incomplete form, appears quite explicitly in the work of mercantilist predecessors, for which economic development meant increasing wealth, more accurate increasing the stock of precious metals that country had. According to this understanding, they think that outside the extraction, foreign trade is the only way to increase wealth, to the extent that exports are in surplus against imports. Going beyond the narrow mercantilist concept about wealth and expanding the analysis in the production domain, founders of the classical theory retains the idea of the binomial foreign trade economic development relation. In this aspect, Adam Smith offers a wide pleading about the contribution of international division of labour based on absolute cost differences in increasing the “wealth of nations”. In his turn, David Ricardo deepens the analysis. He sees the limited character of the resources and he generalizes the specialization criteria in his own version of “comparative costs”. International specialization based on comparative costs condition the participation in foreign trade to broaden the limits of economic growth of a country. “In a system with a perfect freedom of trade”, said Ricardo two centuries ago, the allocation of production factors after the principle of comparative advantage is able “to increase the overall weight of the products, to spread the general benefit and to bound through a common fabric of interests and

relations the universal society of nations from one end to the other one of the civilized world”
(Ricardo, 1959 cited in Makin, 2015).

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CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter aims at presenting suitable methodological framework for carrying out this study. It is the chapter in which the discussion of the methods and tools used in analysing the data obtained is made. Elaborated explanation of the empirical specification of the model utilised in obtaining the relationship that exists between economic growth and public debt in Ghana, definitions, measurements, and variables justification in the model, type and source of data, estimation technique and data analysis is made.

3.2 Research design

The study examines the correlation between public debt and the growth of the Ghanaian economy. The assumptions supporting the use of the quantitative method were adopted for this study. Basically, the positivist philosophy was adopted for this study. It assumes that objective knowledge which researchers pursue systematically is rooted on general causal laws. Also, the assumption that researchers take positions that are strictly unbiased and detached towards the phenomenon they are investigating and that ensures that the outcomes of the study are not influenced by personal biases of the researcher's forms philosophical bedrock of this study.

3.3 Empirical model specification

This study examined how public debts influence economic growth in Ghana. This study utilises models that are based on Pattillo, Ricci, and Poirson (2004) Growth and Debt models due to the existence of subcomponents working unitedly. The stationarity test is very vital as most time

series data are not stationary and if not checked, spurious results will be obtained after running regressions (Owusu-Nantwi and Kuwornu, 2011). The determinations of stationarity of variables are done using these two unit root tests and also indicate the degree of integration.

To investigate public debt and its effect on the growth of the economy in Ghana, the study augments a growth and debt specifications based on conditional convergence by adding some controlled variables, which includes the inflation, public debt, real effective exchange rate, trade openness and government consumption. Based on the debt overhang and financial gap theories reviewed in the precious chapter (theoretical review), the econometric model below is specified;

$$Y_t = \beta_0 + \beta_1 CPI_t + \beta_2 PDEBT_t + \beta_3 TRADE_t + \beta_4 GEX_t + \beta_5 REER_t + \varepsilon_t \quad (1)$$

Where Y_t = GROWTH and is measured by GDP growth rate, CPI represents consumer price index, PDEBT is public debt as a ratio of gross domestic product, TRADE is trade openness measured as the ratio of imports plus exports as a ratio of GDP, GEX is government consumption expenditure and REER represents the real effective exchange rate. t stands for time and the random disturbance term is represented by ε_t . The intercept parameter is represented by β_0 , and the slope coefficients $\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 measures the elasticities.

3.3.1 A priori expected signs

The a priori expected signs are denoted by the following; $\beta_1 < 0$ or > 0 , $\beta_2 > 0$ or < 0 , $\beta_3 > 0$ or < 0 and $\beta_4 > 0$ or < 0 , $\beta_5 > 0$ or < 0

3.4 Data type and sources

The research heavily utilizes secondary data. The World Development Indicators (WDI) online database is the main source from which all the variables were obtained. These datasets were proved to be consistent with each other because their consistency were cross-checked by the use of various sources (Sánchez-Juárez and García-Almada, 2016). A 38 sample period of yearly observations for all variable ranging from 1980-2017 were considered by this study. The study adopted STATA 13 as the main analytical software.

3.5 Estimation technique

In attempt to test for the for the relationship that exists between public debt and public investement, the following procedures were used:

- i. Pairwise correlations, it was used to clearly show the correlation between the two variables.
- ii. Time Series Graph, was used to show serial dependence of public debt on public investement.

In attempt to test the correlation that exists between the growth of the economy and public debt in Ghana in the short and long run, the process of testing used includes:

- i. Firstly, the time series properties of the data are tested with Augmented Dickey-Fuller (ADF) test. A unit root test was carried out to ascertain the stationarity of the variables.
- ii. Secondly, the Autoregressive Distributed Lag (ARDL) approach which can also be referred to as the bound testing approach to cointegration was used to test for long-run and short-run correlation between the variables.

- iii. Thirdly, in order to ensure the stability and goodness of fit of the model, there will be the examination of the stability and diagnostic tests of the ARDL model.
- iv. The cointegration testing was equally used.

3.6 Pairwise Correlation and Time Series Graph

Pairwise comparison can generally be explained as any process of matching entities in pairs to judge which of each entity is preferred, or has a greater amount of some quantitative property, or whether or not the two entities are identical. The method of pairwise comparison is used in the scientific study of preferences, attitudes, voting systems, social choice, public choice, requirements engineering and multi-agent AI systems. The introduction of the scientific approach to using pairwise comparisons for measurement was done by Thurstone in 1927, which he termed to as the law of comparative judgment. Thurstone linked this approach to psychophysical theory developed by Ernst Heinrich Weber and Gustav Fechner. Thurstone (1927) demonstrated that the method can be used to order items along a dimension such as preference or importance using an interval-type scale. In this study the pairwise correlation was used to assess the relationship between the public investment and public debt in Ghana. It was used to compare each pair means using difference between means.

Time Series Data/Graph is a line graph of recurrent dimensions taken over regular time intervals. Time is always presented on the horizontal axis. It is a series of data points indexed in time order. On time series graph, data points are drawn at regular intervals and the points joined, usually with straight lines. It helps to show trends or patterns. It is an econometric tool which aids in the extraction of meaningful statistics and other characteristics of a given data. The time

series data was used in this study to analyse the long term trend seasonal variations between changes in debt in Ghana and related effect on investment. It is used to show the yearly trend of variations between the public debt and public investment in Ghana from 1980-2017.

3.7 Stationarity test

The stationarity test aids in the distinction between stationary and non-stationary variables so as to ensure the results obtained are statistically reliable; hence it was the first step that was undertaken for the time series regression analysis. Spurious results or outcomes may be obtained when non-stationary data using OLS estimation is used to run a regression (Stock & Watson, 2001; Granger & Newbold, 1974). One method used in the resolution of the challenge of variables that are not stationary which reverses them back to stationary is by differencing them, this aids in the achievement of reliable parameter estimates; however doing this may invariably result in the data losing their long-run properties (Gujarati & Porter, 1999).

Diverse numbers of tests are employed in the testing of stationarity of macroeconomic time series data. Dickey–Fuller (1979) test is included in the tests as well as Phillips–Perron (1988). This study made use of the Augmented Dickey–Fuller (ADF) test in testing for existence of unit roots in the variables. This test is usually utilised by most researchers because it is simple to use and also has an advantage of being thorough. The Phillips–Perron (PP) was used in the examination for the robustness and how reliable the ADF unit root test is. The assumption that errors must have constant variance and be identically and independently distributed was employed during the ADF test. In the following equation, the null hypothesis which is $\beta = 0$ is tested against $\beta < 0$ which is alternative hypothesis.

$$\Delta X_t = \alpha + \delta t + \rho X_{t-1} + \sum_{i=1}^n \lambda_i \Delta X_{t-1} + \varepsilon_t \quad (2)$$

Where Δ symbolizes the first difference operator, X_t represents the variable in question, t denotes a time trend, ε_t stands for a random variable and n signifies the number of lags which are added to the model to make ε_t white noise. Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) are employed in the determination of the optimal lag length n . The rejection of null hypothesis that the variable x has a unit root can be carried out when ρ (ADF test statistic) is significantly negative and greater than the MacKinnon critical value. When the series is found to be non-stationary, we fail to reject the null hypothesis. However, the null hypothesis is rejected when the series is found to be stationary.

