PUBLIC DEBT, INVESTMENT AND ECONOMIC GROWTH IN GHANA

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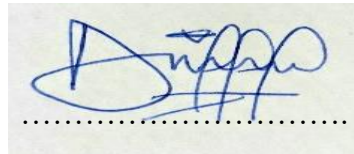
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A THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS, UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PHILOSOPHY (M.PHIL) DEGREE IN ECONOMICS

SEPTEMBER, 2021

DECLARATION

I, ALFRED DODOO, hereby declare that this thesis is an original research undertaken by me under the guidance of my supervisors; and with the exception of references to other people's work which have been dully cited, this thesis has neither in part nor in whole been submitted for another degree elsewhere.

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ABSTRACT

This thesis was motivated by the persistent growth in Ghana's debt per GDP above the 60 percent sustainability threshold prescribed by the West African Monetary Zone (WAMZ) coupled with its low performance in terms of debt servicing. These two situations raise more concerns on how the country's level of public debt can affect both investment and economic growth. Several studies carried out to investigate the relationship between the country's level of debt and economic growth have yielded many results. This thesis provides an updated debt-growth nexus, as well as investigating the use of investment as the basic channel through which public debt affects investment. Guided by the neoclassical growth model, the effect of public debt on economic growth is dependent on the effectiveness of investment made with the borrowed funds and the part of investment crowded out due to the macroeconomic effect of high debt on interest rate and investment. Based on the results obtained from the unit root test, the ARDL cointegration method was used to estimate the effect of public debt on both economic growth and investment in Ghana. From the estimated results of the thesis, there was a negative relationship between external debt and economic growth in both the short run and long run growth equations. In these growth equations, no relationship was established between debt servicing and economic growth. In the estimated short and long run investment models, no relationship was found between external debt and investment, as well as debt servicing and investment. These findings imply no "crowding out" effect for Ghana. Rising from the thesis's results, it is recommended that government channels borrowed funds into productive ventures of the economy as this will help in generating output to finance its debt. In order to control the persistent rise in external debt, structural programs must be implemented to ensure efficient mobilization of domestic funds. It is also recommended that government pays serious attention to revising the export led growth strategy, adheres strictly to macroeconomic policies that ensures a stable and favourable exchange rate in order to propel trade and investment.

DEDICATION

To my lovely mother, Tsotso Elavanyoh.

ACKNOWLEDGEMENT

All praise and thanks to God for His unmerited love, blessings, care and protection over my life. It would have been impossible without Him. May His name be praised forever.

I would like to express my sincere appreciation to my supervisors, Dr. William Bekoe and Prof. Edward Nketiah-Amponsah for their immense support, guidance, insightful and critical criticisms that have contributed to the success of this thesis. I would also like to acknowledge the support and efforts of lecturers at the Department of Economics – University of Ghana, especially Dr. Alfred Barimah and Dr. Abel Fumey for their constant support and directions during my National Service and MPhil years at the Department. Their contribution to my academic life is one I would always be grateful for.

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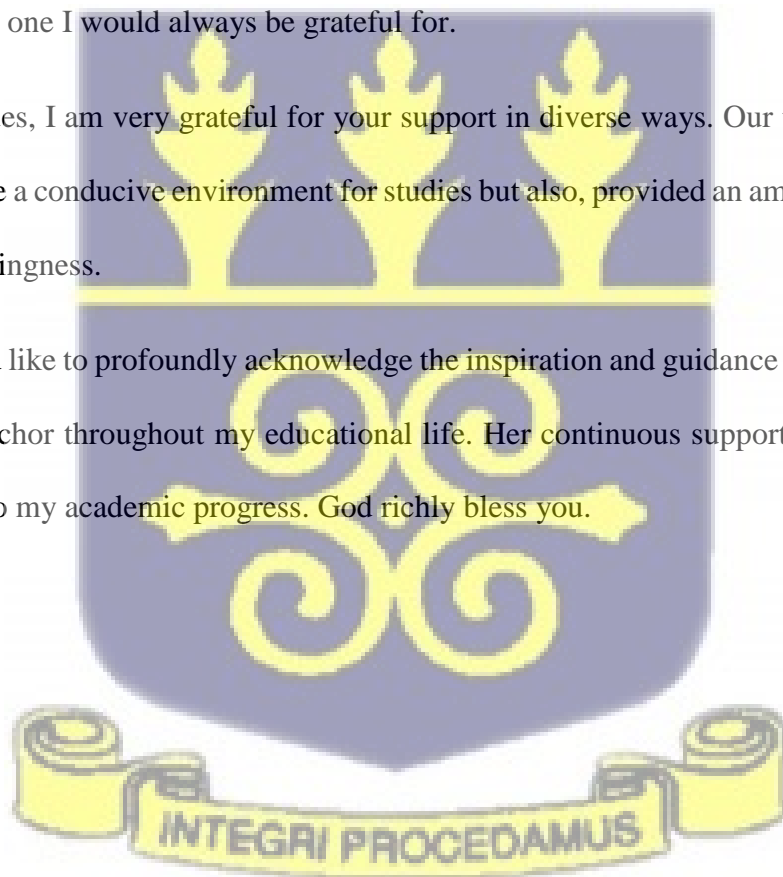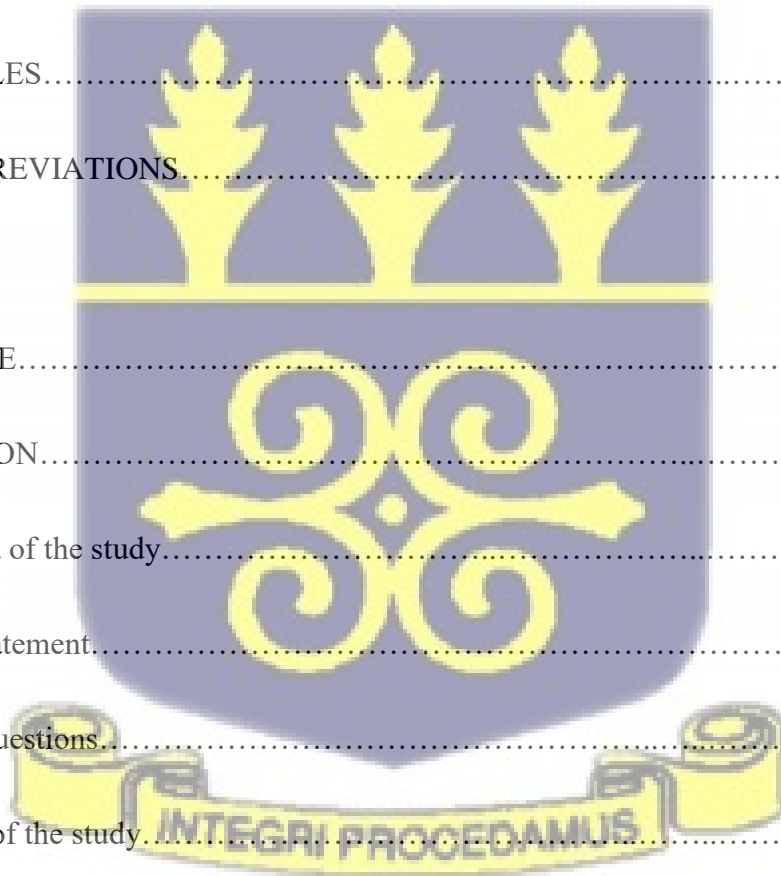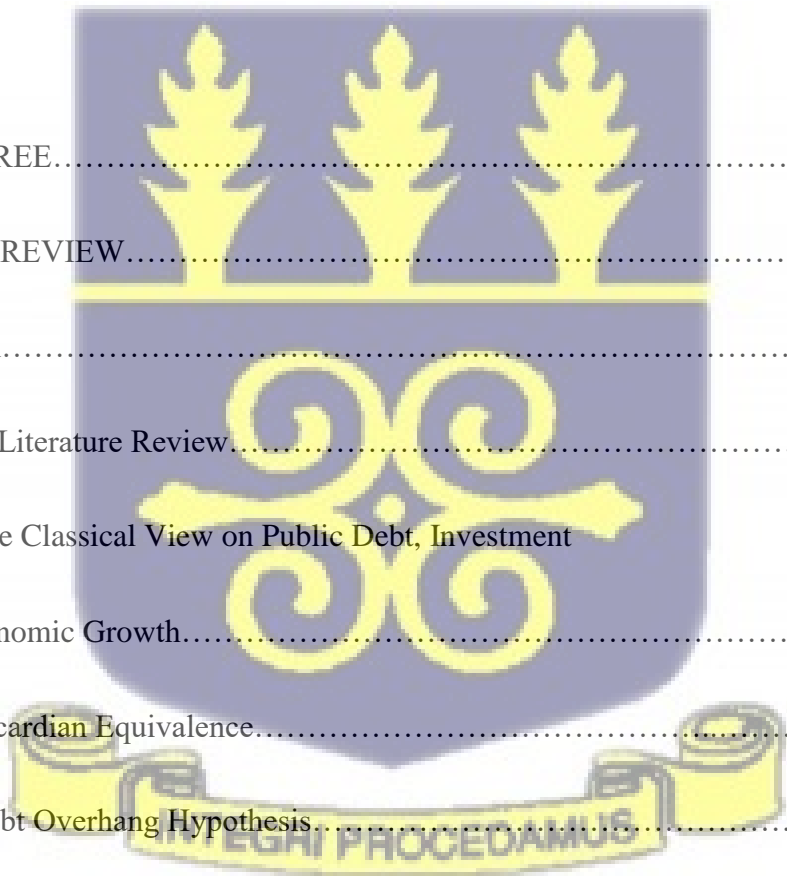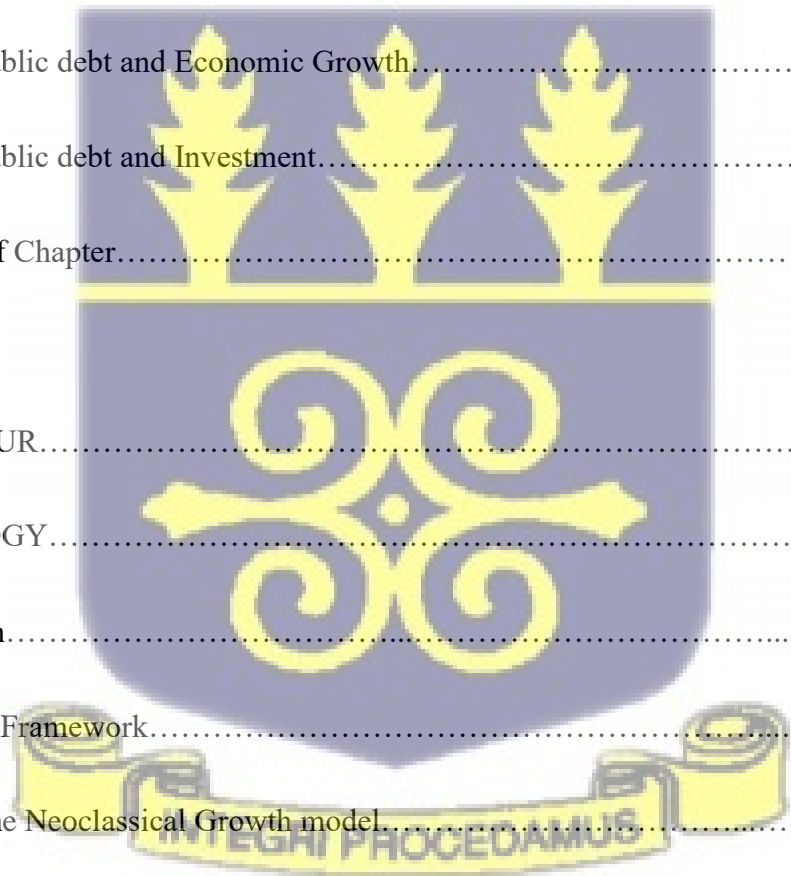
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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
AEO	Authorized Economic Operator
AfDB	African Development Bank
AFRODAD	Africa Forum and Network on Debt and Development
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
CUSUM	Cumulative Sum
DEDH	Direct Effect of Debt Hypothesis
ERP	Economic Recovery Program
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GEPA	Ghana Exports Promotion Authority
GIPC	Ghana Investment Promotion Centre
GLS	Generalized Least Square
GMM	Generalized Moments of Methods
GNI	Gross National Income
HIPC	Highly Indebted Poor Countries
HQIC	Hannan-Quinn Information Criterion
IDA	International Development Association
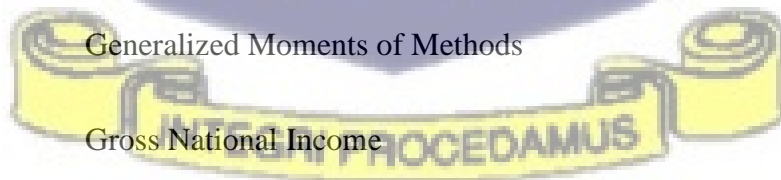
IMF	International Monetary Fund
MTDS	Medium-Term Debt Strategy
OLS	Ordinary Least Squares
PP	Philip Perron
SAP	Structural Adjustment Program
SBIC	Schwarz Bayesian Information Criterion
VAR	Vector Autoregression
VECM	Vector Error Correction Model
WAIFEM	West African Institute for Financial and Economic Management
WAMZ	West African Monetary Zone
WDI	World Development Indicators
WEO	World Economic Outlook
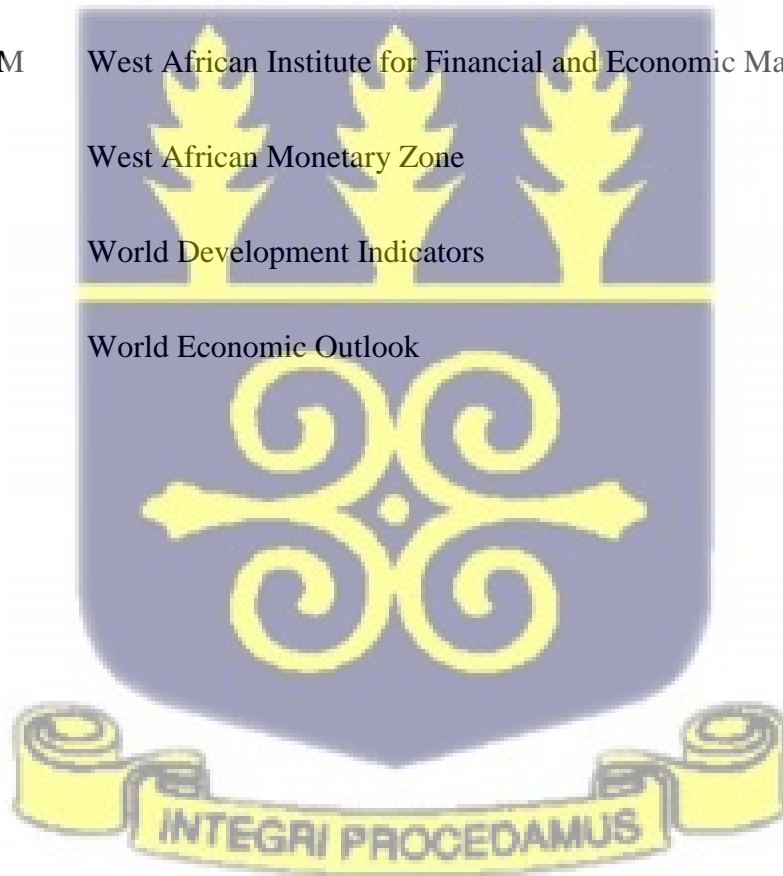
CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The need for a sustained economic growth and development has been a major concern for countries all over the world. In order to propel economic growth and development, investment in major sectors of that economy such as education, health, infrastructure and, social welfare is crucial (Owusu-Nantwi and Erickson, 2016). Investment into these key areas requires huge levels of public expenditure, since the free market tends to fail with the efficient provision of such services, especially when they are public goods. This situation worsens government budget deficits when the targeted revenue is not generated to match up these expenditures (Rosen and Gayer, 2008).

Public finance provides governments with many options of financing this deficit. This includes mobilizing tax revenue, borrowing, printing of money, imposition of user fees on public goods, and others. Most developing countries are characterized by weak tax systems thereby, making tax mobilization very ineffective. In effect, relying on taxation as a means of financing government deficit will not only give rise to little and insufficient funds but distort household consumption and savings. Governments in developing countries also avoid the use of printing money as a means of financing budget deficits in order to ensure the stability of key macroeconomic indicators in the country. The main key macroeconomic variable that is affected by this means of financing budget deficit is inflation. High levels of inflation is detrimental to both the welfare of the citizenry, as well as production. The problem of free- ridership continues to persist with most public goods, hence, making it very difficult for government to impose user fees on public goods. With these limited options, developing economies mostly rely on borrowing as a means of financing budget deficits, despite its adverse effect on the economy.

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The wealth and income of individuals in a country influences the tax revenue that can be generated. In most developing countries where the average GDP per capita is low, tax revenue is also expected to be low. This condition also contributes to the worsening of government budget deficit hence, the need to borrow (Rosen and Gayer 2008; Ogunmuyiwa 2010).

Todaro and Smith (2006) assert that, the reason for borrowing is justifiable because, at an early stage of development, developing countries are unable to domestically generate enough capital for investment. At an early stage of development, income levels are low and countries have inadequate capital stock, limiting their investment opportunities. This justifies the need to borrow capital from the external market to undertake investment ventures domestically. At the latter stage of development, increased growth in both general and capital market provides a good source of domestic funds for development. Increased level of national output translates into increases in both savings and investment. This provides the public with an option to tap into the domestic credit market for funds in order to carry out public expenditure. In an attempt to over-rely on the domestic market for credit, domestic borrowing may crowd out investment and contributions from the private sector. This also has the tendency of creating instability in the financial sector. This provides the basis for most developing countries to rely on the use of external debt to raise revenue in order to finance public expenditures (Panizza *et al.*, 2010).

Public debts are generally categorized into two forms, that is, external and domestic debt. According to the World Bank, domestic debt represents total debt owed to a specific country's residents, which must be repaid in terms of goods, services or money. This includes bonds, treasury bills, non-interest bearing stocks, and so on. Servicing domestic debt is mostly carried out using domestic currency. External debt constitutes the part of debt owed to non-residents, foreign institutions and governments which must be repaid in either monetary or non-monetary terms. This also includes funds owed to both bilateral and multilateral creditors, and private institutions. External debts are purely serviced with foreign currency, making it liable to

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fluctuations based on the prevailing exchange rates. Total public debt is the estimated sum of domestic and external debt which together serves as the principal. Debt servicing involves interest payment which is estimated at either a fixed or flexible rate, depending on the source of the fund (Kamundia, 2015; World Bank, 2021).

Interest payment forms another major component of public debt. Just like ordinary bank loans, funds that are borrowed by the government must be paid together with the stipulated interest. Interest payments form a significant part of government expenditure and is subject to periodic changes. It is worth noting that, as a country's debt stock increases, interest payment increases as well. That is, the more a country borrows and fails to finance the debt, interest payment increases with time. The continuous rise in the prevailing interest rates gives rise to a higher burden of interest payment by the government (Brue *et al.*, 2009).

Governments also resort to refinancing of public debt in order to keep them from being insolvent. Refinancing is the act of selling new bonds (usually at a higher interest rate) in order to generate funds to service matured debts. This activity increases debt servicing obligations in the form of increased total debt and higher interest payments. Holders of government bonds tend to benefit from refinancing activities of the government. This is due to the relatively higher interest on new bonds as well as the certainty of government not defaulting in the payment of borrowed funds. These benefits accrued to bondholders may be wiped out by imposition of new taxes by the government (Hoag and Hoag, 2006).

The use of debt as an option to boost investment and economic growth must be carried out and sustained at a reasonable level to avoid its "overhang" effect. When high levels of public debt is sustained over a long period of time, it becomes very difficult to pay back. In order to clear the existing debt burden, governments in most developing countries resort to increasing tax rates. This is transferred into higher tax rates on various investment portfolios. This cuts down the returns investors get from investing in these countries. This ultimately suppresses the

country's domestic and foreign investments, as well as economic growth (Sachs, 1989; Krugman, 1988).

Debt obligations can affect public investment and economic growth, a channel known as the "crowding out" effect. A higher level of public debt (both domestic and external) is always associated with higher debt servicing obligations. In an attempt to clear existing debt, governments use both domestic and foreign capital to service public debt, depriving areas such as education, health, welfare, trade, infrastructure, and so on of the needed funds for development. These deprived areas are known for their high level of productivity and contribution to national development. Government's inability to provide resources for the growth of these areas "crowds out" investment, which is very essential to the growth of the economy (Karagol, 2002; Diaz-Alejandro, 1981).

An escalating debt situation in a country may not necessarily be an alarming situation. High levels of public debt may contribute to growth in output. This is based on the condition that these funds are invested into productive and sustainable projects that will ensure continuous generation of future income. A desirable amount of this experienced growth in output must be devoted to debt servicing obligations. This ensures that both debt stock and interest payments are paid (Sulaiman and Azeez, 2012). This assertion is opposed by Were (2001), who argues that, information on public debt is asymmetric in terms of nature, structure and magnitude. According to him, the level of public debt and debt servicing obligations are characterized by many uncertainties. These uncertainties make it impossible to carry out servicing obligation effectively, hence making public debt detrimental to economic growth.