3.8 Autoregressive Distributed Lag (Bound Test) Approach to Co-integration

This study employed the cointegration and error correction analysis because it was deemed to be the most appropriate estimation technique that could aid in answering the main objective of this study which seeks to ascertain how public debt affects the economic growth of Ghana. In addition, the Autoregressive Distributed Lag (ARDL) is a technique which is also referred to as the bounds testing approach to cointegration (Pesaran et al., 2001; Pesaran & Shin, 1999; Pesaran & Pesaran, 1997), was utilised. When a comparison is made between the ARDL approach to cointegration and the Johansen cointegration approach, it is observed that the ARDL approach to cointegration offers more significant econometric advantages over the Johansen cointegration approach. Firstly when dealing with small sample sizes, a more significant statistical approach is achieved when the ARDL model is used in the determination of the cointegration relation. On the other hand, a larger sample is required for the utilisation of the Johansen co-integration

techniques so as to ensure validity. Therefore when conducting a study that makes use of a sample size, like this study, the ARDL approach is preferable because it gives a robust estimate and performs better than other co-integration techniques (Cochrane, 2011).

Also, the application of the ARDL approach can be done with the regressors $I(1)$ and/ or $I(0)$ while other techniques of co-integration involve all the regressors to be integrated of the same order. This according to Cherif and Hasanov (2012) implies that pre-testing problems associated with standard cointegration which requires variables to be already classified into $I(1)$ or $I(0)$ are avoided by the ARDL approach. For instance, the application of the ARDL approach is considered inappropriate if the available information about the unit roots test properties is inadequate. As described by Bahmani-Oskooee (2004), the starting point of any co-integration technique is the determination of the degree of integration variable by variable in the model but this is dependent largely on the type of unit roots tests being used since contradictory results could be arrived at from different unit roots tests. Perron (1991) explained that there is the possibility for a conclusion to be drawn that unit root tests are present in a series that is actually stationary around a one-time structural break when the conventional unit roots tests such as the Augmented Dickey-Fuller and Phillips-Perron tests are applied. To help in the resolution of the problems, the ARDL approach was adopted. Furthermore, problems of endogeneity that are linked with macroeconomic variables are also resolved by the ARDL approach. Cochrane (2011) argued in an empirical work conducted that the problems associated with endogeneity and serial correlation can be corrected by modelling the ARDL with suitable lags. The assumption that all variables are endogenous is a remarkable feature of this approach. It can be deduced that the estimation for both long-run and short-run are jointly done for parameters of the model.

Additionally when making large number of decisions, challenges are faced when the Johanson cointegration technique is used, but the additional utilisation of the ARDL approach caters for this challenge. The process includes deciding the inclusion of endogenous and exogenous variables, treatment of deterministic elements, the order of Vector Autoregressive (VAR) in addition, the ideal number of lags to be used. According to Pesaran and Shin (1999), the processes required for estimation in making these decisions and choices are very delicate. Resulting from this, there is the likelihood that when it comes to the ARDL approach, variables that are different have ideal number of lags that are also different. The Johansen model on the other hand does not permit this.

According to Pesaran and Pesaran (1997), the approach of the ARDL involves these two stages. The first stage involves the determination of the existence of long-run relationship that exists among the variables of interest through the computation of F-statistic. The second stage also involves the estimation of the coefficients of the long-run relationships and the determination of values. This is followed by estimating the elasticity of the variables in the short-run using the error correction representation of the ARDL model. To determine the adjustment speed, the ECM version of the ARDL will be employed. This research adopted the empirical work done by Pesaran *et al.* (2001) and Shahbaz and Lean (2011) in the estimation of the elasticities in both the long-run and short-run by following Error Correction Model (UECM) with no restricted intercepts and no trend on the postulation made by Pesaran *et al.* (2001) as:

$$\begin{aligned}
GROWTH_t = & \beta_0 + \beta_1 CPI_{t-i} + \beta_2 PDEBT_{t-i} + \beta_3 TRADE_{t-i} + \beta_4 GEX_{t-i} + \beta_5 REER_{t-i} \\
& + \sum_{i=1}^p \alpha_{1i} \Delta CPI_{t-i} + \sum_{i=1}^p \alpha_{2i} \Delta PDEBT_{t-i} + \sum_{i=1}^p \alpha_{3i} \Delta TRADE_{t-i} \\
& + \sum_{i=1}^p \alpha_{4i} \Delta GEX_{t-i} + \sum_{i=1}^p \alpha_{5i} \Delta REER_{t-i} + \sum_{i=1}^p \alpha_{6i} \Delta ECM_{t-i} \\
& + \nu_t
\end{aligned} \tag{3}$$

Where Δ represents the first difference operator, the lag order selected by Akaike's Information Criterion (AIC) is represented by ρ , the drift parameter is denoted by β_0 , the parameters in the long-run and short-run are respectively denoted by α_{ij} and β_{ij} , while ν_t represents the white noise error term which is assumed to be with zero mean and constant variance (i.e. $\nu_t \sim N(0, \delta^2)$). The steps involved in the estimation starts with estimating equation (2) with the bounds test by applying the OLS method which normally is the first in the process in the ARDL model. To test for the existence of long-run correlation among the variables, the F-test or Wald test was employed in equation (2) as follows: The null hypothesis which is there is no existence of long-run correlation among the variables in equation (1) is tested against the alternative hypothesis that there is existence of long-run correlation.

$$H_0: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0 \tag{1}$$

$$H_1: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0 \tag{2}$$

The F-statistic or Wald statistics was used to test this study to find out whether there exists cointegration among variables. The asymptotic distribution of this -statistic, however, non-standard regardless as to whether the regressors are $I(0)$ or $I(1)$. Two set of critical values for

testing co-integration were provided by Pesaran and Pesaran (1997). The first which is the lower critical bound assumes all variables to be $I(0)$. The upper critical bound on the other hand, assumes all variables to be $I(1)$, implying that there exists co-integration between all variables. In the decision rule, the null hypothesis is not accepted if F-statistics calculated is more than the upper critical bound. This implies that there exists co-integration among the variables. On the other hand, there is no existence of co-integration if the calculated F-statistics lies beneath the lower critical bound values. To add to this, inconclusive results are arrived at from the test when the calculated F-statistics lies inside the region of the lower and upper bounds. With regards to that, the determination of the order of integration of variables is done by conducting a unit root test first. Arriving on this decision depends on the upper critical value. If all variables are found to be $I(1)$, then the decision is done on the basis of the lower critical bound. If all variables on the other hand are found to be $I(0)$. Estimating the coefficients of the long-run correlations and making interpretations about their values by using the ARDL options on the condition that the long-run correlation between the variables yet to be estimated is spurious is the next step to take.