A healthy public debt situation cannot be assessed based on its absolute term. There is always the need to always compare the debt situation to the productive capacity or wealth of the country. A wealthy and productive country has the capacity to manage and service public debt,

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as compared to a country with low resources and an unproductive economy. The best measure of the debt situation of a country is to measure debt as a ratio of GDP (Brue *et al.*, 2009).

Governments are more able and willing to pay for higher costs of loanable funds in the domestic market. This is due to the fact that taxation provides an avenue for financing such loans obtained from the financial market. In the case where the supply of capital does not grow to match up the increasing demand, interest rates will increase. This makes it relatively difficult for individuals to demand for these loanable funds in order to undertake private investments. A persistent demand for funds by the government on the domestic market will cause shortages when the supply of such funds do not increase to match its demand. This shortage of funds in the domestic market leads to increases in the price of the funds (interest rate). This increase in interest rates sometimes increases the rate of return on assets. This develops the desire of foreigners to invest in the market affected by this increase. This increases the demand for the domestic currency, which affects both imports and exports. The appreciation of the domestic currency propels imports but reduces exports. This results in a trade deficit which ultimately downsizes economic growth (El-Mahdy and Torayeh, 2009).

A high level of public debt also has the ability to increase income inequality through interest payment, as well as other domestic debt servicing obligations. This situation is true if a high percentage of government bond holders are the wealthier in society, with just a limited number of holders belonging to the low-income group. This condition must also be complemented with the economy having a regressive tax system. In a situation where debt must be serviced through taxation, this will erode a relatively higher income from the poor which will be used to service government debt. Since a higher percentage of bond holders are the wealthier in society, it further makes them richer when the government fulfills its debt servicing obligations. This implies that, high levels of public debt that must be serviced in a regressive tax system will

provide more income (return on bonds) to the rich than the poor who are all bond holders. This has the potential of widening the poverty gap within an economy (Brue *et al.*, 2009).

Most economies in the world suffered greatly from the global recession and oil price shocks in the 1970s. These situations, coupled with unfavorable domestic macroeconomic indicators such as high inflation rates, exchange rate volatility, deteriorating fiscal positions, and so on led to the accumulation of huge external debts in most parts of the world. This was due to the fact that, public spending was massively dependent on external debt, therefore worsening the balance of payment problem in these countries (Tran, 2018).

These countries were mostly low-income countries in Latin American and the Caribbean region, East Asia and Pacific region, and the Sub-Saharan Africa region. In Latin America and the Caribbean region, public debt peaked up in the 1970s and 1980s. This public debt situation was similar to that of the Sub-Saharan Africa region. The high level of public debt in low-income countries in Latin America and the Caribbean region as well as the Sub-Saharan Africa region in the 1970s and 1980s was popularly known as the "first wave" of broad-based and substantial public debt buildup. Countries in these regions were seen to have built up a very high level of external debt in the syndicated loan markets, and had a series of failed efforts in resolving these debt crisis. In the East Asia and Pacific region, public debt peaked in the 1990s. The situation of high public debt was not only experienced by low-income countries, but also affected high-income countries in Europe and the United States of America (Kose *et al.*, 2021).

This situation implied that affected countries within these regions had to pay higher principals, as well as interest payments for most of these externally borrowed funds. The estimated average future payment of debt-to-export ratio in the 1980s was about 150 percent. This value grew to about 880 percent in the 1990s, representing 160 percent of the total external debt accumulated by countries within the region (Amoating and Amoaku-Adu, 1996). This situation warranted the call by many governments and institutions to bail these countries out of the prevailing

predicaments. This call was given much attention and got responses from two of the most prominent financial institutions worldwide, the World Bank and IMF. In advanced economies, governments recapitalized banks and adopted sizeable fiscal stimulus packages as fiscal measures to boost aggregate demand and curtail the prevailing effect of high public debt on economic growth.

In the 1980s, the World Bank and International Monetary Fund (IMF) introduced Structural Adjustment Programs (SAPs) and Economic Recovery Programs (ERPs) to curtail the prevailing effect of the economic crisis. These adjustment programs were enacted to ensure that, macroeconomic variables such as unemployment, inflation, GDP, and others were stable in the short run. Some notable and crucial objectives of this program were the devaluation of currencies and deflations of prices across most Sub-Saharan African countries in order to boost export and reduce high levels of inflation. These initiatives yielded mixed results across the region. In most of these countries, average poverty and unemployment levels continued to worsen, standard of livings and income levels dropped after these programs were adopted. The attempt to devalue domestic currencies in order to boost exports led to increases in debt stock as well as debt service payments. The deliberate reduction in prices had adverse effect on national output across most of these Sub-Saharan African Countries including Ghana (Iyoha, 1999).

In order to assist these countries to manage their debt situations and reduce poverty levels, the World Bank and International Monetary Fund (IMF) introduced the Highly Indebted Poor Countries (HIPC) initiative in 1996. The initiative was to help poor (lower income countries with per capita income below $400) and highly indebted countries by relieving them of their external debts, as well as providing lower rates on interest payment. Countries that benefited from this initiative were those with debt-to-export ratio of the minimum threshold of 150 percent. This must also be coupled with a debt-to-revenue level of 250 percent. This led to the

declaration of 41 countries as HIPC. Ghana was declared HIPC following its highest ever debt-to-GDP ratio of 111.9 percent in 2000. The country's relief of this massive external debt stock as a means of curtailing the situation's effect on investment and output has yielded similar results as observed across the Sub-Sahara African region. In the early years after the relief, external debt dropped gradually till 2006 and began rising till 2019. The number of Sub-Saharan African countries classified under HIPC for the first time constituted 80 percent of the total number. Currently, the number is made up of thirty-three (33) Sub-Saharan African countries (Iyoha, 1999; IMF 2021).

1.2 Problem Statement

The Structural Adjustment Programs (SAPs) and Economic Recovery Program (ERP) are major initiatives that have contributed to Ghana's economic growth and development since the 1980s. These initiatives comprise of both monetary and fiscal policies that are geared towards boosting investment as well as promoting exports. Investment was viewed as a major factor that will help transform the economy. The major monetary policies led by the Bank of Ghana were to control inflation by mobbing up excess liquidity, as well as the liberation of the financial sector. The need for a more liberalized financial sector made it relatively easier for firms to directly obtain capital from commercial banks at an affordable rate. This was believed to help promote private investment. These initiatives also led to the reduction of taxes and duties on equipment that will boost investment in the country (Baffour, 1995). The results of these programs have been positive on the growth of the Ghanaian economy. Growth in GDP per capita averaged 5.25 percent, whereas investment per GDP averaged 27.57 percent for the period 1984 – 2019 (World Bank, 2021; IMF, 2021). The role of public debt has always been very crucial in achieving high growth levels of GDP per capita and investment. This is due to the country's heavy dependence

on loans and aids to finance development projects and consumption expenditure in the economy (Attefah and Enning, 2016).

In order to ensure a sustainable level of public debt across the West African sub-region, the West African Monetary Zone (WAMZ) recommends a 60 percent debt to GDP sustainability threshold. Debt per GDP ratio for Ghana was below this threshold from 1990 till 1999. Within this period, debt to GDP ratio averaged 39.52 percent, which was very desirable. The debt situation in Ghana reached an alarming level of 80.2 percent (debt to GDP ratio) in 2000. This was mainly due to fiscal imbalances, lower tax base, high interest payments and so on. After relieving the country of its external debt under the HIPC program in 2000, debt to GDP ratio has been below the WAMZ 60 percent sustainability threshold from 2002 to 2017. The country has experienced persistent growth in debt to GDP ratio from 2011 till 2019. In 2018 and 2019, the level of debt to GDP ratio exceeded the threshold level. The levels recorded for 2018 and 2019 were 63.2 and 63.9 percent respectively (IMF, 2021; AFRODAD, 2013; Aimola and Odhiambo, 2018).

The continuous growth of public debt in Ghana has raised a lot of concerns. These concerns have led to the need for assessing the impact of the country's debt on economic growth. The existing literature on the debt-growth nexus for Ghana has provided mixed results. This is partly due to the use of different estimation techniques, different study time periods, as well as the employment of different variables. In terms of estimation techniques, a number of studies adopted the use of a multiple OLS regression technique which is not ideal for establishing relationships between time series variables. These studies include Adi (2019) and Anning *et al*. (2016). Using a multiple OLS regression without checking for the stationarity status of the variables and applying the right time series estimation technique would result in a spurious regression (Gujarati, 2003). This study will employ either the ARDL or Johansen Cointegration Method which are appropriate for estimating time series relationships. This will be consistent

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with works by Owusu-Nantwi and Erickson (2016), Frimpong and Oteng-Abayie (2006) and Ackon (2019). Another limiting factor of these works is their respective period of study. The most recent of the works is Ackon (2019) which used data over the period 1965 – 2017. The average debt per GDP ratio of 61.8 percent from 2017 to 2019 represents a value which is above the 60 percent sustainability threshold prescription by the WAMZ. It is very important to ascertain whether this short term changes will have a significant effect on the debt-growth nexus for Ghana. This study will provide a more updated estimate of debt-growth and debt- investment nexus for Ghana covering the period 1983 – 2019.

Economic growth in most of these studies has been consistently measured by either GDP or GDP growth rate. Anning *et al.* (2016) and Ackon (2019) used GDP, while Adi (2019), Owusu-Nantwi and Erickson (2016) and Frimpong and Oteng-Abayie (2006) used GDP growth rate as a proxy for economic growth. This thesis will digress from using any of these proxies as a measure of economic growth. In order to factor into account welfare implications of variables such as GDP and GDP growth rate, GDP per capita growth rate will be used as a measure of economic growth. This measurement reflects the expected wellbeing of individuals within the country Akram (2011).

Studies on the debt-growth nexus for Ghana are mostly carried out using either external debt or Debt to GDP ratio without regarding other debt indicators such as debt servicing or interest payment variables. Frimpong and Oteng-Abayie (2006) and Ackon (2019) relied on external debt while Adi (2019) and Owusu-Nantwi and Erickson (2016) relied on total debt per GDP. These studies only provide a narrow view of how debt affects economic growth in Ghana. This thesis realizes the need to also ascertain how other debt indicators such as debt servicing affects economic growth. This study will include debt servicing as an additional debt indicator that affects growth. This gives a broader view of how debt indicators affect economic growth in Ghana.

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In addition to this, most studies in the literature depend heavily on the assumption of investment being the major channel through which debt suppresses economic growth. This includes Clements *et al.* (2003), Akram (2011), Bilan and Iulian (2015), Fiagbe (2015), Sanchez- Juarez and Garcia-Almada (2016), Anning *et al.* (2016), Adi (2019) and many others. A few empirical studies including Clements *et al.* (2003), Akram (2011) and Sanchez-Juarez and Garcia-Almada (2016) have tried to ascertain whether this is true or not. Clements *et al*. (2003) and Sanchez-Juarez and Garcia-Almada (2016) provided results that confirmed the assumption that investment is the main channel through which debt affects economic growth. Akram (2011) provided results that did not confirm this assumption. In the context of Ghana, the effect of public debt on economic growth does not attempt to verify the claim that investment is the main channel through which debt affects national income. This thesis will verify whether investment is a justifiable channel by modelling it as an interactive term with external debt and debt servicing in the econometric analysis. This thesis will also assess whether Ghana's level of investment is significantly affected by external debt and debt servicing.

1.3 Research Questions

The main research questions of this study are:

    i.   What are the impacts of external debt and debt servicing on economic growth in Ghana?

    ii.   What are the impacts of external debt and debt servicing on investment in Ghana?
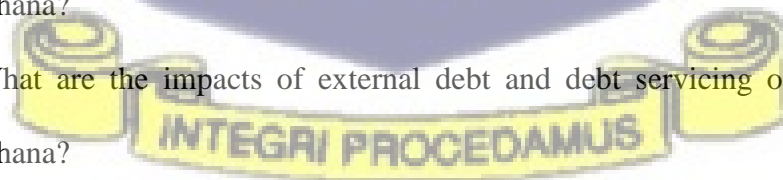
1.4 Objectives of the study

The main objectives of the study are:

    i.   Examine the effects of external debt and debt servicing on economic growth in Ghana.

    ii.   Determine the effects of external debt and debt servicing on investment in Ghana.

1.5 Significance of the study

Prior studies on Ghana's debt-growth nexus includes: Frimpong and Oteng-Abayie (2006), Owusu-Nantwi and Erickson (2016), Ackon (2019), Anning *et al.* (2016), and Adi (2019). These works have provided mixed results. A positive debt-growth nexus was found in Frimpong and Oteng-Abayie (2006), Owusu-Nantwi and Erickson (2016), Ackon (2019), and Adi (2019). Anning *et al.* (2016) realized a negative debt-growth nexus for Ghana. In all these works, none of them uses multiple debt indicators (external debt, domestic debt or debt servicing) as control variables in its econometric modelling and analysis. Most of these studies rely heavily on only external debt, which represents just one component of public debt indicators in Ghana. These studies include Frimpong and Oteng-Abayie (2006) and Ackon (2019). It is also very prudent to analyze the debt-growth nexus to cover a wide range of debt indicators. This study will not only contribute to the existing literature, but will provide a general and more current empirical evidence of the debt-growth situation in Ghana. In addition to this, the study will suggest distinct policy implications for the various debt indicators used in the analysis.

Econometric modelling and estimation techniques play a very crucial role in establishing relationships between time series variable. For a time series study, it is worth noting that, the stationarity level of the variables used in the study is very important. Estimations made without regarding this diagnostic test results in spurious regressions Gujarati (2003). The estimations found in Anning *et al.* (2016) and Adi (2019) and made no attempt to determine whether the

variables used are stationary or not. This study will adopt an appropriate estimation technique (ARDL or Johansen Cointegration method) which are primarily based on stationarity test results. This implies that this study will provide estimates that are more reliable for prediction.

In all the above mentioned works, none tried to analyze the effect of public debt on economic growth in "step relationships"- which ultimately determines the validity of considering investment as the sole means through which debt affects output. (Presbitero, 2005). These "step relationships" as adopted by Presbitero (2005) involves estimating two different econometric models. The first model will involve an estimation of the impact of both external debt and debt servicing on Ghana's economic growth. The second model of econometric analysis will determine the impact of external debt and debt servicing on investment in Ghana. This second analysis provides a test of the significance of using investment as an interactive variable through which public debt indicators affect economic growth. Fosu (1996) argues that, public debt could affect growth by dampening factor productivity and not necessarily through the reduction in investment. This study will test the importance of investment in the overall effect of public debt on economic growth in Ghana.

1.6 Research Scope and Data Sources

The study is country specific: that is, assessing the effect of external debt and debt servicing on economic growth and investment in Ghana. This study covers a time period of 37 years (1983 – 2019). This choice is based on the unavailability of data for all variables in the preceding and succeeding years of the stated time period of study. The study is based on secondary data which will be sourced from IMF's World Economic Outlook database, World Bank's World Development Indicators, and the Bank of Ghana's online database.

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1.7 Organization of the study

This study is made up of six (6) chapters. Chapter One (1) provides a background information on public debt, investment and economic growth. This chapter provides a discussion of the various effects of high public debt levels on macroeconomic variables. The research questions and objectives of the study are found in this chapter. Chapter Two (2) gives an overview of the debt, investment and economic growth in Ghana. Chapter Three (3) provides theoretical and empirical reviews on debt-growth nexus, as well as debt-investment nexus. The methodology used for this study is discussed in Chapter Four (4). Chapter Five (5) is made up of estimations as well as the discussion of results obtained from the study. The study is concluded with Chapter Six (6), which entails the summary, conclusion and policy recommendations.

CHAPTER TWO

OVERVIEW OF PUBLIC DEBT, INVESTMENT AND ECONOMIC GROWTH IN GHANA.

2.1 Introduction

This chapter provides an overview of the debt situation in Ghana. It also includes trends and analyses of key public debt indicators such as external debt, debt to GDP ratio and debt servicing in Ghana. A compositional analysis of total public debt in Ghana is also discussed in this chapter. The chapter also provides an overview of both investment and economic growth in Ghana. It is finally concluded with a summary of the general debt-growth and investment situation in Ghana.

2.2 Public Debt in Ghana

After achieving independence, the need to achieve rapid transformation from an agricultural based economy to an industrial one became very eminent. The country relied mostly on the export of raw materials as a major means of generating income from trading with the international community. In order to transform the economy, there was the need to generate more income in order to build industries nationwide. On the other hand, resources needed to fund most of these projects nationwide were lacking. With an undeveloped domestic funds market, government resorted to borrowing from the external funds market to cater for the importation of necessary equipment for the execution of state projects. This habit has perpetuated till modern times, leaving the country in a highly indebted state (AFRODAD, 2013).

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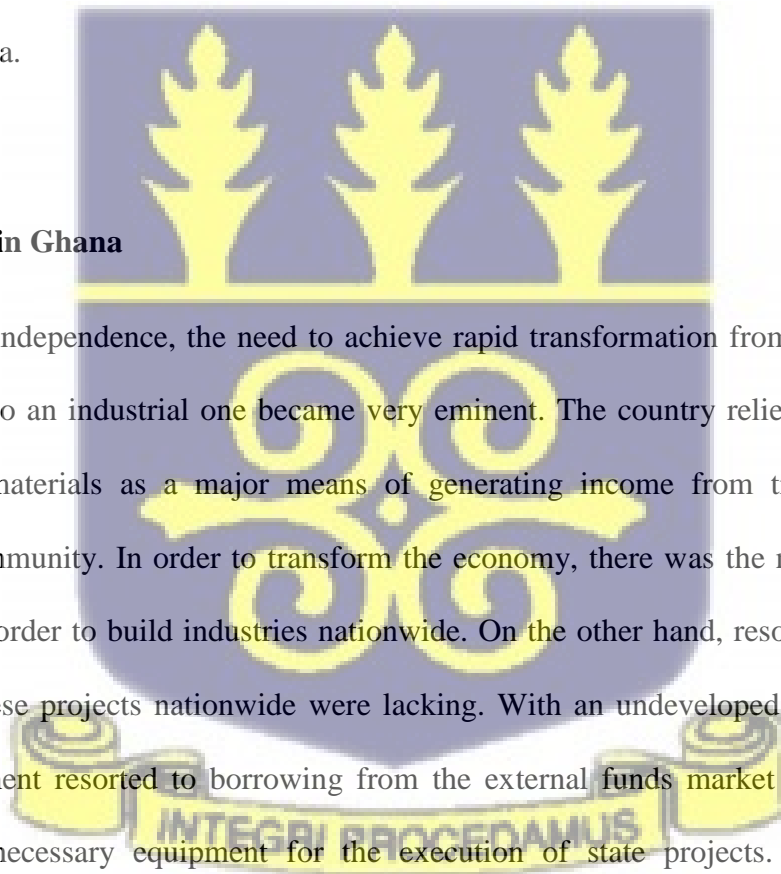
The country's debt situation has been a major concern since the year 2000, where it entered into the Highly Indebted Poor Countries (HIPC) initiative following its high indebtedness coupled with relatively lower levels of economic growth. Since this time, public debt to Gross Domestic Product (GDP) ratio has been skyrocketing above the 60 percent sustainability threshold recommended by the West Africa Monetary Zone. (Aimola and Odhiambo, 2018). This is very evident from the recorded levels of debt per GDP ratios of 63.23 and 63.9 percent in 2018 and 2019 respectively. This has called for major concerns since various assertions and thoughts about this phenomenon will imply huge debt obligations, leading to lack of capital for investment into other important sectors of the economy. This growth in public debt can largely be attributed to lower commodity costs, fiscal imbalances (deficits), higher costs of borrowing with high interest payments, and deliberate narrowing of tax base (AFRODAD 2013; MTDS, 2010).

The country's Debt to GDP ratio for the period 1990-2019 is shown in Figure 2.1.
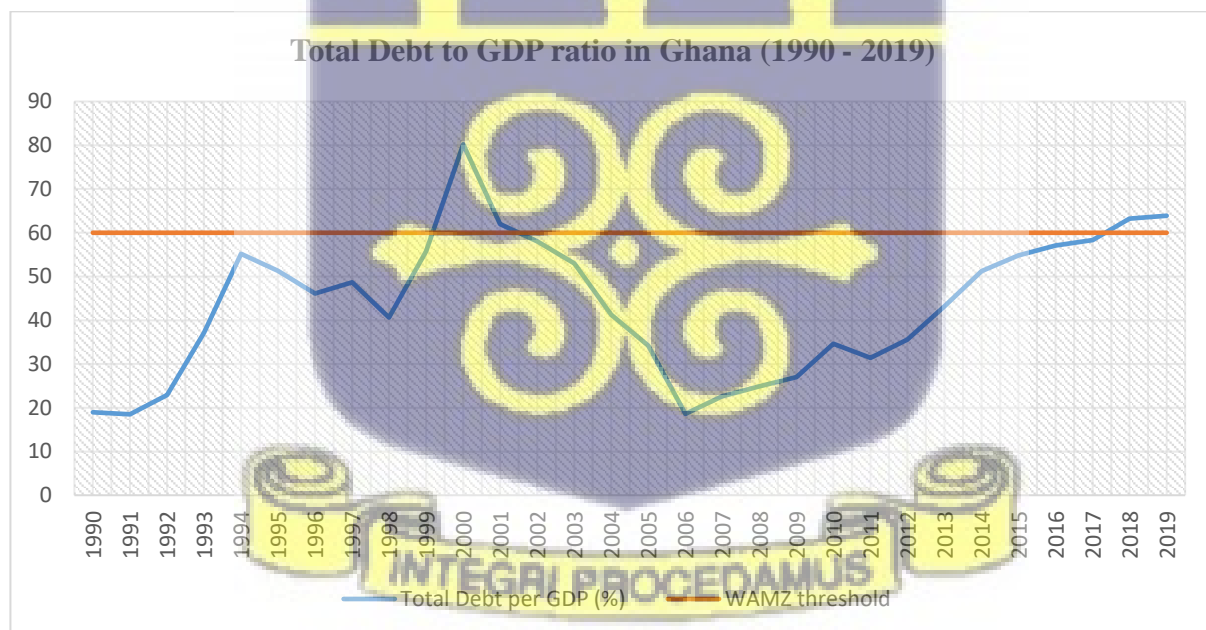
Figure 2.1: Trends of Total Debt to GDP ratio for Ghana (1990 – 2019).

Source: (IMF) – Author's compilation using Excel.

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From Figure 2.1, total debt to GDP ratio between 1990 and 1999 was below the 60 percent threshold prescribed by the WAMZ. This period was few years after the country's adoption of the Economic Recovery Program (ERP) and Structural Adjustment Programs (SAPs) in the 1980s. Total debt to GDP averaged 39.52 percent within this period. This average level was desirable until the unprecedented increases in debt per GDP to 80.2 and 62 percent in 2000 and 2001 respectively. This increase in debt to GDP can be attributed to the continuous reliance on external funds to cater for the continuous deteriorating state of government fiscal deficit as well as the sharp reduction of earnings from exports. Following the country's declaration as HIPC and its debt relief from international organizations such as the African Development Bank (AfDB), IMF, and the International Development Association (IDA) under the Multilateral Debt Relief Initiative, the level of debt to GDP ratio has continuously reduced from 2000 (80.2 percent) to 2006 (18.6 percent). After 2006, debt to GDP ratio has experienced a continuous rise from 22.6 percent in 2007 to 58.3 percent in 2017. In the years 2018 and 2019, the country experienced high levels of debt to GDP. An increase from 63.2 percent in 2018 to 63.9 percent in 2019 implies that the current debt situation in Ghana is alarming (IMF, 2021).

In terms of external debt, the debt situation is very similar in terms of trends and patterns to total debt to GDP. This is shown in Figure 2.2.

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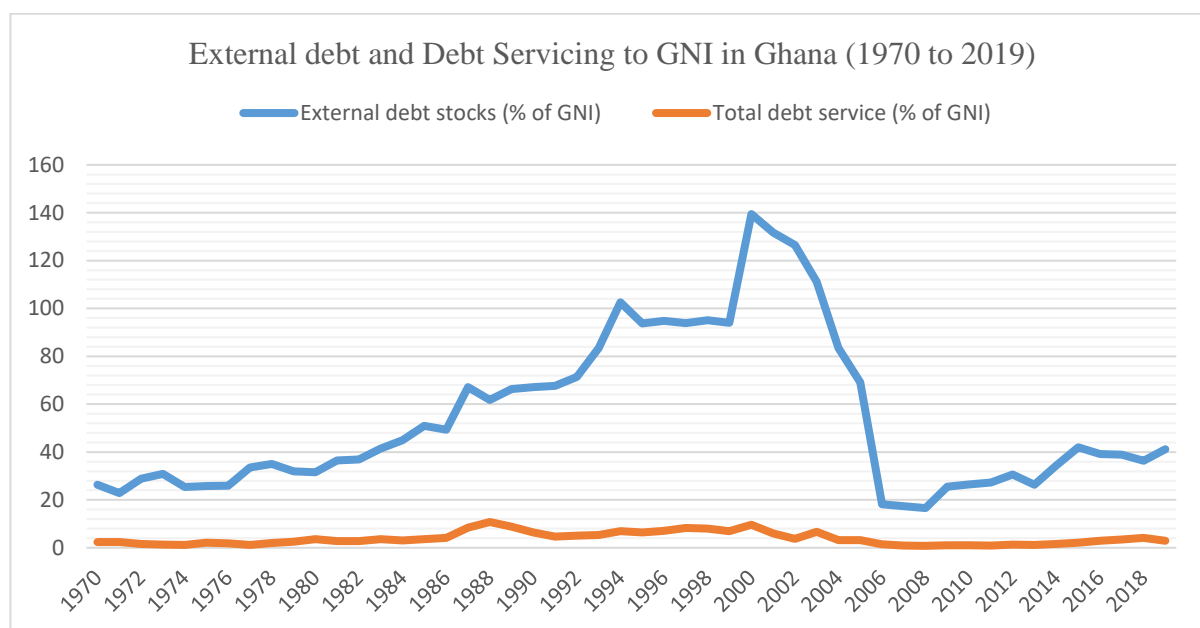
Figure 2.2: Trends of External Debt and Debt Serving to GNI ratio for Ghana (1970 – 2019).

Source: World Bank – Author's compilation using Excel.

The dynamics of external debt to GNI ratio is very similar to total debt to GDP ratio. This is due to the fact that, the country's composition of total debt stock is mostly dominated by external debt (Bank of Ghana, 2021). External debt increased gradually from 26.35 percent in 1990 to a maximum of 139.44 percent in 2000. This continuous increase was due to the prevailing effect of the global recession in the 1970s coupled with a persistent balance of payment problems which was very common in most Sub-Sahara African countries (Tran, 2018). After the country's relief of its external debt burden, this resulted in a continuous fall in the level of external debt per GNI from a maximum of 139.44 percent in 2000 to the minimum of 16.58 percent in 2008 (World Bank, 2021). This achievement was due to the country's sustenance of a consolidated fiscal discipline coupled with the adoption of appropriate strategies even before the adoption of the Medium-Term Debt Management Strategy in 2000. In addition to this, the country's relief of its external debt also played an important role in this achievement (Aimola and Odhiambo, 2018).

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Total debt servicing activities has been given little attention, indicating the country's inefficiency in servicing debt. With the 15 percent sustainability threshold by the IMF, the country has performed poorly with respect to servicing debt. The highest level of debt servicing per GNI was in 1988 at a 10.77 percent rate and a minimum rate of 0.81 percent in 2008. The average level of debt servicing during pre-HIPC declaration period was 4.66 percent. This level reduced to 2.54 percent in the current post-HIPC declaration period. This indicates that, debt servicing obligations are not being carried out effectively as prescribed by the IMF.

Total Debt Stock in Ghana is mainly made up of domestic and external public debt. Figure 2.3 shows the composition of Total Debt stock in Ghana from 1983 to 2019.
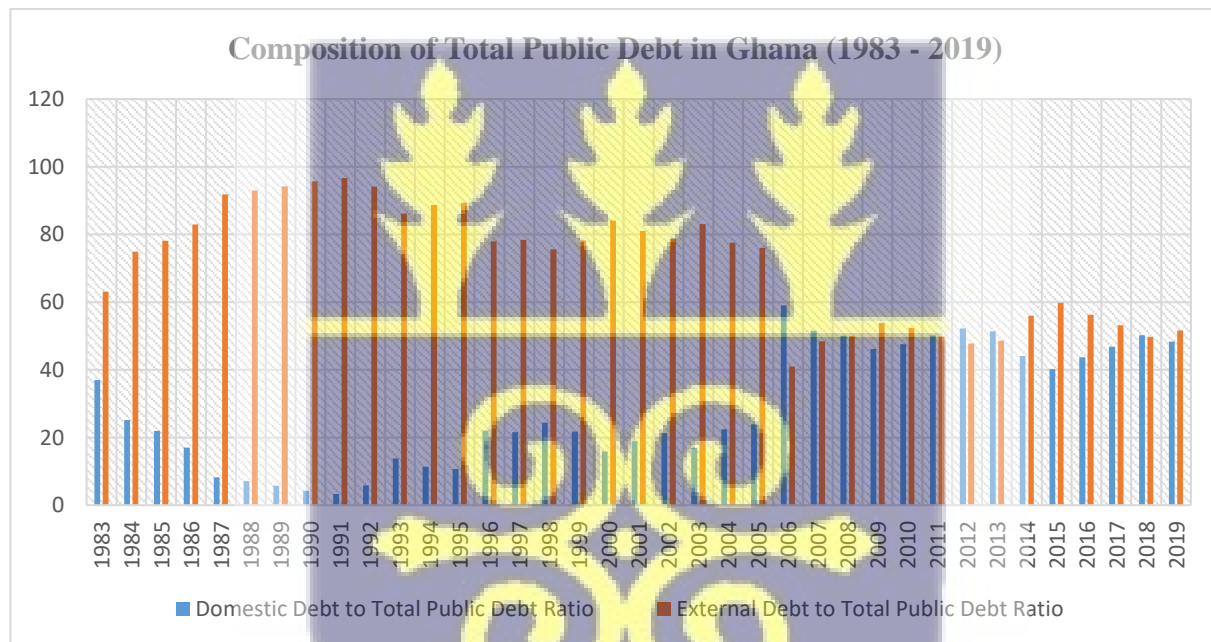
Figure 2.3: Trends in the Composition of Total Public Debt in Ghana (1983 – 2019).
Source: Bank of Ghana Database – Author's compilation using Excel.

Before 2006, external borrowing constituted a greater part of total public debt. The domestic funds market was not developed enough to support the financial needs of the government. Funds needed to fund government expenditure were impossible to totally generate on the domestic market (Fosu, 2001). Domestic public debt averaged 15.92 percent, while external debt

averaged 84.08 percent. This dominance by external debt in the composition of total public debt ended in 2006 where domestic debt level was 50.01 percent with external debt level of 49.99 percent. This continued in both 2007 and 2008. In 2007, domestic debt constituted 51.58 percent whereas external debt constituted 48.42 percent of the country's debt stock. In 2008, domestic debt constituted 50.02 percent of debt stock whereas external debt constituted 49.98 percent of total debt stock in Ghana. According to Aimola and Odhiambo (2018), this change in the component of total debt stock in the mid-2000s was due to the country's relief of external debt under the Multilateral Debt Relief Initiatives after the country was declared HIPC in 2000. Domestic debt increased as a result of increases in the issuance of various time-bound debt instruments by the government as well as the implementation and strict adherence to domestic debt management strategies. After these domestic debt management strategies, domestic public debt has averaged 46.67 percent, an indication of the effectiveness of these strategies (Bank of Ghana; 2021; WAIFEM, 2007).

In recent times (2009 to 2019), external debt has been a dominating component of total public debt with an average of 52.66 percent. Total domestic debt as a component of total debt averaged 47.34 percent during this period. This implies that, in recent times government mostly depends on external borrowing as a means of financing fiscal deficits.

The Bank of Ghana and Ministry of Finance are the main public institutions mandated to carry out these strategies in the quest of maintaining public debt at a sustainable level. The country's main working document geared towards debt management practices is the Medium Term Debt Strategy, which was published in 2010. This document contains sets of optimal mix of both domestic and external debt management strategies, and is revised year after year. In terms of external debt management, an optimal level of both concessional and non-concessional funds is required to maintain a sustainable external debt level. External debts are financed primarily through borrowing and grants, which must be greater than 35 percent, use of commercial

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facilities, development of innovative products, creating contingent liabilities and lend facilities. Domestic debt management strategies include developing domestic markets, ensuring the right levels of short, medium and long term funds, lengthening the maturity profile of debt, debt refinancing and others. Domestic debt is financed by using established benchmarks issues in time-based debt instruments (Ghana MTDS, 2010; Aimola and Odhiambo, 2018).

2.3 Investment in Ghana

Investment is undoubtedly one of the crucial economic activities and component of growth in every economy. The Keynesian view explicitly argues that, increases in investment will ultimately lead to an increase in aggregate demand. Other components of growth such as household consumption and public expenditure are fairly stable, with investment relatively sensitive to changes. This is due to the fact that, capital is highly mobile and can easily be moved from one country to another depending on how favorable the business economy in the other country is. In view of this, any slowdown in the growth of investment ultimately slows down the growth of the economy. This has been proven in most empirical studies in Africa, Latin America and Asia – (Keynes, 1936; Gnansounou, 2010; Pfefferman and Madarassy, 1990).

After Ghana's independence in 1957, investment has been given much attention, as a component to propel growth. Investment in Ghana has taken two forms. The first being the "direct investment" and the latter, the "indirect investment" form. Investment took a direct form right after independence. Government issued direct orders for banks to provide funds to important sectors within the economy in order to propel economic growth. The main sector to benefit from such initiative was the industrial sector, as government had the intention of moving Ghana from an agriculturally dependent state to an industrialized state. Most state-owned enterprises during this era were highly inefficient and unproductive, hence, leading to lower

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levels of expected output. The drought in 1983, external shocks, together with the ineffectiveness of state owned enterprises led to massive reductions in growth, savings and hence, investment (Attefah and Enning, 2016).

The prevailing evidence of state inefficiency led to the redundancy and rejection of the Bretton Wood system, leading to the country's enrolment on the Structural Adjustment Programs (SAPs) and the Economic Recovery Program (ERP) in the 1980s. This ushered the country into the "indirect investment" era. The main idea was to reduce the level of state intervention and encouraging both full and part privatization of most state enterprises, as well as providing an "enabling" environment for the market to generate desired outcomes. During this era, the financial sector was deregulated in other to boost investment. The foreign exchange reforms were also adopted in order to propel exports. Government introduced policies such as the reduction of corporate tax from 32.5 percent (2005) to 28 percent (2006), tax holidays, mopping up excess liquidity to control inflation, accelerated depreciation allowances, reduction of import duties on equipment, reforming the capital income tax, and so on. These policies were introduced in an attempt to boost private investment. Several policies have been introduced by government in collaboration with the Ghana Investment Promotion Centre (GIPC) to help propel investment nationwide. With all these attempts to boost investment, the growth of investment has been slow (Asante, 2000; Attefah and Enning, 2016).

Figure 2.4 provides the trends of Total Investment to GDP ratio in Ghana from 1983 to 2019.

Investment to GDP ratio (%)
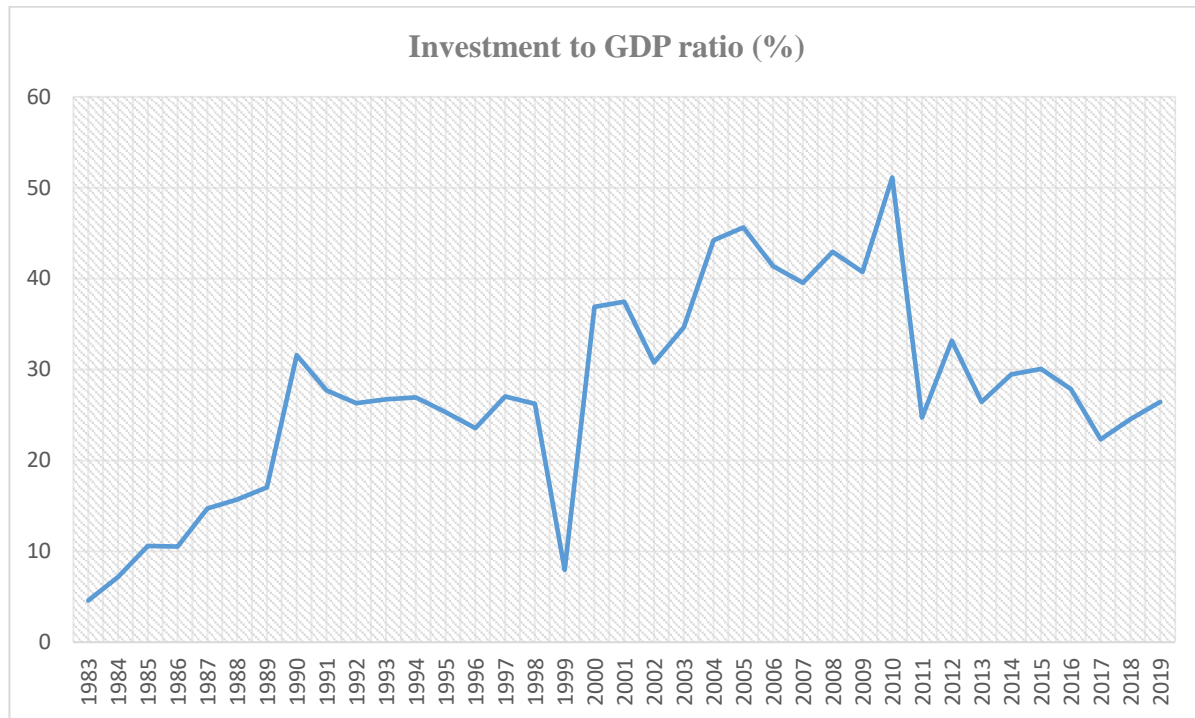
Figure 2.4: Trends of Investment to GDP ratio in Ghana (1983 to 2019).

Source: IMF's World Economic Outlook – Author's compilation using Excel.

From Figure 2.4, it is evident that Ghana's investment to GDP has exhibited an unstable trend since 1983. Within the period of study (1983 to 2019), the minimum recorded investment per GDP level was 4.59 percent in 1983 with a maximum value of 51.13 percent in 2010. The minimum level of 4.59 percent is justifiable due to the unfavorable economic conditions and drought in 1983. The average level of investment per GDP over this period of time is 27.57 percent, which is favorable for propelling economic growth. The highest level of investment of 51.13 percent in 2010 can be attributed to the country's discovery of oil in that same year. In 2011, this value dropped to 24.7 percent and then rose to 33.15 percent in 2012. The value of investment has been fairly unstable after 2012, showing no sign of either a continuous rise or fall. The value of investment per GDP averaged 26.73 percent after this period.

2.4 Economic Growth in Ghana

Achieving a sustained economic growth in Ghanaian has come of great interest during the pre and post-independence era where GDP per capita growth rates were matched with other developing countries such as South Korea, Taiwan, and many others. The main strategy for growth acceleration during the pre-independence era was the high dependence on agricultural-based industries to process and export primary products including cocoa, gold and timber. During this era, growth rates were fairly stable until the mid-1960s when the price of cocoa dropped on the international market. This had a great impact on GDP per capita growth since exports contributed a large proportion of total GDP (Darko, 2015; Berry, 1994).

The country has experienced high volatility of GDP per capita from the mid-1960s to the mid-1980s. This is partly due to the fall in cocoa prices on the world market, and the political instability within that period of time. As suggested by Jong-a-Pin (2009), economic growth is highly sensitive to political instability. Politically unstable countries are characterized by halts in most economic activities nationwide. This halt in economic activities affects GDP, hence, slowing down economic growth. The military coup d'états from 1978 to 1982 adversely affected growth rates recorded in 1978, 1979 and 1982. High levels of inflation were also recorded during these events (Anyemedu, 1993; Darko, 2015).

The drought in 1983 was another significant event that retarded growth of the country in the early 1980s. Unlike the other events, this was natural and was unavoidable. The drought led to the decline in production of agricultural products which were vital for local consumption and exports. This resulted in high levels of inflation, coupled with significant declines in capital formation and GDP growth rate. This was due to the country's over-reliance on agriculture as the main engine to propel economic growth. During this period, the economy nearly collapsed with an inflation rate of 123 percent, an increase from a level of 116.5 percent in 1981 (Aisen and Veiga, 2006; Darko, 2005).

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The high rate of volatility in GDP per capita between 1963 and 1983 is shown in the figure below:
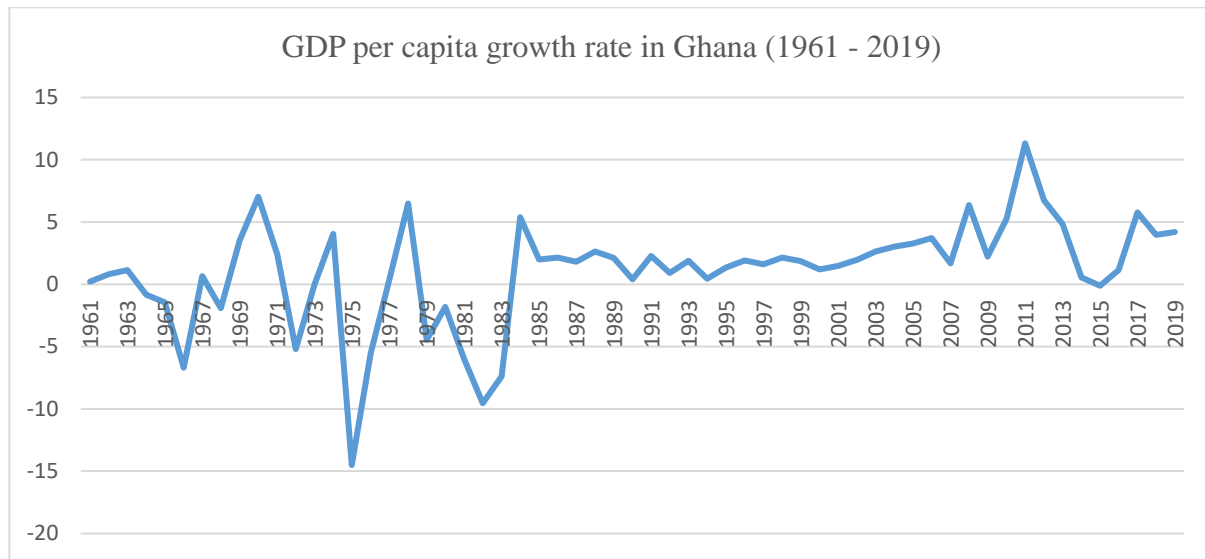
Figure 2.5: Trends of Growth in GDP per capita for Ghana. (1961 to 2019)

Source: Author's Construct using World Development Indicators (World Bank, 2021) and Excel.