CHAPTER FOUR

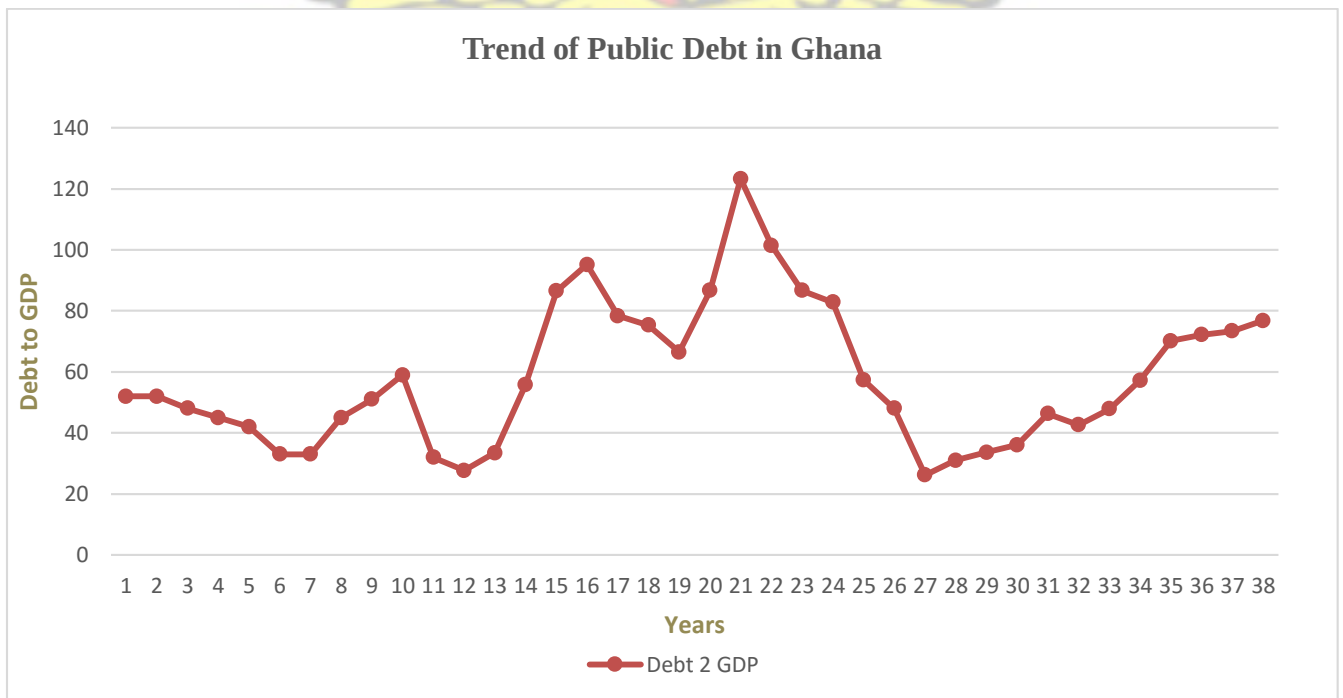
DATA ANALYSIS AND DISCUSSION OF RESULTS

4.0 Introduction

This key focus of this chapter is on the analysis of the study. The data used covers the period of 1980 to 2017 using variables of Consumer Price Index (CPI), Real effective Exchange rate, public debt, trade and Government expenditure in the country. This chapter is broken down into three sections. Section 4.1 would discuss the Trend of Ghana's Public Debt. Section 4.2 will touch on the correlation that exists between Public Investment and Public debt while the last section (Section 4.3) will be based on the impact of public debt on the economic growth of Ghana both in long run and in short run.

Section 4.1: Trend of Ghana's Public Debt (1980-2017)

Figure 4.1: Trend of Ghana's Public Debt (1980-2017)



Source: World Bank Debt Table, 2018

Ghana's public debt since the early 1980's has remained relatively high following the soaring prices of food items in the early 1980's. Ghana's industrialization policies were all geared towards the manufacturing sector of the country and led to the neglect of the Agriculture sector which was providing high amount of food and ensuring price stability (Osei, 1995). The agriculture sector which served as the backbone of the Ghanaian economy was neglected with its contribution dropping from 60 percent to 46 percent between 1957 and 1969. This affected the country's importation of goods with Ghana experiencing a trade deficit because industries were set up to make use of the raw materials. Osei (1995) observed that, Ghana continued to depend on importation of raw materials to feed the manufacturing sector leading to high debt stock in the country in the early years of the 1980s. Figure 4.1 above displays the trends in the public debt to GDP ratio in Ghana. The country experienced a public debt of 52% in 1980 as well as 1981. This debt stock was due to the high level of borrowing from the external sources to finance the manufacturing sector which was been set up in the country.

Between 1982 and 1986, Ghana's debt stock stood at an average of 40.2 percent of the Gross Domestic Product of the country. This was relatively high compared to other developing countries that had an average debt stock of 40 percent. According to Amankwah, Ofori-Abebrese & Kamasa (2018) although governments possess the desire to achieve their nations' developmental needs, they are unable to generate the required revenue to appropriate their expenditure and this has resulted in the deterioration of the fiscal balance of their nations or countries. In the latter part of the 1980's thus between 1987 and 1990, the public debt stock of Ghana remained relatively lower compared to the debt stock in the mid-1980s. According to Osei (1995) the World Bank's decision to make sure the country adopt the Structural Adjustment

Programme in the mid-1980's contributed significantly to the fall in the debt stock of the country. The country enjoyed the gains of the Structural Adjustment Programme between 1990 and 1993. The country's debt stock stood at relatively lower value compared to the previous years due to the gains the country was enjoying from the Structural Adjustment Programme. The debt to GDP ratio stood at a lower rate of 27.7 percent between 1990 and 1993. This was one of the lowest rates in the country since independence. Ghana experienced a rise in the debt to GDP ratio between 1995 and 2005. The government borrowed massively from external sources and internally due to the low revenue mobilization and high demand for public goods by the citizens of the country. Poghosyan (2018) suggested that one major cause of rising debt in developing countries is the asymmetry in the correlation that exists between financial and debt cycles. When overheating in credit and financial markets precede debt expansions, longer lasting effects becomes the outcome than other expansions, however no significant association exists between financial cycles and debt contractions. There is strong evidence of duration dependence in both phases of the cycle, with the likelihood of expansions and contractions to end increasing with the length of their respective spells (Poghosyan, 2018). Ghana's debt to GDP ratio stood at a relatively high value averaging at 55 percent of the country's Gross Domestic Product.

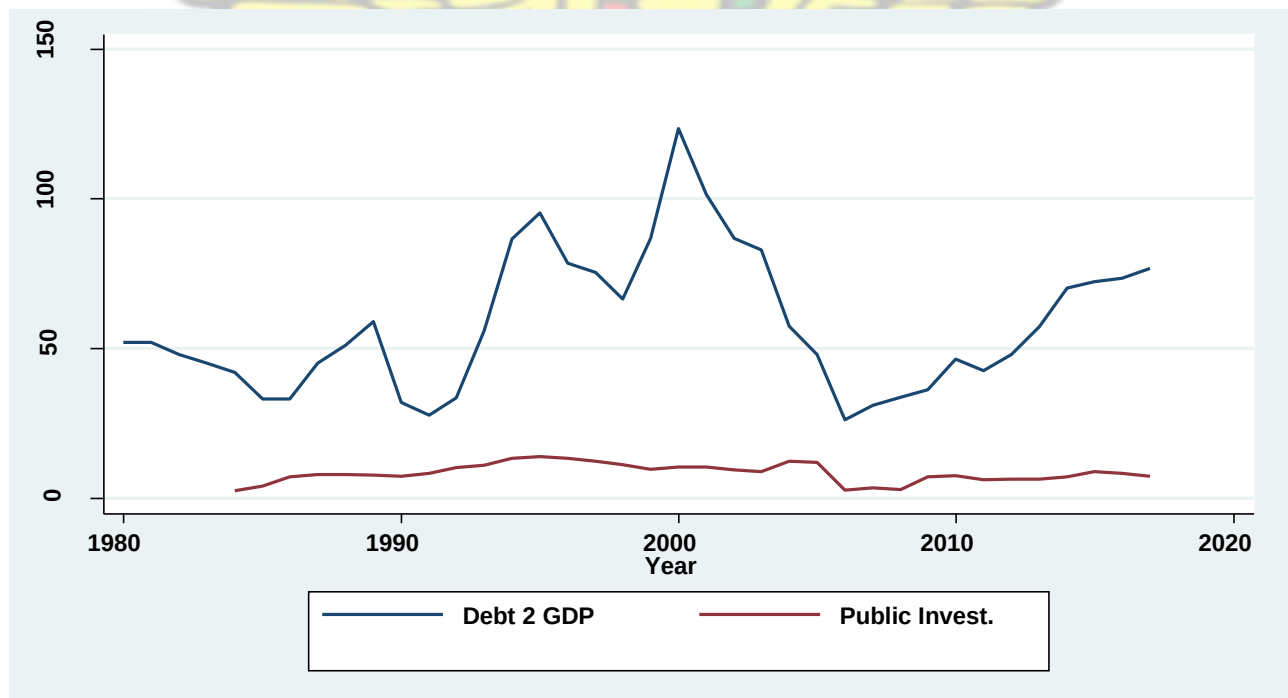
Between the periods 2006-2013, Ghana experienced a downward trend in the debt to GDP ratio with an average value of 30 percent of GDP. The major reason for the fall in Ghana's debt stock was due to the gains from the Ghana Poverty Reduction Strategy and the Growth and Poverty Reduction Strategy in 2009. These pro-poor policies reduced the burden of debt through increased cocoa production from the Agricultural sector. The country also discovered oil in

commercial quantities in 2007 which served as an economic bait to attract foreign investors compared to Government borrowings.

Between the years 2014 and 2017, debt to GDP ratio in Ghana has stayed on the average of 60 percent per annum. The soaring debt levels to GDP ratio in the country have been due to the increased in governments borrowing to finance infrastructure in the Ghanaian economy. The high levels of public debt for the country shows that the country have engaged in increased levels of borrowing leading to high interest payments and increased levels of deficit that continues to affect the country's balance of payment account.

Section 4.2: Relationship between Public debt and Public investment in Ghana

Figure 4.2 Relationship between Public debt and Public investment in Ghana



Source: Authors computation with Data from WDI, 2017

Figure 4.2 above shows the correlation that exists between public debt and the level of public investment in Ghana between 1980 and 2017. The debt to GDP shown in figure 4.2 illustrates an increased debt levels to GDP ratio in Ghana averaging about 35 percent between 1980 and 1990. According to Osei (1995), Ghana's debt stock remained high because of the increased demand for public goods and infrastructure by the increased population of the country. Within this same period, the public investment as percentage of GDP remained at average growth rate of 8 percent. The government invested massively in infrastructure within the country due to the growing population and increased level of government role in development.

Figure 4.2 shows that for close to decades between 1990 and 2010, the public debt in Ghana continued to increase while the public investment in Ghana also increased slightly. The major reason for the increased in the public debt of Ghana between 1990 and 2010 was due to the increased in government effort to eradicate extreme poverty following the introduction of the Millennium Development Goals (MDGs). Public investment in infrastructure also increased massively in Ghana. Even though the public debt between 2011 and 2017 has reduced drastically, it remains high relative to that of the public investment in Ghana. While the public debt stands at an average rate at 40 percent between 2011 and 2017, the public sector investment in Ghana remained below that at an average rate of 8 percent.

**Table 4.1 Pairwise Correlation between Public Debt and Public investment in Ghana
(1980-2017)**

Variable	Debt2GDP	Public Investment
Debt2GDP	1	
Public investment	0.6156*	1

Source: Authors computation using Data from the WDI, 2017

Table 4.1 shows the relationship between public debt and the public sector investment in Ghana. It can be observed from table 4.1 that, there is an existence of a positive correlation between the public debt level and that of public sector investment level in Ghana. One percent increase in the public sector investment leads to a 61.56 percent rise in the public debt of Ghana. This shows that most of the debt accrued in Ghana are because of the rises in the public investment.

Section 4.3: The effect of public debt on economic growth in Ghana (Long run)

Table 4.2: Summary statistics of variables for the study (1980-2017)

Variables	Obs.	Mean	Std. Dev.	Min.	Maximum
RGDP	38	4.600667	3.666488	-6.92365	14.04712
Debt2GDP	38	58.17503	23.2504	26.192	123.346
CPI	38	47.76695	63.05415	0.060453	232.2565
REER	38	333.2612	663.9641	68.31362	3444.639
GEX	38	10.24631	2.12736	5.86129	15.30817
Trade	38	65.2188	30.2675	6.320343	116.0484

Source: Authors computation with Data from WDI, 2017

Table 4.2 above shows the summary statistics made for the variables. The summary statistics comprises of the mean, standard deviation, maximum and minimum values of all the variables used for the study between 1980 and 2017. The study has a total of 38 observations from the period of study till the current year of study. Table 4.2 shows that Real Economic Growth (RGDP) within the period of study has the lowest mean value of 4.6 percent while the real effective exchange has the highest value of mean with an equivalent value of 333.2612 of the Gross Domestic Product of Ghana.

Again, table 4.2 displays that the real effective exchange rate (REER) had a maximum value of 3444.639 which was the highest among the variables whilst Real Gross Domestic Product (RGDP) obtained the maximum value of 14.047 which was the lowest among the variables. Among all the variables displayed in table 4.2, the real effective exchange rate (REER) has the highest value of standard deviation with a value of 663.9641 while government expenditure has the lowest standard deviation among the variables in table 4.2. Among all the variables displayed in table 4.2, only the real Gross Domestic Product has a negative minimum value. This means that Ghana has experienced massively economic decline with contraction in economic growth. The debt to GDP ratio in Ghana has a maximum value of 123.346 and this is regarded as the highest among the debts of the country. The country recorded increased borrowing in the year 2000 leading the country into Highly Indebted Poor Countries (HIPC). The country declared itself HIPC due to the fact that it was unable to service its international debt obligation and therefore called for the cancellation of many debts the country owned at that time.

Table 4.3: Kurtosis and Skewness Test for Normality of variables (1980-2017)

Variables	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
RGDP	0.0157	0.0055	10.96	0.0042
Debt2GDP	0.0524	0.6788	4.11	0.1279
CPI	0.0008	0.0908	11.42	0.0033
REER	0.000	0.000	37.96	0.000
GEX	0.4318	0.6905	0.81	0.6666
Trade	0.2833	0.1288	3.73	0.1547

Source: Authors computation using Data from WDI, 2017

Table 4.3 shows that Kurtosis and Skewness Test for the variables of study. The table shows that aside Consumer Price Index (CPI) and Real Effective Exchange Rate (REER) which are normally distributed, the rest of the variables are positively skewed. The variables RGDP and REER are also statistically significant at 1%, 5% and 10%. This to a large extent shows that they have major impact on the Ghanaian economy and influences the level of growth in the economy.

4.3.1 Results of Unit Root Test of ADF and PP

The utilisation of the ARDL Bound Test approach requires the satisfaction of two conditions. Firstly, the variable that depends on the other must be integrated in the first order, i.e. I (1). To put it differently, the variable that depends on the other must be stationary at first difference. Secondly, the explanatory variables should not be I (2) or higher. Therefore, the Augmented Dickey Fuller (ADF) test was used as the main unit root test tool and the Phillip-Perron (PP) unit root test is used in the confirmation of the results of the ADF test

Table 4.4: Unit root test Results of ADF and PP (1980-2017)

Variables	Augmented Dickey Fuller Test		Philips-Perron test	
	t-statistics	P-values	t-statistics	P-values
RGDP	-3.85	0.001***	2.79	0.008***
Debt2GDP	-2.55	0.016**	8.15	0.000***
CPI	2.23	0.033**	68.85	0.000***
REER	-2.82	0.008***	3.55	0.001***
GEX	-3.36	0.002***	3.63	0.001***
Trade	-1.91	0.065*	8.28	0.000***

Source: Authors computation using Data from WDI, 2017

Following the analysis made by Mackinnon (1996) of the critical values, rejection of the null hypothesis is based on the fact that the t-statistic calculated (absolute terms) exceeds the critical t-value. On the other hand, when the t-statistic calculated (absolute terms) is lower than the critical t-values then we fail to reject the null hypothesis. The results as shown in table 4.4 indicates that, except for TRADE which was not stationary at 1% and 5% significance level, the other variables were stationary at 1%, 5%, 10% levels of significance. This therefore calls for the first difference in the statistically insignificant variable to be determined. The stationery test is of much significance to determine why some variables in the regression model are insignificant. This can be determined using Auto regressive Distributed Lag (ARDL) model or the Philips-Perron test.