Between 1963 and 1983, growth rate of GDP per capita averaged -1.89 percent, with a minimum value of -14. 51 percent which was recorded in 1975, and a maximum value of 7.02 percent in 1970. This summarizes how poor economic growth was within that era.

The need to accelerate growth and get the economy back on track resulted in the adoption and implementation of the Economic Recovery Program (ERP) and Structural Adjustment Programs (SAPs) and which was spearheaded by the IMF and World Bank in the 1980s. These programs were implemented with the main objective of restoring the economy back to normal state and a further plan of making it both efficient and sustainable. Under these programs was the aim of reducing fiscal budget deficit by increasing export activities and ensuring a healthy level of fiscal discipline. This proved to be very effective, leading to a positive GDP per capita growth in the following year together with a reduction in inflation rates, a budget surplus, and increased in export earnings (World Bank 1988, 1990a,: Darko, 2015).

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The average GDP per capita growth rate after this period is 2.84 percent. The minimum and maximum values are -0.11 percent in 2015 and 11.32 percent in 2011 respectively. This implies a favorable growth of the economy in comparison with the previous era. (Pre-SAPs and ERPs). The maximum growth of GDP per capita in 2011 was the highest ever recorded level of growth in the history of the country. The result of this growth was due to the discovery of oil and prevailing high prices of most primary commodities that served as export. The new discovery from the Jubilee field would provide revenue for the country in terms of oil rents, employment, FDIs, and many others. In this same year, the country made USD 2.6 billion out of oil, USD 4.5 billion out of gold and USD 1.9 billion out of cocoa. The country also performed better in terms of fiscal deficit, which fell from 5.9 percent in 2010 to 4.3 percent in 2011 (AEO, 2013; Darko, 2015).

The level of GDP to capita growth was expected to persist from 2011, after the country's discovery of oil. This expectation was not met as GDP per capita growth fell continuously from 11.32 percent in 2011 to -0.11 percent in 2015. This was the lowest ever recorded GDP per capita growth rate after the SAPs and ERPs in 1983. Government consumption expenditure increased sharply leading to a budget deficit in 2012, 2013 and 2014. This could be attributed to the expected persistence of a high GDP growth rate due to the discovery of oil. Government consumption expenditure within these years averaged 12 percent of GDP. This situation led to significant constraints to both debt and fiscal sustainability, which has perpetuated till modern times (World Bank, 2019; Darko, 2015).
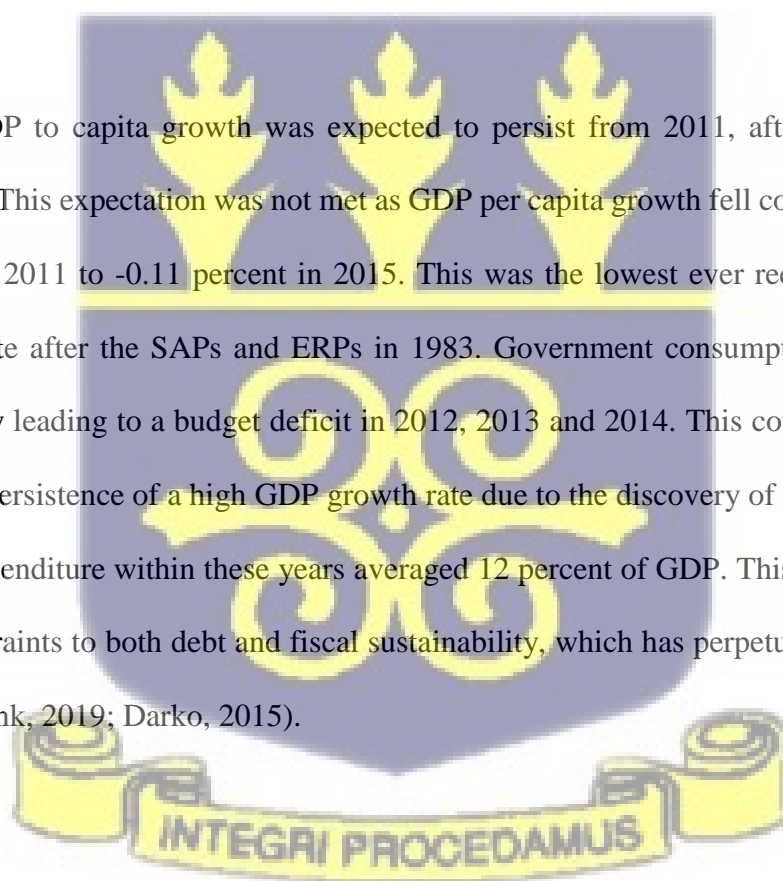
2.5 Summary of Chapter

The chapter shows how total debt per GDP and external debt has evolved in Ghana after the global recession and oil price shocks in the 1970s. The country has experienced persistent

growth in debt per GDP due to lower prices of export commodities, high interest payments, under-developed domestic funds market, persistent fiscal imbalances, and many others. This situation continued until the country was enrolled on the HIPC program and relieved of its external debts. The HIPC initiative rolled out in 2000 had a significant effect on the country's debt situation. This was until 2006 where external debt and total debt per GDP level has increased continuously till 2019, coupled with lower levels of debt servicing. This situation still persists in the present Ghanaian economy. In Ghana, the component of total public debt is mostly dominated by external debt.

In Ghana, the droughts in 1983, and other external and internal conditions such as political instability, and many others led to lower growths in both investment and economic growth. The Economic Recovery Program (ERP) and Structural Adjustment Programs (SAPs) and by the IMF and World Bank were adopted in order to revive the economy. These programs have had a significantly fair improvement on both investment and economic growth in Ghana.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter provides a theoretical and empirical literature review on the relationship between public debt, investment and economic growth. The chapter is basically made up of three parts. The first part entails the theoretical literature review, followed by the review of empirical studies, which is the second part. Empirical works on debt-growth and debt-investment nexus are reviewed in the second part of this chapter.

3.2 Theoretical Literature Review

This section provides a theoretical review of the existing relationships between public debt, investment and economic growth. In most of the cases, the theoretical works use investment as a transfer mechanism through which public debt affects economic growth. This is because of the direct impact of investment on economic growth.

3.2.1 The Classical View on Public Debt, Investment and Economic Growth

According to classical Economists, the impact of public debt on investment and economic growth is ambiguous, depending on the level and activities these funds are channeled into. Public debt has the potential of being used for consumption purposes, thereby, diverting resources from a potentially productive activity (investment) to an unproductive activity (consumption). The effect is relatively greater in countries with lower levels of capital stock. Governments are willing and more able to pay back borrowed funds than individuals since it has the ability to tax and even borrow to service previous debt. With increases in demand for these funds without increases in supply, price (interest rates) of loanable funds in the market

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increases, hence making it very costly for individuals to access these funds for productive activities. Public debt can contribute to growth if the level is sustainably accepted and the funds are used for productive activities such as investment. In this case, borrowing becomes an acceptable means of generating funds for such activities (Say, 1880).

According to Mill (2004), the source of the fund determines the effect it will have on investment and growth. Funds from external sources are expected not to have any effect on interest rates in the domestic market. This is because, in most cases, governments do not compete with individuals over external funds. External funds could just be surplus funds from the international market, hence increases in demand will have no effect on domestic interest rates. This ensures that, investment and economic growth remain unchanged. Governments and individuals compete for loanable funds in domestic loanable fund markets. This competition in the market leads to increases in interest rates, thereby, crowding out private investment which will ultimately lead to a fall in output.

3.2.2 Ricardian Equivalence

This concept asserts that, the burden of government expenditure on the society is as a result of government's inefficiency and wastefulness, but not reasons of poor sources of funding. This implies that, whether funds are obtained externally through borrowing or domestically through taxation, government will be wasteful with the funds obtained. If government borrows to finance its budget deficit through debt instruments, it passes the burden unto citizens through increases in taxes in the future, generating enough funds to cater for debt obligations. The current generation enjoys reduction in taxes, which is intended to increase level of consumption, thereby postponing debt burden into the future. Individuals being aware of this will respond by not increasing consumption (because of a reduction in taxes), but by increasing the level of savings and investment. This amount of savings and investment is presumed to be equal to the reduced taxes. In the future, taxes are raised and this results in a reduction in savings and

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investment by an equal amount, with consumption remaining unchanged. In effect, government debt does not crowd out investment, nor affect consumption level. This implies that, both investment and economic growth do not respond to changes in the level of public debt (Elmendorf and Mankiw, 1999; Roberts, 1942).

3.2.3 Debt Overhang Hypothesis

This hypothesis is based on the idea that, there is a likelihood that a country will over-accumulate its debt and will be unable to pay in the future. The model was developed in the 1980s when debt rescheduling was a common behavior in most countries around the world. When debt is over-accumulated and the country is unable to pay, this increases the expected debt service cost which is transferred into a higher marginal tax rate on various investment portfolios. This discourages domestic and foreign investment, and hence, downsizes economic progress. This implies that, public debt should be sustained at a reasonable level. The debt overhang hypothesis asserts that, higher levels of public debt downsizes economic growth for the debtor country but propels economic growth for the country the debt was sourced from (Krugman, 1988; Sachs, 1989).

In most of the theories discussed, a consistent emphasis is placed on physical capital. The fall in investment levels due to higher taxes is not only limited to physical capital. According to Hjertholm (2001), any activity that ensures an increase in output but involves a future cost will be affected when public debt increases. These activities include education, health, technological advancement, and so on. The debt overhang problem affects a wide range of investment activities, which slows down economic growth.

3.2.4 Crowding out Effect of Public Debt

This theory postulates that, a higher debt leads to higher debt servicing obligations and hence, reduction in the desired level of investment into productive ventures within the economy. This

implies that a reduction in debt servicing obligations propels current investment. In this case, government will devote revenue from fiscal activities and export receipts into productive investment ventures. Contrary to this, if there is an increase in debt servicing, public investment will reduce. In the case where private investment is complementary to public investment, this will lead to lower levels of output (Diaz-Alejandro, 1981).

3.2.5 Lerner's View on Public debt, Investment and Economic Growth

Lerner (1943) posits that when government is inefficient in raising revenue, it resorts to either printing money or borrowing. In most cases, deficits in government budgets are covered up by borrowing. This option is due to inflationary outcome of financing deficits with the printing of money. Since interest rate is one of the major determinants of investment, public debt is encouraged only at the most desirable interest rate. At this desirable rate, the individuals should find it more comfortable to hold more bonds than money in the form of cash. The amount of money held should be optimal, with no desire to hold any extra amount of government bond. This is to ensure that interest rates do not stay too low in order to propel investment expenditure by the private sector. According to Lerner, an increase in the investment expenditure by the private sector leads to inflation. The main purpose of issuing public debt is to achieve the optimal rate of interest rate for private investment in order to control inflation. This forms part of Lerner's theory of functional finance which asserts that, the efficiency of fiscal policies is measured by its effect as against its soundness.

Some economists including Hansen (1946) hold the view that, keeping a reasonable debt to GDP ratio and having enough tax revenue to source interest payment is healthy for an economy. Lerner disagrees with the latter part of this assertion. He strongly disagrees with the use of taxation as a source of financing interest payment. According to him, when higher taxes are imposed with the aim of raising revenue to finance public debt, this discourages private investors by reducing the returns on investments that involves a higher level of risk. Investors

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become exposed to the possibility of not been compensated for their losses in these investment activities. This will force the government to further increase taxes just to maintain a reasonable amount of both employment and income. This burden of public debt in the form of higher taxes makes private investment less profitable (Lerner, 1943).

3.2.6 Modigliani's Theory on Public debt and Investment.

According to Modigliani (1961), changes in the level of public debt have an effect on either current or future generations depending on the direction of change. In this theory, interest rate represents the burden or gain from a change in public debt. This effect can also be offset depending on the use of funds obtained from borrowing. In the case of an increase in public debt, the current generation does not bear its burden. This is passed onto the next generation through a reduction in private capital stock. This reduction in private capital stock in the future can be offset if the debt is used to fund government expenditure that has the potential of increasing real income in the future. On the other hand, when government reduces public debt, this reduces the level of public capital for productive public investment that will propel growth. This results in a generational disparity which tends to favor the current generation. Reduction in the level of public debt reduces the interest rate, making it relatively cheaper for the growth in private capital stock and investment. This decrease in interest rate propels investment and growth in the future.

3.2.7 Keynesian View on Public debt, Investment and Economic Growth

The Keynesian view suggests that, high levels of public debt tends to slow down investment and hence, economic growth. Financing public spending using public debt has two main effects. The first effect suggests the fact that, public debt is used to finance public spending which increases output. On the other side, increases in public debt are very likely to increases taxes across board. This leads to a fall in consumption, as well as adding up to the cost of capital,

making it relatively expensive to invest. Decreases in the levels of both investment and consumption reduce the growth rate of the country. At a moderate rate of public debt, the latter effect is almost negligible. This highlights the fact that, the impact of public debt on economic growth will be positive. Since the level of tax revenue is proportional to economic growth, the increase in national output will translate into increases in tax revenue without an increase in the rates. The increases in tax revenue will be used to facilitate debt servicing obligations (Varughese, 1999; Ferreira, 2009).

3.2.8 Neoclassical View on Public debt, Investment and Economic Growth

The relativity of changes in both economic growth and interest rates determines the overall effect of public debt on growth. If the economy grows faster than increases in interest rates, it ensures that a meaningful amount of capital is being accumulated to take care of a proportionally lower level of investment that will be crowding out due to increases in domestic interest rates. This improves the welfare of both current and future generations. On the other hand, when growth in interest rates is higher than growth of the economy, this will imply that, the level of investment crowded will be higher than the accumulated capital. This situation will make public debt as an option of financing budget deficit and unfavorable option (Saint-Paul, 1992).

In most cases, public debt is financed primarily through increases in household taxes. This reduces disposable income, consumption and savings in the future. Reduction in savings leads to a reduction in capital stock, slowing down the growth of capital formation. This is translated to reduction in economic growth. Both external and domestic debt have the same effect of reducing utility as a result of increases in taxes to help generate the needed funds to pay for both principal and interest components. Crowing out effect is more prevalent in the case of where the government relies on domestic debt. This is because, government debt are used as substitutes for physical capital in the portfolio of an individual holder. This replacement of physical capital

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by "promissory notes" crowds out investment, therefore leading to a decline in output (Diamond, 1965).

3.2.9 Endogenous Growth Theories and debt-growth relation.

Theories of endogenous growth assert that, whenever there is technological advancement, this increases capital stock which further increases the level of output. The level of savings and investment are proportional to changes in the level of output, implying that whenever there is an increase in output, this boosts the level of savings and investment. An improvement in the level of technology together with capital accumulation results in increases in output per worker. One key assumption of these theories of growth is that, technological growth is endogenous. Its level is determined by individuals' intentional response to market incentives. These theories also assume that, the cost of technology is fixed, having no additional costs to incur in the future. Interest and tax rates in these theories are assumed to be constant and therefore, government will always maintain a constant level of debt to GDP ratio in order to ensure a right balance of welfare for both current and future generations. When there is an increase in public debt, this increases the debt to GDP ratio, and further leads to a fall in growth rate of the economy. The government has to provide investment subsidies in order to increase output, ensuring the same level of debt to GDP ratio. This subsidy provided will become a burden on the future generation in the form of increases in taxes. On the other hand, when public debt is reduced, this reduces the debt to GDP ratio, and promotes economic growth in the economy. In order to keep a constant rate of interest, government mops up current level of investment by increasing taxes in the current generation. This retards savings, investment and hence, economic growth (Romer, 1990; Saint-Paul 1992).

3.2.10 Import Compression Effect

The value of a country's currency as well as its level of exports influences the impact economic of public debt on economic growth. In the case where a country's currency has a low value in the exchange market, higher levels of debt will require more foreign exchange for debt servicing. Debt servicing obligations are worsened when the said countries have lower levels of exports, capital inflows and reserves. In order to attract foreign exchange inflows, the country resorts to devaluation, depreciation or import restrictions. Commodities that are restricted may include capital goods and inputs meant for the production of goods and services. This action therefore leads to a reduction in production levels (Serieux and Yiagadeseen, 2001; Ndulu *et. al*, 1997; Taylor, 1983).

This study will be based on the Neoclassical Theory of public debt, investment and economic growth. The theory predicts that the effect of debt on growth is based on the relatively of growths in output and interest rates, thus ambiguous. Private investment in this theory is always eroded while public investment increases in the case of high interest rates that arise due to consistent increases in debt levels. This implies that, the effect of public debt on overall investment is also ambiguous. This study will be based on this theory, establishing the possible effects that public debt can have on investment and economic growth for Ghana.

3.3 Empirical Literature Review

This section reviews empirical studies on public debt, investment and economic growth. The section is basically made up of two (2) parts. The first part provides a review of empirical studies that examine the relationship between public debt and economic growth. The second part reviews studies that examine the impact of public debt on investment, as well as the impact of public debt on investment and growth.

3.3.1 Public debt and Economic Growth

Empirical studies on the effect of debt on economic growth started during the debt crisis in the 1980s. These investigations have either been across a region or country-specific. These studies yielded mixed results for the impact of public debt on economic growth. Some studies found a positive relationship between public debt and economic growth, while others found a negative relationship. In some of the studies, there was no significant relationship between public debt and economic growth.

One of the earliest studies on debt-growth nexus was carried out by Cunningham in 1993. The study was motivated by the growing state of public debt across countries in the 1970s and 1980s. The study was carried out using data from sixteen (16) developing countries for two different time periods. The first period was from 1971 to 1979. The second was from1980 to 1987. The study extended the normal Classical production function to include export as a control variable. This was done in order to explore the relationship between growth in export and output growth. Export was viewed by the author as an important determinant of growth since it affects the productivity of both capital and labor. This new production function was further extended to include public debt, suiting the possibility of assessing the impact of public debt on economic growth. An OLS technique was employed with capital, labor, debt burden and export as independent variables. The results of the study show a negative relationship between debt burden and economic growth for the first time period (1971 to 1979). The estimation for the second period was impossible due to lack of data. One key note of this paper was the fact that, debt burden affects economic growth by reducing the productivity of labor and capital, and not necessarily through a reduction in investment levels.

Afxentiou and Serletis (1996) conducted a study to evaluate how external borrowing affects productivity in fifty-five (55) selected countries over two different time periods; 1970 – 1980 and 1981 – 1990. The study grouped these countries into four separate categories depending on

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their level of debt and GNI per capita. The first categorized was indebted middle-income countries and consisted of fourteen (14) countries. The second was termed as moderately indebted low-income countries consisting of ten (10) countries. The third was made up of twelve (12) countries grouped as severely indebted middle country. The fourth and final group consist of nineteen (19) countries classified as low-income countries. The results found for the 1970 – 1980 period showed no relationship between external borrowing and productivity. The authors explained that this may be possible since these countries could have used the externally generated funds to cater for shocks in oil prices within that period. Results from the 1981 – 1990 period showed a negative relationship between external borrowing and productivity.

Bilan and Iulian (2015) ssessed the impact of public debt on growth for thirty-three (33) European countries over the period 1990 – 2011. These countries constituted both developed and developing countries. The study was very keen on establishing a non-linear relationship between the key variables. This idea was taken from the debt Laffer curve concept which asserts that debt beyond a certain threshold will be detrimental to growth. Data for the study was sourced from the World Banks's Development Indicators, Historical Debt Datasets and the Economic Outlook of the IMF. The model specification took a non-linear form with independent variables including population growth, public debt, fixed capital formation, openness of the economy, budget balance and exchange. The study also accounted for welfare implications by using growth rate of per capital income as a proxy for economic growth, which was the dependent variable. A pooled OLS regression analysis was carried out to investigate the existence of a non-linear relationship between public debt and economic growth. Results from this work show a maximum debt threshold (public debt per GDP) level of 94 percent. Debt per GDP levels below 95 percent will propel economic growth for these European countries. Debt to GDP ratios above 95 percent slows down the growth of countries within the region.

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With respect to the Sub-Saharan Africa region, Gerald and Luc (1994) conducted a study to analyze how dynamics in exports and import can affect debt and debt serving in Sub-Saharan Africa. The study used a sample of thirty-one (31) Sub-Sahara African countries. In terms on import, a simple neoclassical model was used to assess the impact of capital imports on real output. Export which contributes significantly to output was viewed as the main means through which debt in serviced in this region. The results of the study suggested that export earnings in the region are insufficient to service debt. This inability to effectively perform debt servicing obligations may lead to a debt overhang situation.

A different direction was taken by Deshpande (1997) who suggested that, the debt overhang problems are not caused by normal debt servicing obligations but total debt payables. His study was centered on investigating the debt overhang hypothesis through the investment channel. The study employed data from thirteen (13) Highly Indebted Poor African countries for two different time periods. The first period was before the adoption of the ERP by most of these countries, that is, from 1975 to 1983. The second period was from 1984 to 1991. This represented the post-ERP program. The author used an OLS estimation technique for the study. The results of the study reveal a negative relationship between external debt and economic growth using investment as the basic macroeconomic channel. In addition to this, the investment function exhibited an inverted U-shape. This implied that, external debt was only detrimental to both investment and economic beyond a certain point.