Table 4.5. Order of Integration of the Regression Variables (1980-2017)

	ADF Unit root	Philip Perron unit root
Variables	t-statistic	t-statistic
RGDP	I(1)	I(1)
Debt2GDP	I(1)	I(1)
CPI	I(1)	I(1)
REER	I(1)	I(1)
GEX	I(1)	I(1)
Trade	I(1)	I(1)

Source: Author's estimation using STATA 13.

Deductions made from Table 4.5 shows that the ARDL Bounds Testing Approach to co-integration satisfies the precondition for its application. The order of Integration of the regression

variables shows that RGDP has an integral order of I (1) using the ADF and same integral order of I (1) for the Philip perron unit root test. For the PDEBT, the order of integration is known to be I(1) using the ADF unit root test and same as under the Philip Perron unit root test.

Table 4.6: Correlation between variables and their previous values (1980-2017)

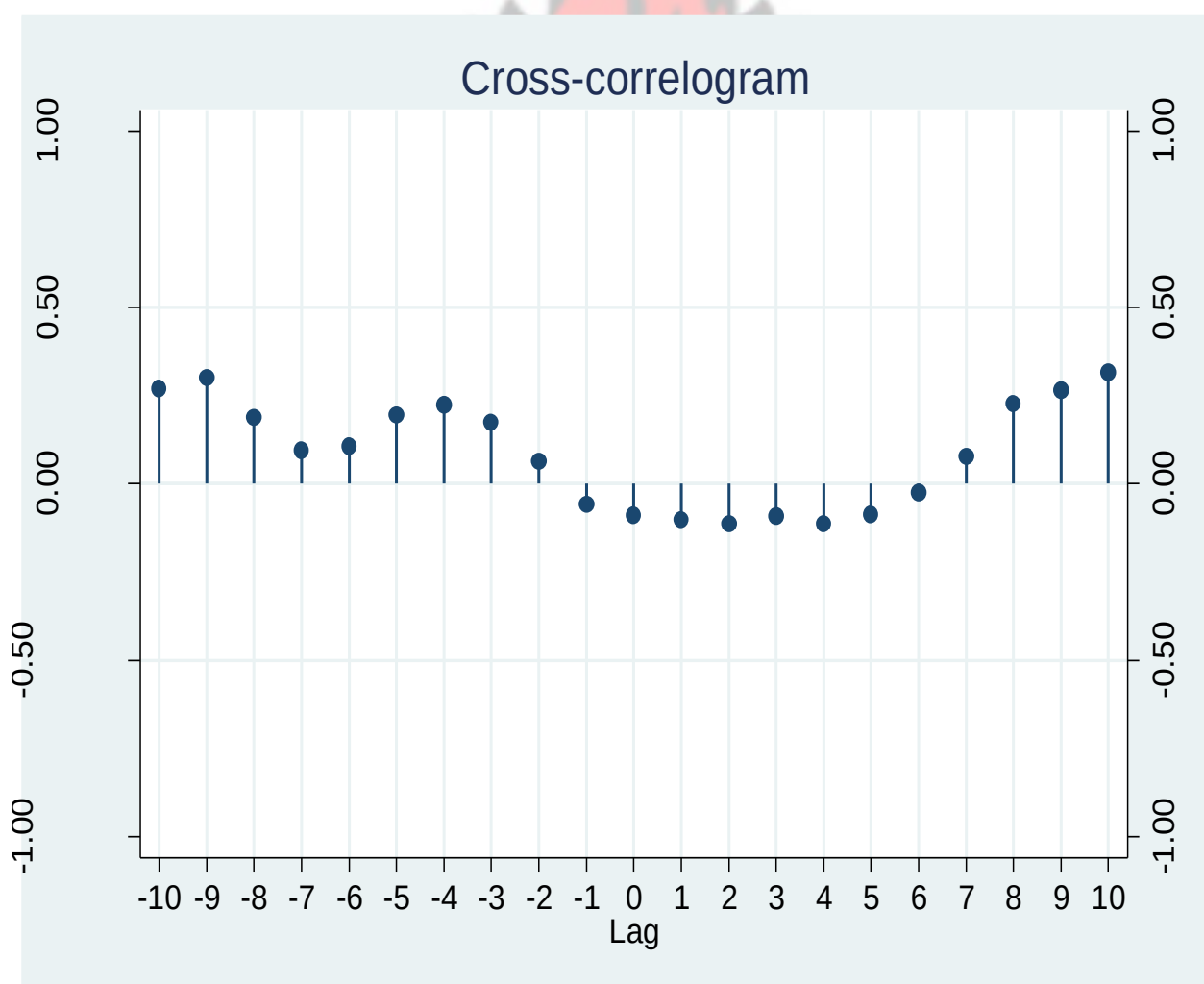
Lag	AC	PAC	Q	Prob>Q
1	0.8115	0.8263	27.052	0.000
2	0.535	-0.3799	39.138	0.000
3	0.2936	0.0098	42.883	0.000
4	0.1304	0.0189	43.643	0.000
5	0.0853	0.1473	43.978	0.000
6	-0.0132	-0.4221	43.986	0.000
7	-0.1807	-0.2149	45.587	0.000
8	-0.3644	-0.1811	52.314	0.000
9	-0.5085	-0.1751	65.867	0.000
10	-0.5286	-0.0883	81.037	0.000
11	-0.4666	-0.1371	93.295	0.000
12	-0.3694	-0.1272	101.27	0.000

Source: Authors computation with data from WDI, 2017.

Table 4.6 is used to explore autocorrelation, which is the correlation that exists between a current value of a variable and its previous values, use the command correlogram. The number of lags depends on theory, AIC/BIC process or experience. The output comprises autocorrelation coefficient and partial correlations coefficients which was used to specify an ARIMA model. AC

shows that the correlation that exists between the current unemployment value and its value three quarters ago is 0.2936. AC can be used to define the q in MA (q) only in stationary series. PAC shows that the correlation existing between the current value of Economic growth and its value three quarters ago is 0.0098 without the two previous lags effect. PAC defines the p in AR(p) only in stationary series. Box-Pierce' Q statistic tests the null hypothesis that all correlation up to lag k are equal to 0. This series show significant autocorrelation as shown in the Prob>Q value which at any k are less than 0.05, therefore rejecting the null that all lags are not autocorrelated.

Figure 4.3: Relationship between Debt to GDP ratio and the level of Economic growth



Source: Authors computation using Data from WDI, 2017.

Table 4.7: AIC, HQIC and SBIC selection criteria of study (1980-2017)

Lag	LL	LR	Df	p	FPE	AIC	HQIC	SBIC
0	- 623.705				1.40E+12	44.979	45.0662	45.2644
1	- 467.757	311.9	36	0.000	2.80E+08	36.4112	37.0221	38.4096
2	- 415.729	104.06	36	0.000	1.30E+08	35.2663	36.4009	38.9775
3	- 336.623	158.21	36	0.000	2.30E+07	32.1874	33.8455	37.6113
4	1283.59	3240.4	36	0.000	1.9e-40*	-80.9709	-78.7892	-73.8341
5	4529.63	6492.1	36	0.000		-311.545	-309.102	-303.552
6	4643.35	227.43*	36	0.000		319.66*	317.22*	311.67*
7	4640.91	-4.8863	36			-319.493	-317.05	-311.5
8	4627.77	-26.284	36			-318.555	-316.111	-310.561
9	4598.68	-58.17	36			-316.477	-314.034	-308.484
10	4567.24	-62.871	36			-314.232	-311.788	-306.239

Source: Authors computation with Data from World Bank, 2017

Table 4.7 shows the three selection criteria in choosing the correct lags for the study. The HQIC is better used for quarterly analysis but since this study has yearly observations, the Akaike Information Criteria (AIC) would be selected for the study.

4.4. Short-run analysis of the Impact of Public Debt, CPI, Exchange rate and trade on Economic Growth in Ghana (1980 to 2017)

The short-run is presented in Table 4.8. The Wald test is projected to deal with the investigation of the short-run causal relationship. The null hypothesis states that there is no linear relationship between the real GDP growth rate, public debt, government consumption expenditure, inflation (CPI), openness (Trade) and Exchange rate as observed in Ghana from 1980 to 2017. However, the alternative hypothesis suggests otherwise. The results in Table 4.8 show that there is substantial correlation between debt to GDP ratio and the real GDP growth rate. That is, in the short run, the debt-to-GDP ratio exerts positive impacts on the real GDP growth rate. Next, the results show a statistically substantial link between the real GDP growth rate and government consumption expenditure and openness (trade) respectively. These variables have a positive effect on real GDP growth rate in the short run. However, changes in government consumption expenditure and inflation (CPI) are statistically insignificant indicating that these variables are not important for explaining the variation in real GDP growth rate in the short run. Even more, the results also indicate a statistically significant relationship between the real GDP growth rate and debt to- GDP ratio; government consumption expenditure and openness/Trade respectively. The positive short-run relationship between real GDP growth rate and debt-to-GDP ratio is consistent with the study by Baum *et al.* (2012). Inflation (CPI) and Exchange rates are statistically insignificant indicating that there is no links between real GDP growth rates and

these variables. This indicates that variations in these variables do not cause changes in real GDP growth rates. In summary, the causal link between real GDP growth rate and public debt in the short run is bidirectional, indicating that the causation runs from the real GDP growth rate to public debt and also from public debt to the real GDP growth rate. This is because the p-values in both cases are less than the assumed critical values. This bidirectional link between debt-to-GDP ratio and real GDP growth rate reported is consistent with the study by Egbetunde (2012). Equally important, the results exhibit statistically significant causal links between government consumption expenditure and debt-to-GDP ratio; and population growth rates respectively. That is, in the short run, variation in government consumption expenditure is determined by variations in the debt-to-GDP ratio and exchange rates.

However, real GDP growth rates, inflation and openness/trade in the short run are statistically insignificant. Therefore, the link between government consumption expenditure and debt-to-GDP ratio runs in both directions (bidirectional). The results show that the coefficients for real GDP growth rates, debt-to-GDP and government consumption expenditure are statistically significant. The coefficients for Openness/trade and exchange rates are statistically insignificant and these exhibit no relationship with respect to Inflation/CPI. In summary, the link between inflation and real GDP growth rate is unidirectional indicating that the causation runs from inflation to real GDP growth rate and not otherwise. There are unidirectional relationships between inflation and government public debt as well as government consumption expenditure. There is a bidirectional link between openness and real GDP growth rates and a unidirectional relationship between openness/trade and inflation/CPI. Table 4.8 also indicates there are links between government consumption expenditure, and openness/trade in the short run.

Table 4.8: Vector error correction model (VECM) showing short run analysis

Dep. Var.	Independent variables – Chi Square values (Wald Test)						
	GDP	Debt2GDP	CPI	REER	GEX	TRADE	Error Correction
GDP	1.00	15.782 (0.0004) **	0.440 (0.8025)	65.538 (0.000)	22.2058 (0.000)**	48.590 (0.000) **	-0.51707 (-6.46112)
Debt 2GDP	2.76168 (0.0251) **	1.00	0.78879 (0.6741)	3.3583 (0.1865)	0.62884 (0.0730)*	6.01481 (0.0494) **	6.43897 (0.68193)
CPI	8.779442 (0.0124)	4.22142 (0.1212)	1.00	14.8776 (0.0006)	13.8110 (0.0010)	3.42616 (0.1803)	5.15023 (2.26239)
REER	3.971395 (0.1371)	8.2177 (0.0164) **	2.75076 (0.2527)	1.00	4.99483 (0.0823)	4.57092 (0.1725)	2.17527 (0.51754)
GEX	2.019220 (0.364)	0.24109 (0.0864) *	2.66026 (0.2644)	4.8867 (0.0869)	1.00	3.5146 (0.1725)	1.16579 (1.41382)
TRADE	14.44229 (0.007) **	1.36478 (0.5054)	4.90285 (0.0862) *	0.88866 0.6413	0.45031 (0.7984)	1.00	0.00747 (0.78367)

Source: Authors computation with Data from World Bank, 2017

4.5. Tests for White Noise

White noise refers to the possible evidence that a variable does not have autocorrelation. The null is that there is no serial correlation.

Table 4.9: Test for White Noise

Portmanteau test for white noise	
Portmanteau (Q) statistic = 106.6492	
Prob > chi2(17)	= 0.0000

Source: Authors computation using Data from WDI, 2017

Table 4.9 shows that the Prob > chi2(17)= 0.0000 depicts that there is no auto-correlation in the variables used for the study. This makes it best fit for the study.

Table 4.10: Estimated Long Run Coefficients using the ARDL Approach ARDL (1, 1, 1, 1, 0) selected based on Schwarz Bayesian Criterion

Variables	Co-efficient	Std. Err.	T	P> t
RGDP	0.0032608	0.16718	0.02	0.985
Debt2GDP	-0.02937	0.02274	-1.29	0.208
CPI	-0.461039	0.13863	-3.33	0.003**
REER	-0.00421	0.00073	-5.73	0.000***
GEX	0.2922841	0.18648	1.57	0.129
Trade	0.03169	0.02208	1.44	0.163

Source: Authors computation using Data from WDI, 2017.

The results of the estimated coefficients of the variables in the long-run of the model are shown in Table 4.10. The observation made was that, all the long-run coefficients of the variables are significant at 1%, 5% and 10% respectively. The signs of the coefficients of REER and PDEBT do conform to their expected theoretical signs as well.

Table 4.10 shows that there exists negative consequence of the proportion of public debt on the growth of economy. Therefore, a percentage point increase (decrease) in Debt in an economy, keeping all other variables unchanged leads to a corresponding increase (decrease) in the Economic growth rate by -0.02937. This finding contradicts the assertion by Sargent and Wallace (1981) that public sector deficits are inflationary and may have positive impact on the level of economic growth rate in a particular country. The increase in government borrowing as a means of deficit financing tends to increase the amount of money in circulation and this result in inflationary pressures in the country.

The level of trade in an economy is established to have positive effect on the growth of the Ghanaian economy. This implies that a percentage point increase (decrease) in trade causes economic growth to increase by 3.169%. As trade continue to increase in the country, the level of economic growth also rises in a positive percentage terms. The increase in openness to trade in Ghana causes a massive rise in the economic growth rate levels in the country. Frankel& Romer (1999) in their study however observed from their results that there is no evidence exists that point to the conclusion that the effects of trades are overstated by ordinary least-squares estimates. They further suggested that trade has quantitatively large, statistically significant,

positive effect on the growth of the economy. This confirms our earlier stated effect that trade has on the economic growth in Ghana.

Theoretically, the depreciation of the Ghana cedi favours the export sector in that, Ghanaian exports becomes comparatively cheaper and more competitive on the foreign markets. On the other hand, imports to the domestic markets become fairly expensive. This results in both cost-push (imported) and demand-pull inflation in the long-run. The level of real exchange rate impacts positively on inflationary pressures in Ghana at 1% level of significance. Rodrik (2008) observed that real exchange rate affects the level of trade positively and therefore seeks to promote economic growth in a particular country.