Most studies rely heavily on the use of investment as the main channel through which debt affects economic growth. This popular idea was tested by Fosu (1996) who examined the impact of external debt on economic growth in Sub-Saharan Africa for the period 1970 – 1986. The author assumed endogeneity between capital and debt, which was derived from an analysis of covariance model in assessing both a direct and indirect effect of external public debt on growth. The direct effect measures the impact of external debt on economic growth through the

reduction in the marginal productivity of inputs such as labor and labor. The indirect effect measures the effect of external debt on economic growth through a reduction in investment. This made it possible to augment the classical production function into both continuous and discontinuous interactive models. The results confirmed a direct effect but did found no evidence of an indirect effect. In essence, high levels of external debt in the region dampen economic growth through the reduction of the productivity of labor and not through a reduction in investment. Based on this study, a maximum debt to GDP threshold level of 16 percent was found to be enough to propel investment in Sub-Saharan Africa.

Fiagbe (2015) conducted a study on the impact of external debt on economic growth in the Sub-Saharan Africa region. The study employed a sample of thirty-nine (39) Sub-Sahara African countries for the period 1990 – 2013. A system Generalized Moments of Methods (GMM) estimation technique was used to analyze the effect of external debt as well as variables such as labor force, capital, export, and a middle-income dummy on economic growth. The results show a negative impact of external debt on economic growth in Sub-Saharan Africa. This implies that external borrowing downsizes economic growth for countries in the region. It also confirms the DEDH (Direct Effect of Debt Hypothesis) for Sub-Saharan Africa. This implies that funds that are borrowed externally must not be used for consumption but be channeled into productive long term investment ventures.

Owusu-Nantwi and Erickson (2016) assessed the effect of public debt on economic growth in Ghana. The study was carried out using annual data from the World Banks and IMF for the period 1970 – 2012. The Johansen cointegration and vector error correction (VEC) models were used to estimate the short and long run relationship between public debt and economic. The main independent variables used in the study include public debt, investment government consumption expenditure, inflation, population growth and trade openness. These variables were regressed on GDP growth rate which represented the dependent variable in the model

specification. The result of the study revealed a positive long run relationship between public debt and economic growth for Ghana. A bidirectional causality link was found between the two main variables only in the short run. This implies that, public debt contributes to growth in GDP and vice versa in the short run.

Other empirical studies for Ghana also include Frimpong and Oteng-Abayie (2006), Anning *et al.* (2016) and Adi (2019). The study by Frimpong and Oteng-Abayie (2006) was carried out to examine the effect of external debt on economic growth for the period 1970 – 1999. The Johansen cointegration technique was used to estimate the long run relationship between external debt and economic growth. The short run effect of debt and economic growth was estimated using the vector error correction model (VECM). Key macroeconomic variables in the study include GDP growth rate which was the dependent variable, investment to GDP, external debt to GDP, export to GDP, and foreign direct investment which were the main independent variables. The study shows a positive relationship between external debt and economic growth, indicating that debt propels growth in the Ghanaian economy.

The similarity between the works of Anning *et al.* (2016) and Adi (2019) is the use of OLS in modelling and estimating the relationship between Ghana's public debt and economic growth. The study by Anning *et al.* (2016) was carried out to examine how domestic and external debt affect GDP in Ghana. The study used data on government consumption expenditure, private consumption expenditure, investment expenditure, inflation GDP, imports, savings, external debt and domestic debt spanning from 1990 to 2015. The study shows a negative impact of both external and domestic debt on GDP for Ghana. The study further recommends the need for government to cut down borrowing and concentrate on tax reformation policies. This was seen a major strategy of ensuring the efficiency of tax mobilization activities which will enable government to generate the needed funds without relying on external fund.

Adi (2019) investigated the impact of Ghana's public debt and economic growth for the period 1965 – 2017. The study adopted the model specification from study by Owusu-Nantwi and Erickson (2016), but included inflation as a key independent variable. Aside inflation, government expenditure, public debt, government investment, trade openness and population growth were used as key independent variables. Unlike the study by Owusu-Nantwi and Erickson (2016) which employed the Johansen cointegration method and vector error correction (VEC) model in the econometric analysis, Adi (2019) used an OLS estimation technique. The result of this study was consistent with the result obtained by Owusu-Nantwi and Erickson (2016). These studies reveal a positive relationship between public debt and economic growth. This implies that, funds that are borrowed are channeled into productive ventures which propels investment and economic growth.

3.3.2 Public debt and Investment

Some empirical studies on debt-investment nexus form an auxiliary part of the main objective of estimating a debt-growth nexus. In these studies, the authors realize the need to further examine the existence of crowding out effect or confirming the debt-overhang hypothesis. Studies on the effect of debt on investment vary in results. Some of the studies found a positive relationship for the debt-investment nexus, while others found these variables to be inversely related. Some studies also reveal no relationship for the debt-investment nexus.

Clements *et al.* (2003) estimated relationships between external debt, public investment and economic growth in fifty-five (55) low-income countries including Ghana, India, Kenya, Macedonia, Nigeria, Pakistan, Sri Lanka, and some countries within the Sub-Saharan Africa region. The study was carried out with data on growth in per capita income, population growth, gross domestic investment, total debt service, external debt trade openness and government fiscal balance for the period 1970 – 1999. The econometric specification was derived from the standard Barro growth model, after which a fixed effect and system General Method of

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Moments (GMM) estimation techniques were applied to the data. The Barro growth model used by the authors tests the possibility of convergence across these countries. The findings of the study suggest that, reduction in external debts promotes both public investment and economic growth in these countries. This finding confirms the debt overhang hypothesis, and reveals a negative result on the possibility of convergence across these countries.

To confirm these findings at the country level, there have been many studies focused on estimating the relationship between public debt and investment. For the Sri Lanka economy, Thilanka and Ranjith (2018) investigate the effect of public debt on investment for the period 1978 – 2015. The study employs a limited number of variables for the model specification. These variables include investment, external debt, domestic debt and real GDP. In order to determine both short and long term relationships between public debt (domestic and external debt) and investment, the authors employed both the Johansen co-integration method and the Vector Error Correction Model (VECM). The findings of the study show a positive relationship between public debt (both domestic and external) and investment. This finding opposes the cross-country findings by Clements *et al.* (2003) which suggest that external debt crowds out investment in Sri Lanka and other low-income countries. The results by Thilanka and Ranjith (2018) show that, both domestic and external debt helps to promote investment in the Sri Lanka economy.

Akram (2011) conducted a study on the impact of public debt on economic growth in the Pakistani economy for 1972 – 2009. As part of the objectives of the study, the author investigated the crowding out hypothesis as being asserted by most theories on debt-growth relationships. Data on key variables such as per capita GDP, investment, debt servicing, external debt, domestic debt, openness and inflation was sourced from the WDI, Global Development Finance database and International Financial Statistics, for the estimation. The ARDL and VEC models were used to estimate both long and short run relationships respectively. The estimation

was carried out using two models. The first model was used to establish the relationship between public debt and per capita GDP. The second model was used to establish the impact of public debt on investment. The results in the first model show a negative relationship between public debt (external debt and debt servicing) and economic growth. The second model also reveals a negative relationship between external debt and investment, but an insignificant relationship between debt servicing and investment. These two findings provide evidence of "debt-overhang effect" in the Pakistani economy. The study does not confirm "crowding out effects" due to an insignificant relationship between debt servicing and investment.

Sanchez-Juarez and Garcia-Almada (2016) assessed the impact of public debt on public investment and economic growth in Mexico. The study was carried out using data from all the thirty-two (32) states for the period 1993 – 2012. The main variables used for the study include population, GDP, GDP per capital, public investment, public debt, government expenditure, foreign direct investment, public investment, and average years of schooling. Using data from all the thirty-two (32) states will require the use of an appropriate panel regression analysis. The authors used Dynamic Models and GMM estimation techniques to estimate these relationships. The results of the study reveal a positive relationship between public debt and public investment as well as economic growth. This implies that, public debt in Mexico propels both investment and economic growth.

In relation to the Kenyan economy, Kamundia (2015) investigated how public external debt affects both private investment and economic growth. The empirical model was adopted from an endogenous growth model used by Ghura and Hadjimichael (1996). In this growth model, output is positively related to government policies which includes public debt. The author employed OLS estimation technique and Granger causality test to assess the relationship and direction of causality between public debt and investment using data on GDP growth, openness to trade, real interest rate, inflation, public debt, debt service, investment, human capital and

population growth for the period 1980 – 2013. The results of the study show an indirect relationship between public debt and private investment, but a positive relationship between public debt and economic growth. The causality test confirms a bidirectional causality between debt and private investment, as well as public debt and economic growth.

Ogunjimi (2018) analyzed how public debt indicators affect the various forms of investment in the Nigerian economy for the period 1981 – 2016. These public debt indicators include domestic debt and external debt. The key types of investment considered for the studies include private, public and foreign direct investment. This implied the use of three (3) different models: impact of external and domestic debt on private investment, public investment and foreign direct investment. Other variables used in the study include interest rate and GDP. In order to test and estimate both long and short run effects, the ARDL bounds test for cointegration and VEC model were employed in the econometric estimations. The results of the study show that, domestic debt propels both domestic and public investment, but reduces FDI. A negative relationship was found between external debt and public investment, while its relationship with private and foreign direct investment was insignificantly, though negative.

Using a multiple linear regression analysis, Oke and Sulaiman (2012) assessed the effect of external debt on investment and economic growth in Nigeria for the period 1980 – 2008. Adopting the Debt-Cum growth model by Elbadawi *et al.* (1996), GDP, private investment, public investment, exchange rate, debt service and reserve to external debt were used as main variables in the model specification. The findings of the study reveal a positive relationship between external debt and public investment, external debt and economic growth. On the other hand, a negative relationship was found between external debt and private investment.

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3.4 Summary of Chapter

This chapter provides a review of theoretical and empirical studies on debt-growth and debt-investment relationships. In most theoretical findings, investment is viewed as the channel through which debt affects economic growth, but this effect varies with respect to the particular theory or hypothesis. The Ricardian Equivalence as discussed by Elmendorf and Mankiw (1999), and Roberts (1942) is a unique view which is distinct from the other theories and hypotheses. The theory implies the neutrality of the effect of public debt on economic growth, implying that public debt has no effect on economic growth. The other theories and hypotheses predict either a negative or positive effect of public debt on economic growth.

Empirical studies on the effect of public debt on economic growth have been conducted on both cross-country and country specific basis. Cross countries include Cunningham (1993) (developing countries), Afxentiou and Serletis (1996) (developing countries), Bilan and Iulian (2015) (European countries), Gerald and Luc (1994), Fosu (1996) and Fiagbe (2015) (Sub-Saharan Africa countries). These studies have produced mixed results, with no consistency in the effect of public debt on economic growth. In relation to Ghana, Owusu-Nantwi and Erickson (2016), Frimpong and Oteng-Abayie (2006), Anning *et al.* (2016) and Adi (2019) are notable studies aimed at probing the effect of public debt on economic growth. These studies were conducted within different periods, with same or different methodologies, as well as different choices of variables. These are some factors that account for the difference in results obtained from the studies. This study is different from the above empirical studies in terms of methodology, time period, and variable choice. Although these studies provide a relationship between public debt and economic growth in Ghana, no extra step is taken to fully analyze the effect of public debt and debt servicing on investment. This extra step when taken, confirms the test for "crowding out effect". This study examines the presence of "crowding out" effect in Ghana.

Finally, the chapter provides a review of empirical works that assess the relationship between public debt and investment. The main studies reviewed are Clements *et al* (2003) (low-income countries), Thilanka and Ranjith (2018) (Sri Lanka), Akram (2011) (Pakistan), Sanchez-Juarez and Garcia-Almada (2016) (Mexico), Kamundia (2015) (Kenya), Ogunjimi (2018) (Nigeria) and, Oke and Sulaiman (2012) (Nigeria). While some of these studies confirmed a direct relationship between public debt and investment, others revealed an indirect effect.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter discusses the theoretical framework and the empirical models employed in analyzing the effect of public debt on investment and economic growth in Ghana. It also provides the sources, definition and measurement of the variables used in the study. For a time series study, a couple of diagnostic tests will be discussed in this chapter, as well as the appropriate econometric techniques for carrying out both short and long run effects. The chapter concludes with a summary of points discussed.

4.2 Theoretical Framework

The main theoretical framework is the neoclassical growth model. Under this model we understand the need for borrowing, and the effect of public debt on both investment and economic growth.

4.2.1 The Neoclassical Growth model

This model provides a relationship between public debt, investment and economic growth. Adopted from Owusu-Nantwi and Erickson (2016), the neoclassical model has an output function expressed as:

$$Y_t = F (K_t , Z_t , L_t , S_t) \tag{4.5}$$

where Y_t (aggregate production) is a function of K_t (private capital), Z_t (public capital), L_t (unit labor), and S_t (vector of other variables that determine output).

The production function exhibits the following properties:

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$F_x > 0$ and $F_{xx} < 0$ where $x = \{K_t, Z_t, L_t, S_t\}$ which indicates the standard assumptions for diminishing marginal returns.

From Solow (1957), savings is a fixed fraction of output therefore,

$$S_t = sY_t \tag{4.6}$$

where S_t represents savings and s the Marginal Propensity to save (MPS).

The model assumes that after-tax savings is used to finance both private and public investment. Therefore we have the expression:

$$sY_t - T_t = I_{K,t} + p_z I_{Z,t} \tag{4.7}$$

where $I_{K,t}$ measures investment in private capital, $I_{Z,t}$ is the investment in public capital, T_t be taxes. Taxes T_t in this model is assumed to be lump sum. The variable p_z indicates the relative efficiency of public investment in terms of national output, determined by institutional factors. A larger value of p_z indicates that public investment is inefficient and vice versa.

With changes in the level of both public and private investment, the movement equation of these variables can be expressed as:

$$\Delta K_{t+1} = I_{K,t} - \delta_K K_t \tag{4.8}$$

$$\Delta Z_{t+1} = I_{Z,t} - \delta_Z Z_t \tag{4.9}$$

where δ_K and δ_Z represent the depreciation rate for private capital and public capital respectively, and $0 < \delta_K, \delta_Z < 1$.

Assuming that original levels (at $t = 0$) of both public and private investments are zero, we have that:

$$K_{t+1} = \sum_{s=0}^{t}(I_{K,s} - \delta_K K_s) \tag{4.10}$$

$$Z_{t+1} = \sum_{s=0}^{t}(I_{Z,s} - \delta_Z K_s) \tag{4.11}$$

Solving for $I_{K,t}$ from equation (4.7) and substituting it into equation (4.10) gives:

$$K_{t+1} = \sum_{s=0}^{t}(sY_t - p_zI_{Z,t} - T_t - \delta_ZZ_s) \tag{4.12}$$

Forwarding the output equation by $t = 1$, we have:

$$Y_{t+1} = F (K_{t+1} , Z_{t+1} , L_{t+1} , S_{t+1}) \tag{4.13}$$

Substituting both equation (4.11) and (4.12) into equation (4.13) gives:

$$Y_{t+1} = F(\sum_{s=0}^{t}(sY_t - p_zI_{Z,t} - T_t - \delta_KK_s), \sum_{s=0}^{t}(I_{Z,s} - \delta_ZZ_s), L_{t+1}, S_{t+1}) \tag{4.14}$$

Given that government has the following budget constraint:

$$G_t + I_{Z,t} = \Delta D_t + T_t \tag{4.15}$$

$$» \Delta D_t = G_t + I_{Z,t} - T_t$$

where G_t represents government spending, and ΔD_t the change in public debt.

Substituting this into (4.14), we have:

$$Y_{t+1} = F(\sum_{s=0}^{t}(sY_s - T_s - G_s - \delta_KK_s) - p_z\Delta D_t, D_t + \sum_{s=0}^{t}(T_s - G_s - \delta ZZ_s), L_{t+1}, S_{t+1}) \tag{4.16}$$

Taking derivatives with respect to D_t gives:

$$\frac{dY_{t+1}}{dD_t} = \frac{\partial F}{\partial Z} - p_z\frac{\partial F}{\partial K_p} \tag{4.17}$$

$$\frac{dI_{Z,t}}{dD_t} = \frac{\partial F}{\partial Z} > 0 \tag{4.18}$$

$$\frac{dI_{K,t}}{dD_t} = - p_z\frac{\partial F}{\partial K_p} < 0 \tag{4.19}$$
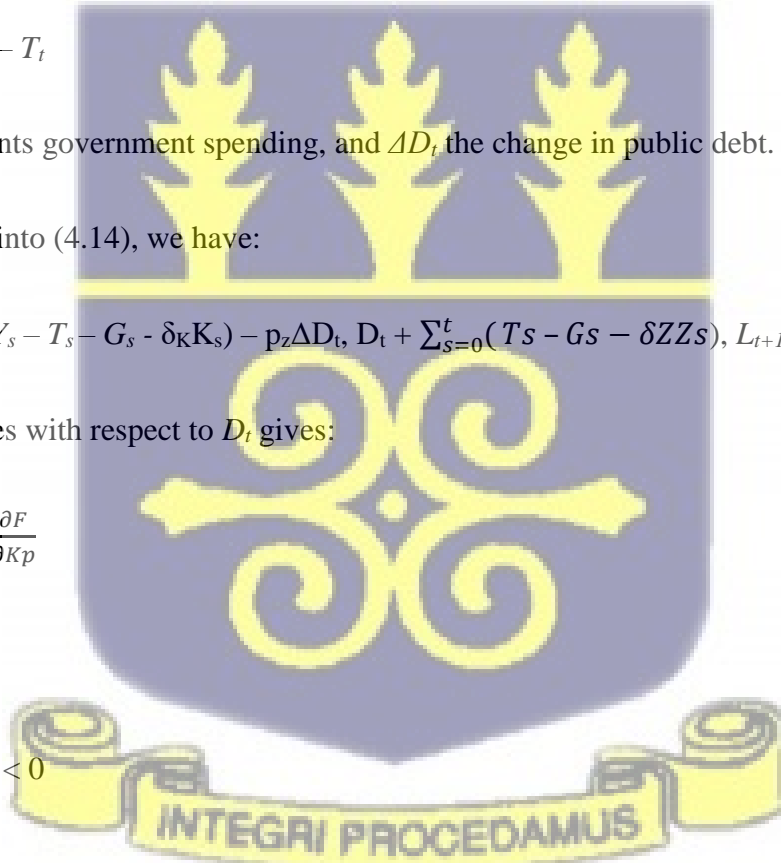
Equation 4.18 represents the effect of public debt on public investment. The model predicts that, public debt leads to an increase in public investment. Equation 4.19 represents the effect of public debt on private investment. The model predicts a negative relationship between public debt and private investment.

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From equations 4.18 and 4.19, the effect of public debt on output (equation 4.17) is ambiguous, with the direction of change depending on the magnitude of both $\frac{\partial F}{\partial Z}$ and $p_z \frac{\partial F}{\partial K}$. This makes equation 4.17 ambiguous indicating that, public debt can either have a positive, negative or no effect on economic growth, as produced by empirical studies.

4.3 Empirical Model Specification

To assess the impact of public debt on investment and economic growth, the study adopts the models specified in Owusu-Nantwi and Erickson (2016). From equation 4.16 we have:

$$Y_{t+1} = F\left(\sum_{s=0}^{t}(sY_s - T_s - G_s - \delta_K K_s) - p_z \Delta D_t, D_t + \sum_{s=0}^{t}(Ts - Gs - \delta ZZs), L_{t+1}, S_{t+1}\right)$$

Which can be represented as:

$$Y_{t+1} = f(K_{t+1}, Z_{t+1}, L_{t+1}, S_{t+1}, Ts, Gs, D_{it}) \tag{4.20}$$

where Y_{t+1} is output at time $t+1$.

K_{t+1} and Z_{t+1} are private and public capitals respectively.

L_{t+1} is labor at time t+1.

S_{t+1} is a vector of variables that determine output.

Ts and Gs are taxes and government expenditure respectively.

D_{it} represents a vector of debt indicators.

For this thesis, there will be two models, that is, the growth model and the investment model. The functional function of this equation will be represented as:

$$Y_t = f(INV_t, ED_t, DS_t, OP_t, GEXP_t, INF_t, EXR_t, POP_t) \tag{4.21}$$

where Y_t = GDP per capita growth rate, INV_t = investment per GDP, ED_t = external debt per GNI, DS_t = total debt servicing per GNI, OP_t = trade openness, $GEXP_t$ = total government expenditure per GDP, INF_t = inflation rate, EXR_t = exchange rate and POP_t = population growth rate.

The equation form of the growth model is represented as:

$$Y_t = \alpha + \beta_1 INV_t + \beta_2 ED_t + \beta_3 DS_t + \beta_4 OP_t + \beta_5 GEXP_t + \beta_6 INF_t + \beta_7 EXR_t, + \beta_8 POP_t + \varepsilon_t \quad (4.22)$$

where α is a constant, β_i are coefficients of the independent variables stated in equation 4.21 and ε_t is the classical error term.

The functional form of the investment model is represented as:

$$INV_t = f(ED_t, DS_t, OP_t, GEXP_t, INF_t, EXR_t, POP_t) \quad (4.23)$$

The equation form of the investment model is represented as:

$$INV_t = \gamma + \sigma_1 ED_t + \sigma_2 DS_t + \sigma_3 OP_t + \sigma_4 GEXP_t + \sigma_5 INF_t + \sigma_6 EXR_t, + \sigma_7 POP_t + \mu_t \quad (4.24)$$

Where γ is a constant, σ_i are coefficients to be estimation and μ_t is the random error term.