There exists a negatively significant long run correlation existing between real GDP growth and Consumer Price Index (CPI). This relationship is not consistent with the supply-side theoretical expectations. This implies that, a percentage point increase (decrease) in real GDP growth brings about approximately 46.18% rise (fall) in the inflationary pressures (inflation) in the long-run. When real incomes increase, demand for goods and services rises, thereby increasing aggregate demand with aggregate supply remaining constant, all things being equal, prices of goods and services will rise. Sarel (1996) found evidence of a significant structural break in the function that relates economic growth to inflation when the inflation rate is 8 percent. Inflation rates below 8 percent do not pose any effect on growth, or in some cases a slightly positive effect may be observed.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Introduction

The current debt crisis, especially in developing countries like Ghana has received a public debate on how public debt affects the growth of the economy. Regardless of the abrupt strong increase in the studies regarding the relationship that exists between public debt and economic activity, the empirical literature on this subject area is scanty and indicates a lack of systematic evidence on how public debt impacts possible economic growth. Almost all economies in the world needs some amount of capital to generate production and thereby sustaining development: capital, which is one of the crucial factors of production is relatively scarce, and the dearth of capital is much more predominant in developing countries which Ghana happens to be part. In order to foster economic development, a developing country would have to organize capital resources by resorting to borrowing one way or the other. This study examined the impacts of public debt, public investment and economic growth in Ghana within the period of 1980 to 2017.

5.2 Summary

The public debt or government borrowing forms an integral part of public finance by which all governments, in addition to revenue generated from their respective tax regimes, raise money on behalf of their citizens to finance programmes and activities approved by the legislature towards economic growth. Despite increasing levels of government spending worldwide, issues of public finance, including government borrowing towards economic growth, have attracted several academic research and studies. However, there is still controversy surrounding the effect of accumulating public debt on economic growth. Growth models augmented with public agents

issuing debt to finance consumption or capital goods tend to exhibit a negative relationship between public debt and economic growth, particularly in a neoclassical setting. The study has a total of 38 observations from 1980 to 2017.

The result showed that the country experienced a public debt of 52% in 1980 as well as 1981. This debt stock was due to the high level of borrowing from the external sources to finance the manufacturing sector which was been set up in the country. Between 1982 and 1986, Ghana's debt stock stood at an average of 40.2 percent of the Gross Domestic Product of the country. In the latter part of the 1980's thus between 1987 and 1990, the public debt stock of Ghana remained relatively lower compared to the debt stock in the mid-1980s. The debt to GDP ratio stood at a lower rate of 27.7 percent between 1990 and 1993. Ghana experienced a rise in the debt to GDP ratio between 1995 and 2005. Between the periods 2006-2013, Ghana experienced a downward trend in the debt to GDP ratio with an average value of 30 percent of GDP. Between the years 2014 and 2017, debt to GDP ratio in Ghana has stayed on the average of 60 percent per annum.

Results also shows that, over the period of study, the P value is represented by 31.5% implying that from 1980 to 2017, goods and services recorded high price levels in the country. Real effective exchange rate (REER) had a maximum value of 3444.639 which was the highest among the variables whilst Government expenditure obtained the maximum value of 15.30817 which was the lowest among the variables. Augmented Dickey Fuller (ADF) test was the main unit root test tool and the ADF test results are confirmed by the Phillip-Perron (PP) unit root test.

Except for TRADE and GOV EXP which were stationary at levels, the other variables were not stationary at 1%, 5%, 10% levels of significance.

Furthermore, the result shows that in the long run, the coefficient of domestic investment was found to be positive and significant at the 1% level, thus domestic investment leads to an upsurge in economic growth. Investment continues to significantly contribute to the increase of output growth. An increase in domestic investment in the short run also increases economic growth. The finding is in tandem with the Solow growth model. This is because investment has the potential to cause a rise in the amount of capital accumulated and this will in turn induce economic growth. The findings however contrast that of Frimpong and Oteng–Abayie (2006) who found a negative effect of domestic investment on economic growth in Ghana.

The study also shows that exchange rate has a positive influence on economic growth in the short run. Specifically an appreciation of the cedi against the dollar leads to an increase in economic growth in the short run. This result suggest that an appreciation of the cedi against the dollar decreases the price of traded goods, which feeds into the general price level rendering a positive real balance effect. This, in turn, will result in higher aggregate demand and output. This result confirms the findings of Owusu-Nantwi (2016) that conducted similar study on the Ghanaian economy. The result shows that Inflation (CPI) rate is statistically insignificant indicating that there is no links between real GDP growth rates inflation. This indicates that variations in inflation do not cause changes in real GDP growth rates. The findings also shows that changes in government consumption expenditure and inflation (CPI) are statistically insignificant indicating that these variables are not important for explaining the variation in real GDP growth rate in the short run.

The study shows that there is a negative effect of debt-to-GDP on growth which means that domestic borrowing from foreign capital was used, partially, to finance government expenditure and public investment, thus contributing to the increase in public spending, increases budget deficit and leading to higher public debt in order to finance these deficits. This findings is in line with the findings of Pegkas (2018) that examined the impacts of debt to GDP ratio on economic growth of Greece. The result also shows that the causal link between real GDP growth rate and public debt in the short run is bidirectional, indicating that the causation run from the real GDP growth rate to public debt and also from public debt to the real GDP growth rate. The positive short-run relationship between real GDP growth rate and debt-to-GDP ratio is consistent with the study by Baum *et al.* (2012). The empirical results reveal a positive and significant long-run relationship between real GDP growth rate and public debt, indicating that public debt contributed to economic growth in Ghana. This also confirms the findings of Pegkas (2018) that examined the impacts of debt to GDP ratio on economic growth of Greece and Owusu-Nantwi (2016) that conducted similar study on the Ghanaian economy.

5.3 Conclusion

The level of rising public debt in Ghana is alarming particularly during election periods and this risen public concerns among academicians and even international funding agencies in recent past. For Ghana to experience high level of economic growth, trade increment and controlling of inflationary pressures in the country should be paramount to ensure a sustained increase in economic growth.

5.4 Policy Recommendations

To promote and sustain the level of Ghana's economic growth rate in the coming years, the following prudent financial and economic policies are recommended to be implemented in the country;

5.4.1 Efficient financial management

Ghana has been borrowing over the past years especially during election years to finance projects as means to win votes. This has led to continuous increase in the level of government debt stock and fiscal deficit that tends to affect the level of economic growth. The continuous increase in the borrowing leads to huge debts for the country with low level of economic growth for the country. As part of policies to ensure economic growth, the government should exercise fiscal restraint and also ensure that, finances borrowed are spent on productive sectors of the country such as the agricultural sector which contributes massively to economic growth. An efficient financial management can result from placing a cap on the amount of government spending annually to ensure that prevention of excessive borrowings. Public debt should be used for projects of investment that should translate into economic growth and jobs, which ultimately improve well-being for citizens. However, public debt needs to be managed and kept under control as high debt would have negative effects in the long run and the later stage of borrowing marked with high debt will lead to subdued growth.

5.4.2 Trade promotion

The government of Ghana can engage in the promotion of trade through openness to trading partners in goods the country have competitive advantage in. Trade openness in the area of the agricultural sector can boost high level of investment in the country and ensure continuous

export of Ghanaian goods that will ensure economic growth. Signing of MOUs by government officials should be based on mutual benefits for the country as compared to just trade. The country can also subsidize the production of certain commodities which are demanded largely on the international market to ensure that a lot of people can invest in that sector of the economy.