4.4 Definition and measurement of variables

The main data used for the empirical investigation of the impact of public debt on investment and economic growth are described in this section of the chapter. It also provides justifications for using the chosen variables, as well as their expected signs.

4.4.1 Economic Growth (Y)

This refers to the annual percentage change in total production of goods and services (Lipsey, 1956). According to Spencer *et al.* (1993), this is the growth level in output when there is full level of employment with constant prices. This measured can either be nominal (non-adjusted

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for inflation) or real (adjustment for inflation). In the literature, this variable has been measured differently. Some of these measurements of economic growth include GDP, GDP growth rate, GNI, GNI per capita, GDP per capita, GDP per capita growth rate, and many others. In this study, GDP per capita growth rate will be used as a proxy for economic growth. This is because, this proxy does not only capture economic growth but also signify welfare implications. The use of this proxy is consistent with works by Akram (2011), Matandare and Tito (2018), and many others.

4.4.2 Investment (*INV*)

This is measured by total investment as a ratio of GDP (WEO, 2021). It can also be defined as additions to fixed assets of the economy which includes land improvement, plants, machinery, purchases of equipment, construction of schools, railways, offices, hospitals, private housing, commercial and industrial buildings, and so on. It also includes changes in the level of inventories as well as net acquisition of valuables (WDI 2021). The variable is measured with other proxies such as gross capital formation, fixed capital formation, and many others. The simple Keynesian aggregate expenditure expresses investment as a contributing factor to the expansion of output. Purchases of new plants and machinery in the form of investment improve upon production efficiency and helps boost output. This study relies on this and expects a positive relationship between investment and economic growth.

4.4.3 External Debt (*ED*)

External debt is the total debt owed by a country to non-residents (individual and / or organizations) which must be repaid in goods, services or in monetary terms. According to WDI, (2021), this is the sum of IMF credit, short term debt, publicly guaranteed and long term debts that are privately nonguaranteed. External debt has an ambiguous effect on investment and economic growth as being provided in the literature review and theoretical model. This

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mostly depends on the type of activity (whether productive or not) in which these funds are channeled into. In the case where the funds are channeled into productive and efficient sectors, this will boost investment and generate future returns, providing the country with surplus output after servicing the debt. This implies that, the effect of external debt on both investment and economic growth are ambiguous. The main proxies used for this variable are external debt per GDP ratio and external debt per GNI. The availability of data informed the choice of external debt per GNI as a proxy for external debt in this study.

4.4.4 Debt Servicing (*DS*)

Debt servicing refers to the sum of principal repayments and interest charged on respective debt held by a country. This comes in monetary form, goods and services which are paid on long term debts, short term debts, as well as purchases and charges by the IMF (WDI, 2021). Debt servicing has been seen a major financial activity that diverts funds from productive investment activities in a country. Its effect on investment depends on the ability of the country to pay back the debt with profit accruing from investment made by the debt. In the case of a debt overhang problem, the profit accrued from investment made by the debt is less than the funds devoted for debt servicing. In the case where these benefits are more than the funds devoted for debt servicing, it would not have any significant effect on investment and output (Sachs, 1989). Total debt servicing per export and total debt servicing to GNI are the mostly used proxies for debt servicing. The study will employ total debt service to GNI as a proxy for debt servicing. The effect of debt servicing on investment and economic growth is uncertain.

4.4.5 Trade Openness (*OP*)

This is measured by the sum of exports and imports of goods and services divided by GDP. This proxy represents total capital mobility as against using only imports or exports as a proxy for trade. According to Smith (1776) and Ricardo (1817), trade plays a significant role in the

growth and development of an economy. According to Smith (1776), trade makes it possible to gain access to a larger market which improves upon productivity as well as division of labor. Ricardo (1817) stresses on the importance of comparative advantage which enables countries to produce domestically at an efficient level with least costs. Exporting these goods and services helps to boost output and also saves the country from huge expenses made on importing goods and services. Husain (1996) also argues that, countries engaging in international trade generate foreign earnings, raises propensity to save, boosts investment, generates employment, as well as increasing the level of productivity of limited inputs and resources. The study expects trade openness to have a positive impact on investment and economic growth.

4.4.6 Government Expenditure (*GEXP*)

This measures total government expenditure as a ratio of GDP (WEO, 2021). It represents the share of GDP devoted to government expenses and not the absolute value of expenditure. This proxy does not only take into account the magnitude of expenses but also captures the production efficiency of the country. In the simple Keynesian growth model, output is an increasing function of government expenditure. This implies that, increases in government expenditure promote economic growth. This is supported by empirical studies such as Coory (2009) and Ranjan (2008). These empirical studies found that, increases in government spending increases the productivity of production inputs thereby, increases output. On the other hand, Folster (2001) argues that, government as an economic entity has a high tendency of misallocating resources as compared to private individuals. This implies that, government spending will lead to a decline in output. Contrary to these assertions, the classical model argues that an increase in government spending has no effect on output. Thus, for this study, the effect of government spending on investment and economic growth is expected to be uncertain.

4.4.7 Inflation (*INF*)

Inflation reflects the annual percentage change of purchasing a basket of goods and services by the average consumer. The period of time for estimation may be fixed or subject to change at specified intervals which are usually a year (WDI, 2021). In most empirical studies on the effect of inflation on economic growth, the results obtained differ. Studies on inflation-growth nexus include Tobin (1965), Mallik and Chowdhury (2001), Fabayo and Ajilore (2006), and many others. Tobin (1965) confirms that, lower levels of inflation help to propel economic growth while high levels retard economic growth. Fabayo and Ajilore (2006) estimated a threshold inflation value of 6 percent for the Nigerian economy. Inflation levels above this value slow down economic growth. Inflation is expected to have a negative effect on investment and economic growth in this study since inflation level is mostly above 6 percent. The consumer price index will be used as a measure for inflation in this study.

4.4.8 Exchange rate (*EXR*)

This represents the price of a domestic currency in terms of a foreign currency – WDI (2021). In the case of a depreciation of a local currency, this requires more of a foreign currency to finance public debt, which could ultimately slow down both investment and economic growth. Asiama *et al.* (2014) and Baharumshah *et al.* (2017) stress the ability of external shocks and currency fluctuations to affect the overall effect of external debt on economic growth. This indicates that, the effect of exchange rate on investment and output is ambiguous. The mostly used exchange rate for Ghana is the Ghanaian cedi to the U.S Dollar rate. The study will employ real effective exchange rate which is measured as the product of the nominal effective exchange rate divided by the price deflator. The price deflator in this measurement makes correction for inflation.

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4.4.9 Population Growth (*POP*)

This is the exponential growth of midyear population from one time say (t-1) to another, say (t). This measurement is based on the de facto definition which requires that, all residents are being counted irrespective of their legal status or citizenship (WDI, 2021). The literature on the relationship between population and economic growth has yielded missed results. Chang *et al.* (2014) and Lartey *et al.* (2018) found that growth in population drives key components of growth such as labor force, consumption, investment and manufacturing. These studies assert a positive relationship between population growth and investment as well as economic growth. The expectation of population growth's effect on economic growth will be based on the results obtained by Chang *et al.* (2014) and Lartey *et al.* (2018).

Table 4.1: Summary of model variables, their indicators and expected signs.

Variable	Indicator	A priori sign	Source
Economic growth (Y)	GDP per capita growth rate (%)		WDI (World Bank)
Investment (INV)	Investment per GDP (%)	(+)	WEO (IMF)
External Debt (ED)	External debt to GNI (%)	Uncertain	WDI (World Bank)
Debt Servicing (DS)	Total debt service to GNI (%)	Uncertain	WDI (World Bank)
Trade Openness (OP)	$OP = \frac{Export+Import}{GDP} * 100$	(+)	WDI (World Bank)
Government Expenditure (GEXP)	Total government expenditure to GDP (%)	Uncertain	WEO (IMF)
Inflation (INF)	Consumer price index (%)	(-)	WDI (World Bank)
Exchange rate (EXR)	Real effective exchange rate (adjusted for inflation)	Uncertain	WDI (World Bank)
Population growth (POP)	Annual population growth (%)	(+)	WDI (World Bank)

Source: Author's compilation

4.5 Data type, Sources and Scope.

The study will be conducted using secondary data sourced from the IMF's World Economic Outlook database, and the World Bank's World Development Indicators. The study will cover a period of thirty-seven (37) years (1983 to 2019), which represents the post-SAPs and post ERP era. The choice of this period is due to the unavailability of data in the pre-SAPs and pre-

ERP era. However, this period covers both pre-HIPC and post-HIPC era, which is expected to capture the effect of the country's historically worst debt situation in the studies.

4.6 Diagnostic Tests

In order to ensure that the estimation does not suffer from some estimation biases and spurious regression, there is the need to carry out some pre and post-estimation diagnostic tests. This section discusses the series of diagnostic tests that were carried out before and after the estimation of the time series regression analysis. These tests include stationarity test, endogeneity, serial correlation, and heteroscedasticity test. This will ensure that the estimated results are authentic for predictions and not biased.

4.6.1 Stationarity test

The stationarity of variables play an important role in time series analysis. Using non-stationary variables in a regression analysis will result in producing spurious regression results. One will be misled by the high value of both R^2 and adjusted R^2 obtained in a regression result, and rely on the estimates as ideal for forecasting. Spurious regressions can be identified when the error terms in the model are highly correlated (low values of Durbin-Watson statistic). This is also accompanied by the presence of high R^2 and adjusted R^2 values. This makes estimated coefficients inefficient, as well as unreliable significance tests and predictions carried out by the model (Granger and Newbold, 1974).

The test for stationarity in this study will be carried out using both the Augmented Dickey Fuller (ADF) and the Phillip-Perron (PP) tests. Both the ADF and PP tests correct cases of autocorrelation that is, ensuring that the error terms in the model are not correlated. The Augmented Dickey Fuller (ADF) test regression can be formulated in the expression:

$$\Delta x_t = \beta' \mathbf{D}_t + \pi x_{t-1} + \sum_{i=1}^{p} \psi_i \, \Delta x_{t-i} + \varepsilon_t \qquad\qquad (4.26)$$

where x_t represents the variable at time t

$\mathbf{D}_t$ – a vector of deterministic terms which includes a constant, trend etc.

p – the number of lagged difference in the model

π and ψ_i – coefficients to be estimated

ε_t – random error term.

The null and alternate hypotheses of the tests are:

H_0: $\pi = 0$ (series in non-stationary)

H_1: $\pi \neq 0$ (series is stationary)

In correcting for serial correlation, the Augmented Dickey Fuller (ADF) and the Phillip-Perron (PP) tests use different methods. The ADF regression specification uses lagged differences of the variables while the PP method uses non-parametric statistical methods to correct for serial correlation.

4.6.2 Serial Correlation test

An important assumption of the classical linear regression model, is the expectation of uncorrelated error terms, that is:

$Cov \ [u_i, u_j] = 0.$ for $i \neq j$ $\qquad\qquad (4.27)$

This implies that, the error at one period should not be correlated with the error in another time. When the disturbance error terms are correlated, we have a situation known as autocorrelation or serial correlation. This situation happens due to model misspecification, inertia, excluded variable bias, incorrect functional forms, data transformation, the use of lags, and others – (Gujarati, 2004).

The model specification in equation 4.20 can be written as an autoregression which contains a lagged variable of the dependent variable Y_t:

$$Y_t = \alpha + \beta Y_{t-1} + \sum_{j=1}^{k} \delta_j X_{tj} + \sum_{m=1}^{p} \pi_m DEBT_{tm} + \varepsilon_t \tag{4.28}$$

where X_{tj} = set of independent variable that affect output, $DEBT_{tm}$ is a vector of debt indicators, α and β are constants, δ_j and π_m are coefficients to be estimated and ε_t is the random error term.

Considering the lag of Y_t, which is Y_{t-1}, we have:

$$Y_{t-1} = \alpha + \beta Y_{t-2} + \sum_{j=1}^{k} \delta_j X_{t-1j} + \sum_{m=1}^{p} \pi_m DEBT_{t-1m} + \varepsilon_{t-1} \tag{4.29}$$

Substituting Y_{t-1} into Y_t, we have:

$$Y_t = \alpha + \beta[\alpha + \beta Y_{t-2} + \sum_{j=1}^{k} \delta_j X_{t-1j} + \sum_{m=1}^{p} \pi_m DEBT_{t-1m} + \varepsilon_{t-1}] + \sum_{j=1}^{k} \delta_j X_{tj} + \sum_{m=1}^{p} \pi_m DEBT_{tm} + \varepsilon_t \tag{4.30}$$

$$Y_t = \alpha + \alpha\beta + \beta^2 Y_{t-2} + \sum_{j=1}^{k} \beta\delta_j X_{t-1j} + \sum_{m=1}^{p} \beta\pi_m DEBT_{t-1m} + \beta\varepsilon_{t-1} + \sum_{j=1}^{k} \delta_j X_{tj} + \sum_{m=1}^{p} \pi_m DEBT_{tm} + \varepsilon_t \tag{4.31}$$

This implies that Y_t which will be estimated with disturbance error term ε_t contains another error term which is $\beta\varepsilon_{t-1}$. This implies that $Y_t = f(\varepsilon_{t-1})$ and $Y_t = f(\varepsilon_t)$. This will lead to a correlation between the error terms ε_t and ε_{t-1}, that is $Cov [\varepsilon_t, \varepsilon_{t-1}] \neq 0$. The presence of serial correlation does not render estimated parameters biased. In the presence of serial correlation, the estimators are still unbiased, linear and asymmetrically normal. The only problem with the estimators will be its larger variance as compared to other estimators.

In order to correct for serial correlation in autoregressive regression analysis, there will be the need to use the difference of variables whose lag are included in the model, adopt robust standard errors and the use of Generalized Least Square (GLS) estimators (Gujarati, 2004; Wooldridge, 2009). The study will employ differencing such variables (noting the results

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obtained from unit root test) as well as using robust standard errors. In addition to this, the study will perform a Durbin-Watson d test for serial correlation.

4.6.3 Heteroscedasticity test

The classical linear regression model assumes that, the variance of each unobserved term u_i conditional on any chosen independent variable of the model is constant. This assumption is known as homoscedasticity which means equal variance. Homoscedasticity fails when the spread of the unobserved term u_i varies with changes in the specified independent variable, say x. This may be due to the presence of outliers, skewness in distribution, following an error correction model, and many others. In this case, the disturbance terms of the regression analysis are said to be heteroscedastic – (Gujarati, 2004).

In a homoscedastic regression model, we have that:

$$\text{Var} \left[\varepsilon_i \mid x_i \right] = \sigma_i^2 \quad i = 1,\ldots, n$$

Furthermore, when we assume that the disturbance terms are uncorrelated then:

$$E \left[\varepsilon \varepsilon' \mid x \right] = \sigma^2 \Omega$$

where Ω is a diagonal vector of normalized weights.

In a heteroscedastic regression model, we have that:

$$\text{Var} \left[\varepsilon_i \mid x_i \right] \neq \sigma_i^2 \quad i = 1,\ldots, n$$

In both cases (homoscedastic and heteroscedastic regression models) the errors obtained from the regression do not affect the biasness or efficiency of the estimated parameters. In the case of a regression with heteroscedastic errors, the OLS estimator will still be unbiased, consistent and asymmetrically normal. Irrespective of this fact, we must still make provision for the presence of homoscedastic errors by using robust standard errors in the estimation. In addition

to this, the study will perform a heteroscedasticity test using the Breusch-Pagan / Cook-Weisberg method.

4.7 Additional diagnostic test

In addition to the diagnostic tests mentioned earlier, the study conducted the Cumulative Sum (CUSUM) of squares test. The CUSUM sum of squares tests are used to test the stability of the model at an appropriate significance level.

4.8 Estimation Technique

In order to estimate both short and long run effect of public debt on investment and economic growth in Ghana, an appropriate cointegration method must be employed. The study considers either the Autoregressive Distributed Lag (ARDL) or the Johansen Cointegration Method for the test and estimation of short and long run effect of public debt on investment and economic growth. The choice between these two cointegration techniques will depend on the results obtained from the stationarity test. In the case where the stationarity results provides a mixture of variables being I(0)s and I(1)s, the appropriate cointegration technique to employ will be the ARDL bounds test for cointegration. If these variables are all I(1)s, then the Johansen Cointegration Method will be used. The thesis will use the Vector Error Correction Model (VECM) to analyze the short run effect of public debt on investment and economic growth in Ghana if all variables are found to be I(1).
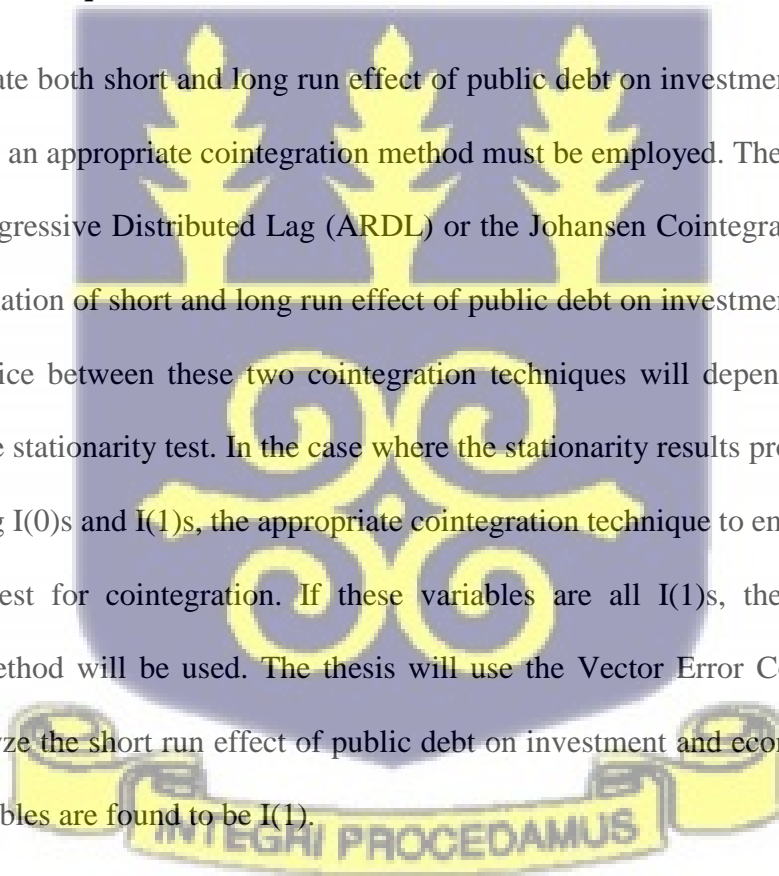
4.8.1 Autoregressive Distributed Lag (ARDL) bounds test of Cointegration

Proposed and developed by Pesaran and Shin (1995) and Pesaran *et al.* (1996), the Autoregressive Distributed Lag (ARDL) bounds test of cointegration method can be used to estimate both short and long run relationships. This can be done if the variables are I(0)s, I(1)s, or a combination of both but not I(2)s. In the presence of multiple cointegration vectors, the technique can be used to exactly identify the number of cointegration vectors.

An ARDL *(p,k)* – two variable (*X* and *Y*) bounds test for cointegration can be performed using the regression equation:

$$\Delta Y_t = \beta_0 + \theta_1 Y_{t-1} + \theta_2 X_{t-1} + \sum_{i-1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{k} \gamma_j \Delta X_{t-j} + \varepsilon_t \tag{4.32}$$

Where Y_t represents the dependent variable at time t

Xt – independent variables at time t

β_0 – intercept

θ_1 and θ_2 – long run coefficients

β_i and γ_j – short run coeficients

p and *k* – number of lagged difference of dependent and independent variable respectively.

ε_t – random error term.

To test for the existence of long-run relationships, the null hypothesis H_o: $\theta_1 = \theta_2 = 0$ (presence of a long run relationship) is tested against the alternate hypothesis H_1: $\theta_1 \neq \theta_2 \neq 0$ (no long run relationship).
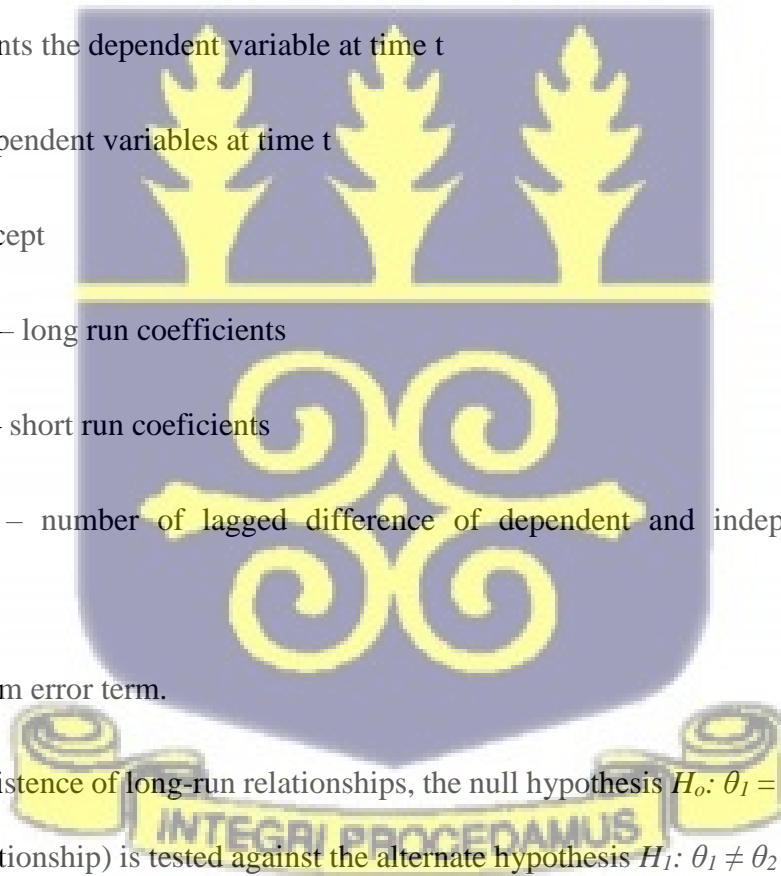
4.8.2 Johansen Cointegration Method

The Johansen Cointegration method is used when all the variables are I(1)s, that is stationary after first difference. This procedure follows a maximum-likelihood estimation which is basically aimed at the identification of a stationary linear permutation using the rank of the relationship between the matrix and its eigenvalues (Johansen, 1991).