5.4.3 Controlling exchange rate depreciation

The continuous depreciation of the Ghanaian cedi has affected the level of economic growth in the country over the last two decades. The country can put measures in place to ensure the stability of the Ghanaian currency in relation to other foreign currencies. Policies such as favourable trade balance and increase in the trade can strengthen the domestic currency of the country. Also Ghana can engage in exchange rate controls at certain times of the year to ensure that the country does not only allow hoarding of the foreign currency. These are some measures to curb the volatility of the exchange rate in Ghana.

5.4.4 Inflationary pressure control

The control of inflation in the country is one of the modest ways to ensure economic growth in the country. The avoidance of excessive government spending in the country and increase in productivity of the various sectors of the economy is one of the major ways of controlling the excessive inflation rate in the country. Also the promotion of made in Ghana goods that will reduce the demand for foreign products is also one of the ways to reducing excessive demand for foreign products which commands higher prices in the country. This is one sure way of increasing production in the country and ensuring economic growth through a domestication process.

5.5 Areas for Further Research

Below are the identified areas for further studies;

- The relationship that exists between domestic public debt and the growth of the economy in Ghana.
- Public debt, corruption and sustainable growth in Ghana.
- The correlation that exists between public debt and vital economic variables in Ghana.
- The effects external debt has on the economic growth of Ghana.



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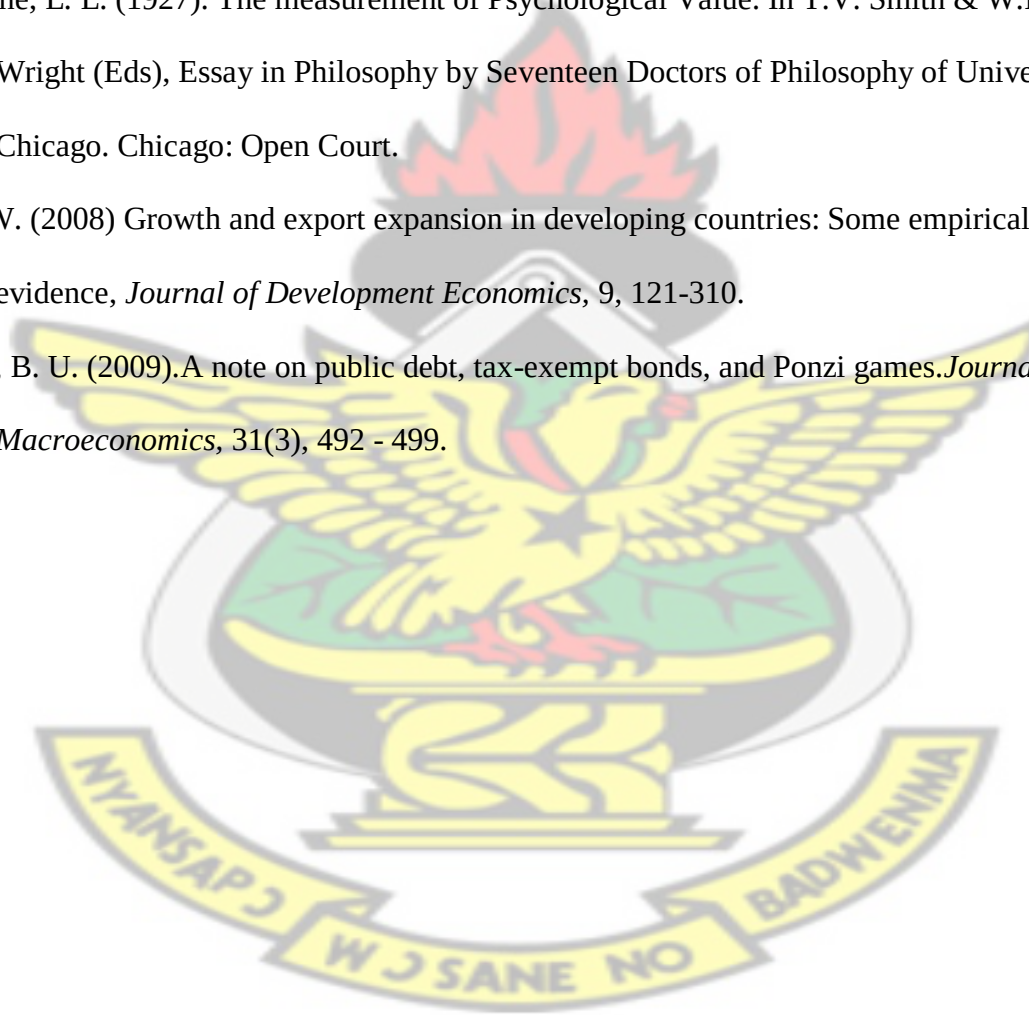
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APPENDIX

Appendix 1: Debt to GDP, Real GDP, CPI, REER, GEX and Trade(1980-2017) used for the study.

YEAR	Debt 2 GDP	RGDP	CPI	REER	GEX	Trade
1980	52	0.471696	0.060453	749.9734	11.16401	17.62111453
1981	52	-3.50307	0.130883	1672.199	8.79024	10.07903506
1982	48	-6.92365	0.160064	2088.38	6.481128	6.320343316
1983	45	-4.56374	0.356742	3444.639	5.86129	11.54489834
1984	42	8.647569	0.498245	545.5556	7.259361	18.81461112
1985	33	5.091617	0.549591	396.6134	9.398393	24.2438376
1986	33	5.199161	0.684601	251.3968	11.06703	36.71168749
1987	45	4.794899	0.957175	186.4735	10.63432	45.84812332
1988	51	5.628169	1.257338	170.0768	9.70799	42.24549941
1989	59	5.085873	1.574485	159.2938	9.844808	41.08589105
1990	31.979	3.328818	2.161123	159.1008	9.311528	42.72817813
1991	27.7	5.281826	2.550805	161.7009	9.483141	42.48834926
1992	33.468	3.879419	2.807317	142.627	12.10757	45.99359586
1993	55.813	4.850001	3.508019	124.4442	14.44937	56.66912012
1994	86.467	3.3	4.380472	100.7892	13.72334	62.02115274
1995	95.147	4.112419	6.985168	116.7407	12.07348	57.42309429
1996	78.419	4.602461	10.23753	126.6165	12.04371	72.20494413
1997	75.338	4.196358	13.09229	134.6959	12.35563	85.40183797
1998	66.443	4.700391	15.00693	143.8856	10.32416	80.59954325
1999	86.689	4.399997	16.86909	141.843	10.84335	81.70510403
2000	123.346	3.7	21.11896	93.28724	10.17162	116.0484302
2001	101.504	4	28.06824	94.36207	9.722364	110.0458542
2002	86.66	4.5	32.22689	93.9972	9.87277	97.48924317
2003	82.813	5.2	40.8234	94.45121	11.5332	97.28714571
2004	57.333	5.6	45.97718	93.41697	12.17281	99.67033435
2005	48.034	5.900004	52.9281	102.1636	15.30817	98.17151411
2006	26.192	6.399912	58.70529	107.6702	8.870722	65.92144384
2007	31.006	4.346819	65.00597	107.0303	8.52494	65.35432229

2008	33.6	9.149799	75.74635	101.9682	8.73166	69.51422561
2009	36.1	4.844487	90.32806	93.64507	7.574244	71.59473853
2010	46.3	7.899712	100	100	7.069499	75.37781579
2011	42.6	14.04712	108.7268	95.05421	13.7886	86.29545385
2012	47.9	9.292789	116.4751	87.42279	11.76435	93.16803513
2013	57.2	7.312525	130.0633	88.03345	9.306668	81.65233262
2014	70.2	3.985866	150.2096	68.31362	9.357636	88.45141177
2015	72.2	3.837041	175.9705	69.34684	9.749641	100.54662
2016	73.4	3.721903	206.6855	79.04784	9.067816	89.3432829
2017	76.8	8.507156	232.2565	77.66846	9.849221	90.63233651