Suppose there are g variables that are all I(1)s, which may be cointegrated. A VAR model which contains variables can be specified as:

$$Y_t = \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \ldots + \beta_k Y_{t-k} + u_t \qquad (4.33)$$

where k represents the number of lags

The Johansen test requires that equation 4.33 be transformed into a VECM model of the form:

$$\Delta Y_t = \Pi Y_{t-k} + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \ldots + \Gamma_{k-1} \Delta Y_{t-(k-1)} + u_t \qquad (4.34)$$

where $\Pi = (\sum_{i=1}^{k} \beta_i) - I_g$ is a matrix of long run coefficients and $\Gamma_i = (\sum_{j=1}^{i} \beta_i) - I_g$

The cointegration test begins by examining the rank (r) of the matrix Π through its eigenvalues denoted by λ_i.

where $|\lambda_i| < 1$.

In ascending order, this will be arranged as $\lambda_1 \geq \lambda_2 \geq \ldots \geq \lambda_g$. If the variables are not cointegrated, the rank of Π will not be significantly different from zero, that is $\lambda_i = 0$ for all values of i.

The Johansen cointegration approach provides two test statistics, that is the trace and maximum eigenvalue tests which are represented as:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{g} \ln(1 - \lambda_i)$$

$$\lambda_{max}(r, r+1) = -T \ln(1 - \lambda_{r+1})$$

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The λ_{trace} test is a joint test with the null hypothesis that the number of cointegration vectors is less or equal to r against a general alternative that this number is greater than r.

The λ_{max} test is a joint test with the null hypothesis that the number of cointegration vectors is equal to r against a general alternative that this number is greater than $r + 1$.

4.8.3 Vector Error Correction Model (VECM)

This model is used to estimate short run effects and can be derived from both the Autoregressive Distributed Lag (ARDL) model and Johansen cointegration model by transforming the regression model. This transformation ensures that, long run information is also captured in the short run analysis through the use of an error correction term – (Granger and Engel, 1969).

From equation (4.32), we can have a VEC model being specified as:

$$\Delta Y_t = \sum_{i-1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{k} \gamma_j \Delta X_{t-j} + \lambda ECT_t + \varepsilon_t \qquad (4.35)$$

where ECT_t represents the error correction term which captures long run information.

4.9 Summary of the Chapter

The Neoclassical model as discussed in this chapter shows that, the effect of public debt on investment and economic growth is ambiguous. Data for the empirical studies are sourced from the IMF (World Economic Outlook) and the World Bank (World Development Indicators). The study will perform diagnostic tests which include stationarity, serial correlation and heteroscedasticity tests. This will ensure that the analysis does not produce spurious regression as well as ensuring that estimates are not biased. The main econometric analysis to employ depends on the results obtained from the unit root test. In the case where the stationarity results provided a mixture of variables being I(0)s and I(1)s, the appropriate cointegration technique to

employ will be the Autoregressive Distributed Lag (ARDL) cointegration method. If these variables are all I(1)s, then the Johansen Cointegration Method will be used.

CHAPTER FIVE

ESTIMATIONS AND DISCUSSION OF RESULTS

5.1 Introduction

This chapter presents the descriptive statistics, diagnostic tests and results from the estimation of the effect of public debt on investment and economic growth in Ghana. The first section of the chapter contains the statistical description of variables used for the empirical estimation. This is followed by some time series diagnostic tests as well as results from the estimated models. The chapter is concluded with some post-diagnostic test results.

5.2 Descriptive Statistics

This section contains the statistical description (mean, standard deviation, and the extreme values) of the variables used for this empirical study. This description provides the average value of the variables as well as the distribution around these averages. These variables are GDP per capita growth rate, investment to GDP, external debt to GNI, Total debt servicing to GNI, Trade openness, government expenditure to GDP, inflation, exchange rate and population growth. The analysis of data on these variables is for the period 1983 – 2019. Table 5.1 shows the statistical description of the variables.
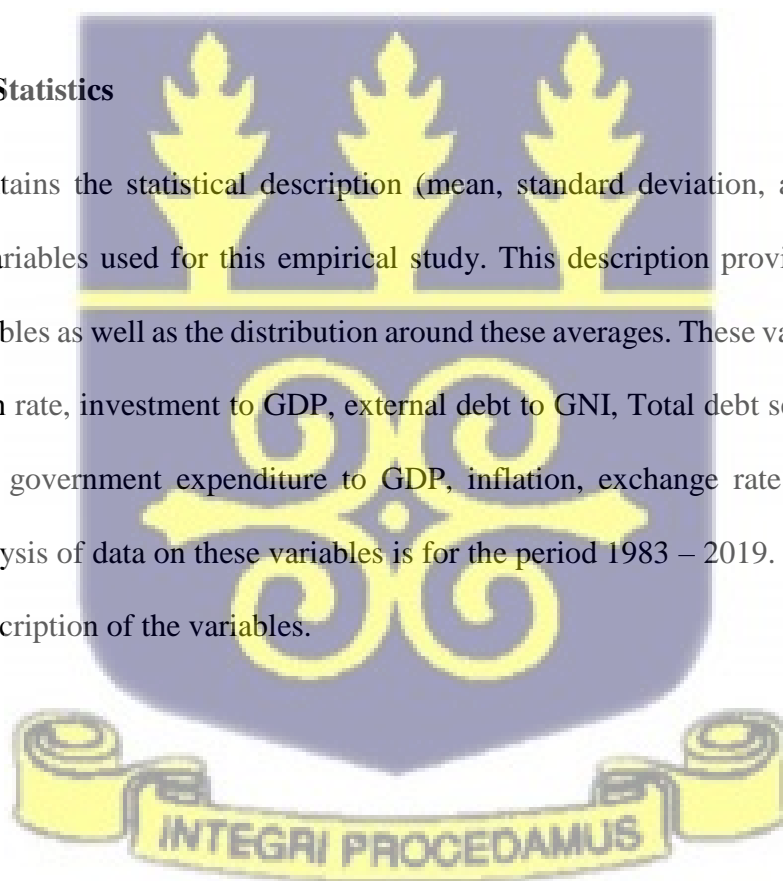
Table 5.1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Y	2.561	2.787	-7.393	11.315
INV	27.565	11.307	4.587	51.127
ED	62.911	34.069	16.584	139.439
DS	4.468	2.806	0.809	10.77
OP	67.086	24.718	11.545	116.048
GEXP	13.957	5.308	3.545	22.113
INF	23.523	20.692	7.126	122.875
EXR	228.193	564.253	64.629	3520.534
POP	2.59	0.262	2.163	3.081

Source: Author's compilation using STATA 15.

Growth in GDP per capita for Ghana for the period 1983 – 2019 averaged 2.56 percent with a maximum of 11.32 percent and a minimum of -7.37 percent. The variable also has a standard deviation of 2.79 percent. The minimum value recorded in 1983 was due to the drought in that period, fall in cocoa prices on the general market, political instability and others. The highest value recorded in 2011 is mostly attributed to the discovery of oil and high commodity (primary) prices. A standard deviation of 2.787 percent about a mean of 2.561 percent represents an unfavorable condition. This implies that, there is a high possibility of unstable level of growth in GDP per capita for Ghana.

Investment within the period provided an average of 27.57 percent with minimum and maximum values of 4.587 percent in 1983 and 51.13 percent in 2010. This indicates a remarkable performance after the country's adoption of the ERP and SAPs in 1983. A standard deviation of 11.31 percent about a mean of 27.57 percent indicates a good level of investment to GDP in Ghana.

External debt to GNI for the period under study has an average of 62.91 percent, with a minimum of 16.58 percent in 2008 and a maximum of 139.44 percent in 2000 which was followed by the country's declaration as HIPC. The average value of 62.91 is above the 60 percent threshold as prescribed by the West Africa Monetary Zone (WAMZ). These figures

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indicate the country's high dependence on external debt as a source of generating funds to finance government budget deficit. Debt servicing in Ghana has not received much attention given that an average of 4.47 percent has been recorded for the period 1983 – 2019. A minimum of 0.81 percent and a maximum of 10.77 percent have been recorded in this period.

Trade openness in Ghana for the period 1093 – 2019 averaged 67.09 percent with a 24.72 percent deviation. The minimum and maximum values recorded are 11.54 percent and 116.05 percent respectively. This indicates high mobility of goods and services in and out of the country. Trade has always been an important contributing factor to the growth and development of the country (Darko, 2015).

Government expenditure as a ratio of GDP for this period recorded an average of 13.96 percent with a minimum of 3.55 percent in 1983 and a maximum of 22.11 percent in 2012. The economic downturns in 1983 had a broad effect on significant components on the economy including government expenditure and inflation. Inflation within this period averaged 23.52 percent with a standard deviation of 20.69 percent. The minimum value of inflation was recorded in 2012. One of the significant objectives of the Bank of Ghana is to achieve a single-digit value of inflation. The average value of 23.52 percent implies a poor performance in achieving the set objective of a single-digit value of inflation.

Exchange rate within the period 1983 – 2019 recorded an average of 228.19 with a deviation of 564.25. A maximum value of 3520.53 was recorded in 1983. Population growth rate within the same period averaged 2.59 percent with a minimum of 2.16 percent in 2019 and a maximum of 3.08 percent in 1985. A standard deviation of 0.26 percent about the mean was recorded for this period. This level of standard deviation about a mean 2.59 indicates that population growth has been fairly constant for Ghana.

5.3 Diagnostic test results

This section presents the results from the pre-estimation diagnostic tests. It includes both the unit root tests and the maximum lag selection test. The lag selections were carried out for the entire model as well as the individual variables for the model.

5.3.1 Unit Root test Results

The Augmented Dickey Fuller (ADF) and Phillip-Perron tests were used to test for the stationarity of the variables in both level form and at first difference. The results of the tests are summarized in Tables 5.2 and 5.3.

Table 5.2: Results of Augmented Dickey Fuller Test for Stationarity

Variable	Level form		First Difference		Order of Integration
	Test Statistic	5% critical value	Test Statistic	5%, 10% critical values	
Y	-3.357	-3.560	-5.444**	-2.975, -2.619	I(1)
INV	-1.932	-3.560	-6.112**	-2.975, -2.619	I(1)
ED	-1.921	-3.560	-2.800*	-2.975, -2.619	I(1)
DS	-2.859	-3.560	-4.395*	-2.975, -2.619	I(1)
OP	-1.914	-3.560	-5.540**	-2.975, -2.619	I(1)
GEXP	-2.629	-3.560	-4.264**	-2.975, -2.619	I(1)
INF	-5.665**	-3.560			I(0)
EXR	-11.514**	-3.560			I(0)
POP	-2.749	-3.560	-3.155**	-2.975, -2.619	I(1)

Null hypothesis: H_o: non-stationary. Alternate Hypothesis: H_1: series is stationary.

**, * Rejecting the null at 5% and 10% respectively.

Source: Author's compilation using STATA 15.

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Table 5.3: Results of Phillip-Perron Test for Stationarity

Variable	Level form		First Difference		Order of Integration
	Test Statistic	5% critical value	Test Statistic	5%, 10% critical values	
Y	-6.169**	-3.556			I(0)
INV	-2.873	-3.556	-11.167**	-2.975, -2.619	I(1)
ED	-1.924	-3.556	-4.912**	-2.975, -2.619	I(1)
DS	-2.565	-3.556	-5.942**	-2.975, -2.619	I(1)
OP	-1.842	-3.556	-6.177**	-2.975, -2.619	I(1)
GEXP	-3.185	-3.556	-7.175**	-2.975, -2.619	I(1)
INF	-8.646**	-3.556			I(0)
EXR	-64.936**	-3.556			I(0)
POP	-1.900	-3.556	-3.394*	-2.975, -2.619	I(1)

Null hypothesis: H_o: non-stationary. Alternate Hypothesis: H_1: series is stationary.

** ,* Rejecting the null at 5% and 10% respectively.

Source: Author's compilation using STATA 15.

From the Augmented Dickey Fuller test results in Table 5.2, all variables were noted to be integrated of order 1, except INF and EXR. The Phillip-Perron test results indicate that Y, INF and EXR are stationary in level form. In both results, the variables are a combination of I(0)s and I(1)s indicating that, the Autoregressive distributed Lag (ARDL) cointegration model will be ideal in estimating the effect of public debt on investment and economic growth in Ghana.

5.3.2 Maximum lag length selection

In order to obtain the maximum lag structure of the ARDL model, the Akaike information criterion (AIC), Schwarz Bayesian information criterion (SBIC) and Hannan-Quinn information criterion (HQIC) were employed. The results for the test are detailed in Table 5.4 and 5.5.

Table 5.4: Maximum Lag Selection Test Results for Model A

Lag	LL	LR	Df	P	AIC	HQIC	SBIC
0	-777.02				44.9154	45.0534	45.3153
1	-540.96	472.11	81	0.00	36.0551	37.4357	40.0546
2	-380.40	321.14*	81	0.00	31.5083*	34.1315*	39.1073*

*Indicates the optimal lag for each information criterion.

Source: Author's own compilation using STATA 15.

Table 5.5: Maximum Lag Selection Test Results for Model B

Lag	LL	LR	Df	P	AIC	HQIC	SBIC
0	-713.69				41.239	41.362	41.5948
1	-491.64	444.09	64	0.00	32.208	33.3127	35.4077*
2	-381.99	219.3*	64	0.00	29.599*	31.6859*	35.6433

*Indicates the optimal lag for each information criterion.

Source: Author's own compilation using STATA 15.

From Tables 5.4 and 5.5 the Akaike Information Criterion (AIC) provides the minimum values of 31.5083 and 29.5997 for Model A and Model B respectively. This indicates that, a maximum lag of two (2) must be used for the variables in both models. The specific number of lags for each variable in both models according to the Akaike Information Criterion (AIC) is presented in Table 5.6 and Table 5.7

Table 5.6: Specific number of lag for variables in Model A

Variable	Y	INV	ED	DS	OP	GEXP	INF	EXR	POP
Max lag	1	0	2	2	2	2	0	2	1

Source: Author's own compilation using STATA 15.

Table 5.7: Specific number of lag for variables in Model B

Variable	INV	ED	DS	OP	GEXP	INF	EXR	POP
Max lag	1	0	0	0	0	1	0	2

Source: Author's own compilation using STATA 15.

From the results obtained in Table 5.6, the best lag structure for the ARDL estimation for Model A according to the Akaike Information Criterion (AIC) is ARDL (1, 0, 2, 2, 2, 2, 0, 2, 1). For Model B, evidence from Table 5.7 indicate that the best lag structure for the ARDL estimation is ARDL (1, 0, 0, 0, 0, 1, 0, 2).

5.4 ARDL Bounds F-test for Cointegration

In order to determine whether cointegration exists among the variables in both models, the ARDL Bounds F-test for cointegration is employed. The results of the tests are outlined in Tables 5.8 and 5.9.

Table 5.8: Bounds F-test results for Model A

Country	F-Statistic value	Lag Length	Significance Level	Bounds Critical Values	
				I(0)	I(1)
Ghana	3.814**	2	1%	2.79	4.10
			5%	2.22	3.39
			10%	1.95	3.06

Null hypothesis: H$_o$: no cointegration. Alternate Hypothesis: H$_1$: cointegration exists.

***, **, * Rejecting the null at 1%, 5% and 10% respectively.

Source: Author's compilation using STATA 15.

From Table 5.8 the test shows an F-statistic value of 3.814 which is greater than the upper-bound values for the 5 percent (3.39) and 10 percent (3.06) significance levels. This shows that the variables in Model A are cointegrated, hence, the existence of both long and short run coefficients.

Table 5.9: Bounds F-test results for Model B

Country	F-Statistic value	Lag Length	Significance Level	Bounds Critical Values	
				I(0)	I(1)
Ghana	7.283***	2	1%	2.96	4.26
			5%	2.32	3.50
			10%	2.03	3.13

Null hypothesis: H_o: no cointegration. Alternate Hypothesis: H_1: cointegration exists.

*** ,**, * Rejecting the null at 1%, 5% and 10% respectively.

Source: Author's compilation using STATA 15.

From Table 5.9 the test shows an F-statistic value of 7.283 which is greater that all the upper-bound values for the 1 percent (4.26), 5 percent (3.50) and 10 percent (3.13) significance levels. This shows that the variables in Model B are cointegrated, hence, the existence of both long and short run coefficients.

5.5 Long Run Estimations

In both Model A and Model B, the variables under consideration are cointegrated, hence the need to estimate the long run relationship among the variables. The results of the long run estimations for Model A and Model B are summarized in Tables 5.10 and 5.11.
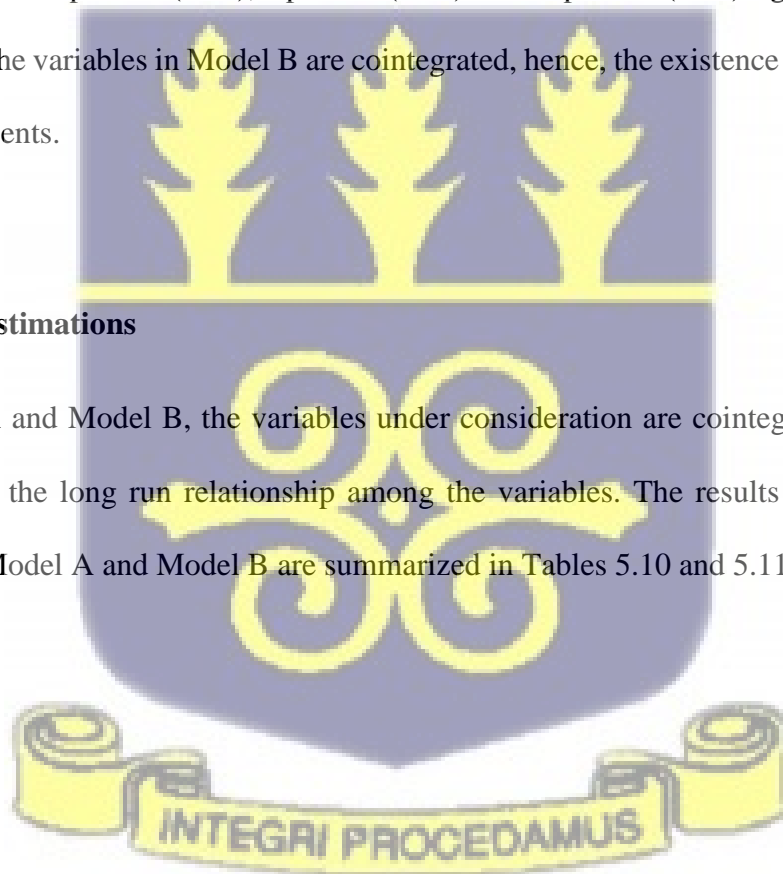
Table 5.10 Model A Results – Long Run Growth Regression results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INV	-0.105222*	0.056230	-1.871283	0.0824
ED	-0.19527***	0.051320	-3.805053	0.0019
DS	0.263176	0.514687	0.511332	0.6171
OP	0.241646***	0.057407	4.209368	0.0009
GEXP	-1.722088*	0.890895	-1.932986	0.0737
INF	-0.000319	0.042351	-0.007522	0.9941
EXR	-0.077389*	0.042403	-1.825073	0.0894
POP	-5.139439	8.459631	-0.607525	0.5532
C	45.31704	36.24095	1.250438	0.2316

***, ** and * indicating a significance level of 1%, 5% and 10% respectively.

Source: Compiled by author using E-Views 10

From Table 5.10, the long run growth equation shows that investment per GDP (INV), External Debt (ED), Trade openness (OP), Government expenditure (GEXP) and Exchange rate (EXR) are statistically significant, while Debt Servicing (DS), Inflation (INF) and Population growth (POP) are statistically insignificant. There is a negative relationship between investment and economic growth. A one percent increase in investment per GDP leads to a 0.11 percent decrease in GDP per capita growth rate. This shows that, investment in Ghana is not directly linked to activities that enhance productivity, but are important. This result is consistent with the findings in Aschauer (1989) and Frimpong and Oteng-Abeyie (2006), but contrary to the findings in Maghyereh (2003) and Kamundia (2015).

Ghana's stock of external debt has a negative effect on economic growth in the long run. A one percent increase in external debt per GNI leads to a 0.19 reduction in GDP per capita growth rate. This result is consistent with results obtained from Anning *et al.* (2016), Afxentious and Serletis (2016) and Akram (2011), but contrary to the findings from Fiagbe (2015), Owusu-Nantwi and Erickson (2016), Ackon (2019) and Adi (2019).

The long run growth model shows a positive relationship between trade openness and economic growth. On average, a 1 percent increase in trade openness (OP) leads to a 0.24 increase in GDP per capita growth rate. This suggests that, Ghana's activities on the trade market propel

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economic growth in the long run. This result is consistent with the findings from Kamundia (2015). On the contrary, this findings diverge from the empirical findings from Owusu-Nantwi and Erickson (2016), Ackon (2019) and Babatunde (2011).

The long run growth model also shows a negative relationship between government expenditure and economic growth. A one percent increase in government expenditure (GEXP) leads to a 1.72 percent decline in GDP per capita growth rate. This implies that expenses made by government are generally unproductive and do not contribute to the growth of the economy in the long run. This findings is similar to that of Folster (2001) and contrary to findings from Ackon (2019), Frimpong and Oteng-Abayie (2006), Owusu-Nantwi and Erickson (2016), and Kumar and Woo (2010). The long run growth model also shows a negative relationship between exchange rate and economic growth. A 1 point reduction in exchange rate (EXR) triggers a 0.08 reduction in GDP per capita growth rate. This result is similar to the findings of Atkins (2000) and Kamin and Roger (2000), but contrary to the findings in Gluzmann *et al.* (2012) and Mbaye (2012).

Table 5.11: Model B Results –Long Run Investment Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ED	-0.095927	0.060013	-1.598439	0.1236
DS	-0.805474	0.781972	-1.030054	0.3137
OP	0.373300***	0.088723	4.207496	0.0003
GEXP	0.814478	0.653102	1.247092	0.2249
INF	0.332514**	0.134027	2.480943	0.0209
EXR	-0.081641***	0.027121	-3.010297	0.0062
POP	35.70878***	9.765447	3.656646	0.0013
C	-84.96437	35.57467	-2.388339	0.0255

***, ** and * indicating a significance level of 1%, 5% and 10% respectively.
Source: Compiled by author using E-Views 10

From Table 5.11, the coefficients of the regression results represent elasticities. External debt (ED) has a negative but insignificant effect on investment in the long run. Debt servicing (DS) in the long run was also found to have a negative but insignificant effect on investment. Trade openness (OP) exhibits a positive and significant effect on investment per GDP in the long run at a 1 percent significance level. On average, a 1 percent increase in trade openness (OP) leads to a 0.37 percent increase in investment per GDP. This confirms the importance of trade in promoting investment in Ghana. This result is consistent with the findings of Barik (2013) and Kamundia (2015). Government expenditure (GEXP) in the long run investment model was found to be positive but statistically insignificant.

In the long run investment model, inflation (INF) has a positive and significant effect on investment at a 5 percent significance level. On average, a 1 percent increase in the rate of inflation (INF) leads to a 0.33 percent increase in investment per GDP. This implies that, increases in general prices do not discourage investment activities in the country, but rather, seen as a factor that promotes investment. This is possible when increases in general prices lead to increases in the rate of returns for various investment portfolios. This result follows the findings of Akram (2011) and Asab and Al-Tarawneh (2018).

A negative long run relationship is found between exchange rate and investment. In essence, a 1 point increase in exchange rate (real effective exchange rate) leads to a 0.08 percent reduction in investment per GDP. This indicates that, a depreciation of the cedi dampens investment in Ghana. This can be attributed to the fact that, depreciation leads to an increase in the cost of importing machinery and equipment, user cost of capital, and many others which ultimately leads to a fall in expected gains from investment therefore, reducing actual investment. This findings is consistent with the results in Campa (2004) and Alba *et al.* (2005), but not consistent with the results in Goldberg and Kolstad (1995), Goldberg (1999), Froot and Stein (1991) and

McCorriston and Sheldon (1998). Again, the long run investment model shows a positive relationship between population growth rate and investment.

5.6 Short Run Estimations

The study uses the ARDL cointegration method to estimate the short run relationship between the variables. The results of the ARDL short run regression results are specified in Tables 5.12 and 5.13.

Table 5.12 Model A Results – Short Run Growth Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Y(-1)	-0.01875	0.227203	-0.082536	0.9354
INV	-0.10720	0.063227	-1.695387	0.1121
ED	-0.15919**	0.055485	-2.869001	0.0124
ED(-1)	0.05098	0.069125	0.737480	0.4730
ED(-2)	-0.09073**	0.039267	-2.310526	0.0366
DS	0.23994	0.354347	0.677119	0.5094
DS(-1)	-0.41164	0.325044	-1.266395	0.2260
DS(-2)	0.43981	0.378567	1.161777	0.2648
OP	0.16644***	0.047576	3.498455	0.0035
OP(-1)	-0.00618	0.061876	-0.099838	0.9219
OP(-2)	0.08591*	0.047924	1.792727	0.0946
GEXP	-0.37904	0.366315	-1.034728	0.3183
GEXP(-1)	-0.33572	0.441704	-0.760059	0.4598
GEXP(-2)	-1.03962***	0.339026	-3.066506	0.0084
INF	-0.00033	0.043151	-0.007521	0.9941
EXR	-0.03334	0.054130	-0.615858	0.5479
EXR(-1)	-0.05413**	0.025694	-2.106605	0.0537
EXR(-2)	0.00862**	0.004074	2.116653	0.0527
POP	-70.9018***	31.31722	-2.263988	0.0400
POP(-1)	65.6660***	27.88709	2.354709	0.0337
C	46.1668	32.90946	1.402844	0.1824
R-squared	0.801509	Mean dependent var		2.764116
Adjusted R-squared	0.517950	S.D. dependent var		2.242745
S.E. of regression	1.557133	Akaike info criterion		4.007279
Sum squared resid	33.94528	Schwarz criterion		4.940488
Log likelihood	-49.12738	Hannan-Quinn criter.		4.329422
F-statistic	2.826608	Durbin-Watson stat		2.927769
Prob(F-statistic)	0.025634			

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***, ** and * indicating a significance level of 1%, 5% and 10% respectively.
Source: Compiled by author using E-Views 10

The short run growth equation in Table 5.12 shows an R-squared and adjusted R-squared of 0.802 and 0.518 respectively. This indicates that the variables Investment (INV), External debt (ED), Debt Servicing (DS), Trade openness (OP), Inflation (INF), Government expenditure (GEXP), Exchange rate (EXR) and Population growth (POP) explain 80% of variations in GDP per capita growth (Y). With a 0.026 Prob (F-stat) value, the coefficients are jointly significant at 5 percent.

At a 5 percent significance level, external debt has a negative and significant effect on economic growth in the short run. This reaffirms the negative relationship obtained in the long run growth equation. Holding all other things constant, a 1 percent increase in external debt (ED) leads to a 0.16 percent decline in output (GNI per capita). Increases in external debt stock requires the provision of funds for debt servicing obligations. This activity leaves government with low funds for investment into ventures that propel growth. This outcome is consistent with studies including Anning *et al.* (2016). The short run regression equation also reveals a positve but insignificant relationship between debt servicing (DS) and economic growth (GNI per capita) in Ghana.

Trade openness was found to have a positive relationship with economic growth at a 1 percent significance level. The reaffirms the positive relationship established in the long run growth model. The estimated coefficient indicates that, on average a 1 percent increase in trade openness (OP) boosts economic growth (GNI per capita) by 0.17 percent. Trade ensures the movement of capital into the country, as well as increasing the productivity of limited inputs and resources. Increases in productivity ensures production efficiency which is translated into increase in economic growth. This outcome is similar to the findings by Owusu-Nantwi and

Erickson (2016). Government expenditure (GEXP), inflation (INF) and exchange rate (EXR) were found to have a negative but insignificant effect on output..

Finally, the short run growth equation shows a negative and significant relationship between population growth (POP) and economic growth (Y). This result is similar to the findings in Owusu-Nantwi and Erickson (2006) as well as Panizza and Presbitero (2012).

Table 5.13 Model B Results – Short Run Investment Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INV(-1)	-0.081071	0.169320	-0.478805	0.6366
ED	-0.103704	0.065153	-1.591713	0.1251
DS	-0.870775	0.912718	-0.954045	0.3500
OP	0.403564***	0.101298	3.983943	0.0006
GEXP	0.880509	0.669135	1.315891	0.2012
INF	0.163940	0.122187	1.341707	0.1928
INF(-1)	0.195531*	0.112089	1.744436	0.0944
EXR	-0.088260**	0.035174	-2.509266	0.0196
POP	99.92996***	34.02336	2.937099	0.0074
POP(-1)	-0.320563	56.98851	-0.005625	0.9956
POP(-2)	-61.00566	36.26038	-1.682433	0.1060
C	-91.8526**	35.89316	-2.559054	0.0175
R-squared	0.810523	Mean dependent var		28.80420
Adjusted R-squared	0.719903	S.D. dependent var		10.29728
S.E. of regression	5.449751	Akaike info criterion		6.494877
Sum squared resid	683.0950	Schwarz criterion		7.028139
Log likelihood	-101.6604	Hannan-Quinn criter.		6.678959
F-statistic	8.944242	Durbin-Watson stat		2.492931
Prob(F-statistic)	0.000006			

***, ** and * indicating a significance level of 1%, 5% and 10% respectively.
Source: Compiled by author using E-Views 10

The short run investment equation in Table 5.13 shows an R-squared and adjusted R-squared of 0.81 and 0.72 respectively. This indicates that the variables, External Debt (ED), Debt Servicing (DS), Trade openness (OP), Inflation (INF), Government expenditure (GEXP), Exchange rate (EXR) and Population (POP) jointly explain 81 percent of variations in INV. With a 0.00 Prob (F-stat) value, the short run coefficients are jointly significant at 1 percent.

The short run investment regression model shows a negative but insignificant relationship between external debt and investment. It also shows a negative but insignificant relationship between debt servicing and investment. The insignificant relationship between these variables and investment are consistent with the log run investment equation. These results show that there is no effect of public debt on additions to fixed capital assets such as plants, machinery, and so on. The results obtained are consistent with findings of Akram (2013) and Kamundia (2015).

Trade openness was found to be positively related to investment at a 1 percent significance level. The coefficient implies that, on average a 1 percent increase in trade openness (OP) leads to a 0.40 percent increase in investment per GDP. The short run relationship between trade openness and investment is reaffirmed in the long run investment equation. This implies that, with access to the global market, the country's level of capital stock increases, which ultimately leads to growth in investment. The results obtained are consistent with the findings of Barik (2013) and Kamundia (2015).

The short run estimation reveals that, exchange rate has a negative effect on investment at a 5 percent significance level. The coefficient indicates that, a 1 point increase in real effective exchange rate (EXR) leads to a 0.09 percent reduction in investment per GDP, with other factors held constant. This negative and significant relationship between exchange rate and investment holds for both the short and long run estimates. This implies that, a depreciation of the currency leads to an increase in the cost of importing machinery and equipment, a relatively higher user cost of capital, and many other factors which ultimately leads to a fall in expected gains from investment. This is eventually translated into a decline in actual investment. This result is consistent with the findings in Alba *et al.* (2010) but contrary to the findings in Goldberg (1999).

The short run investment estimation results shows a positive but insignificant relationship between government expenditure and investment. It also shows a positive but insignificant

relationship between inflation and investment. In addition to this, a positive and significant

relationship was established between population growth and investment in the short run.

CHAPTER SIX

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

6.1 Introduction

This chapter provides a summary of the thesis as well as its findings. The conclusion and policy implications of this study are discussed in this chapter. The chapter is concluded with the limitations of the study and areas for further studies.

6.2 Summary and Conclusion

This thesis was motivated by the persistent growth in Ghana's debt to GDP above the 60 percent sustainability threshold prescribed by the West African Monetary Zone (WAMZ). This is also coupled with the country's low performance in terms of debt servicing. These two situations raise more concerns on how the country's level of public debt can affect both investment and economic growth. These concerns have led to many studies investigating the effect of public debts on economic growth in Ghana. The results of these works have provided mixed results and lack a uniform answer to the concerns raised on how the country's level of public debt can affect growth. The first objective of this study was to provide a more current empirical evidence on the debt-growth nexus for Ghana. In addition to assessing the impact of public debt on economic growth, the study had a second objective of analyzing the effect of public debt on investment which most of the empirical works for Ghana do not attempt to assess. This thesis does not simply assume that the effect of public debt on economic growth is channeled basically through investment, but takes a further step of verifying this assumption.

The thesis was guided by the neoclassical growth model which takes into account the role of public debt indicators in influencing growth within an economy. It justifies the need to fill the

domestic savings gap by seeking external funds to carry out government investments that can propel growth. Based on this growth theory, the effect of public debt on investment and economic growth is found to be ambiguous, that is, depends mainly on the magnitude of the positive benefits accrued from the borrowed funds and the part of private investment crowded out. The study provides an empirical investigation using data from for the World Bank and IMF for the period 1983 – 2019. Based on the result of the stationarity tests carried out, the variables were found to be a combination of I(0)s and I(1)s. This implies that the Autoregressive Distributed Lag (ARDL) cointegration method was appropriate in determining both short and long run effects of public debt on investment and economic growth.

After the estimations, the coefficients of investment, external debt, trade openness, government expenditure and exchange rate in the long run growth equation were found to be significant. A negative relationship was found between investment and economic growth, as well as external debt and economic growth. This implies that the country's level of external debt retards economic growth and individual welfare in the long run. The estimated long run growth equation reveals the importance of trade to the growth of the Ghanaian economy. The positive and significant relationship between trade openness and economic growth signifies that import and export activities are translated into increases in the country's productive capacity. Government expenditure and exchange rate were found to be negatively related to economic growth in the long run growth model.

In the short run growth model, external debt, trade openness and population growth were observed to be statistically significant. The effect of external debt on economic growth was found to be negative, indicating that, funds received through public borrowing are not used for productive activities that will enhance the growth of the economy. From the short run growth model, trade openness was positively related to economic growth, while population growth was

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negatively related to economic growth. The coefficients of investment, debt servicing, government expenditure, inflation and exchange rate were found to be statistically insignificant.

The long run investment equation shows that trade openness, inflation, exchange rate and population growth were statistically significant. The equation shows a positive relationship between trade openness and investment, as well as inflation and investment. The coefficients of external debt and debt servicing were found to be negative but statistically insignificant in the long run investment model. This outcome implies that, the "crowding out" effect of public debt cannot be confirmed for Ghana in the long run. These findings are contrary to Tuffour (2011) who establishes the "crowding out" effect for Ghana. Inflation and population growth were found to be positively related to investment. Finally, the long run investment model revealed a negative relationship between exchange rate and investment, indicating that depreciation of the cedi retards investment activities in the Ghanaian economy.

The short run investment equation shows a negative but insignificant relationship between external debt and investment. It also reveals a negative but insignificant relationship between debt servicing and investment. This reaffirms the long run finding of no "crowding out" effect for Ghana. Trade openness and population growth were found to be significant and positively related to investment in the short run investment model. The importance of trade in promoting investment has been confirmed in both the short and long run investment equations. The short run investment model also shows a negative relationship between exchange rate and investment, indicating that the depreciation of the cedi repels economic growth. The model also shows a positive but insignificant relationship between government expenditure and investment, as well as inflation and investment.

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6.3 Policy Recommendations

The major conclusion that can be drawn from this thesis is that, external debt retards economic growth but has no effect on investment in Ghana. Debt servicing on the other hand has no effect on both economic growth and investment in Ghana. These results from the study provides no evidence for "crowding out" effect in Ghana, since both external debt and debt servicing have no effect on investment. This further implies that, the effect of high external debt stock and debt servicing activities do not retard investment in the country, but could be attributed to the inefficiency of projects that these funds are acquired for, as well as other channels such as factor productivity and so on. External funds that are borrowed by the Ministry of Finance on behalf of the Government of Ghana must be properly scrutinized by the Parliament of Ghana before approval. These institutions are to also ensure that, these funds borrowed from the external market are allocated to productive ventures that would help boost output in both the short and long run. These funds must not be entirely devoted to consumable expenditures, worker's emoluments and financing of previous debt and other unproductive activities.

The thesis also provides some relevant findings on the effect of trade openness and exchange rate on GDP per capita growth in Ghana. The importance of trade in promoting growth has been reaffirmed in this thesis. The estimated growth equation shows a positive relationship between trade openness and economic growth, whereas the investment equation shows a positive relationship between trade openness and investment. In addition to ensuring that trade is promoted with the international community, policymakers in public institutions such as the Ghana Export Promotion Authority (GEPA) and the Ministry of Food and Agriculture should revise the export-led growth strategy by switching from the over-reliance on traditional commodities to the export of value-added products, as this leads to more sustainable export earnings. The persuant of this strategy must be in collaboration with the Ministry of Trade and

Industry, and tailored to ensuring that, externally generated funds are directed into the establishment of new industries as well as revamping already existing ones.

Exchange rate in the thesis was found to be unfavorable to the growth of the Ghanaian economy. The effect of exchange rate was found to be negative on both investment and economic growth, indicating that the depreciation of the cedi slows down capital formation as well as economic growth. With the idea of promoting trade and investment, the Bank of Ghana together with the Ministry of Finance should ensure the strict adherence to macroeconomic policies that will ensure that existing exchange rates will be stable and favorable. A stable and favorable exchange rate will help improve the gains from trade and investment.

6.4 Limitations and areas for further studies

The composition of total debt stock in Ghana has evolved with the development of the domestic credit market in 2006. Domestic debt averaged 15.92 percent before this time and now constitutes about 46.67 percent of total public debt stock. (Bank of Ghana, 2021). This development suggests the need to include domestic debt as a debt indicator in the analysis. The thesis was unable to include this significant variable due to the unavailability of data on domestic debt to GDP for the desired period of time from authoritative sources such as the World Bank and IMF. The inclusion of this variable on assessing the impact of public debt on investment and economic growth will provide a more general view of the debt-growth nexus for Ghana, and can be adopted in further studies.

According to Rother and Checherita (2010), public debt affects economic growth through channels such as private savings, public investment, private investment, interest rates and total factor productivity. This study assessed the impact of public debt on economic growth through investment per GDP. The result provides no support for using investment as the channel through

which debt affects economic growth. Since this study could not verify investment as the main channel, further studies can also explore the other channels suggested by Rother and Checherita (2010). The thesis did not perform a causality test to assess the direction of impact between public debt and investment or public debt and economic growth. It only assumed one direction of impact (public debt on investment and economic growth), and assessed the relationship between public and investment, as well as public debt and economic growth. Further studies can perform causality tests to ascertain the direction of impact between these variables.

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APPENDIX

A: Breusch-Godfrey LM Test Result for Autocorrelation – Model A

Lags (p)	Chi2	df	Prob > chi2
1	20.438	1	0.0000

H_0: no serial correlation

H_1: presence of serial correlation

Source: Author's compilation using STATA 15.

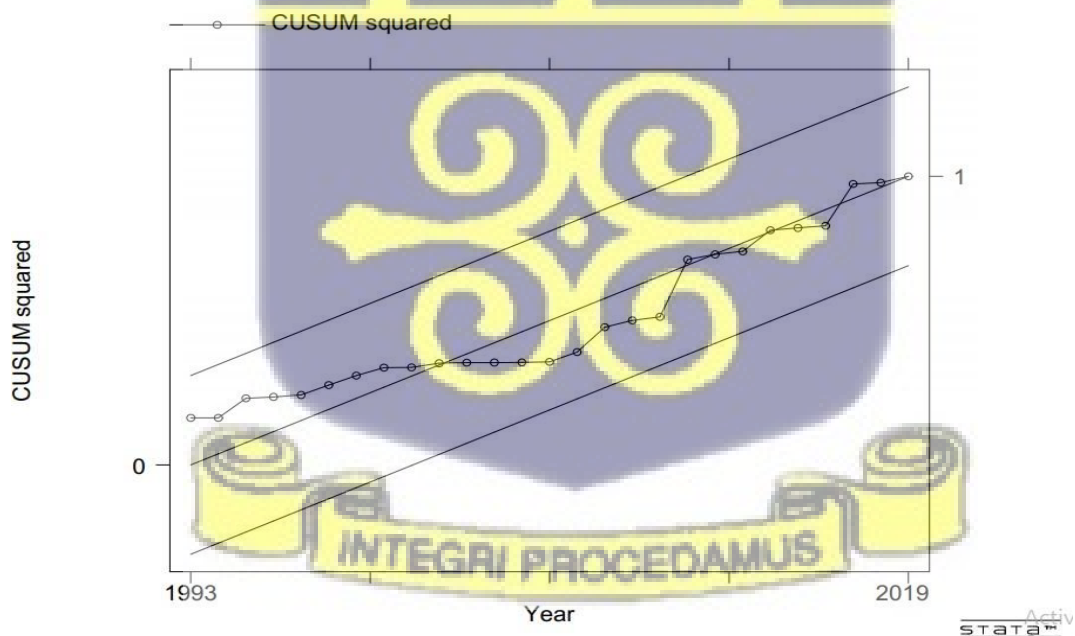## B: White's Test Result for Heteroscedasticity – Model A

Chi2 (34) = 35
Prob > chi2 = 0.4204

Ho: homoscedasticity

Ha: unrestricted heteroscedasticity

Source: Author's compilation using STATA 15.

C: CUSUM Test Result for Model A

Source: Author's derivation using STATA 15.

D: Breusch-Godfrey LM Test Result for Autocorrelation – Model B

Lags (p)	Chi2	df	Prob > chi2
1	5.849	1	0.0156

H_0: no serial correlation

H_1: presence of serial correlation

Source: Author's compilation using STATA 15.

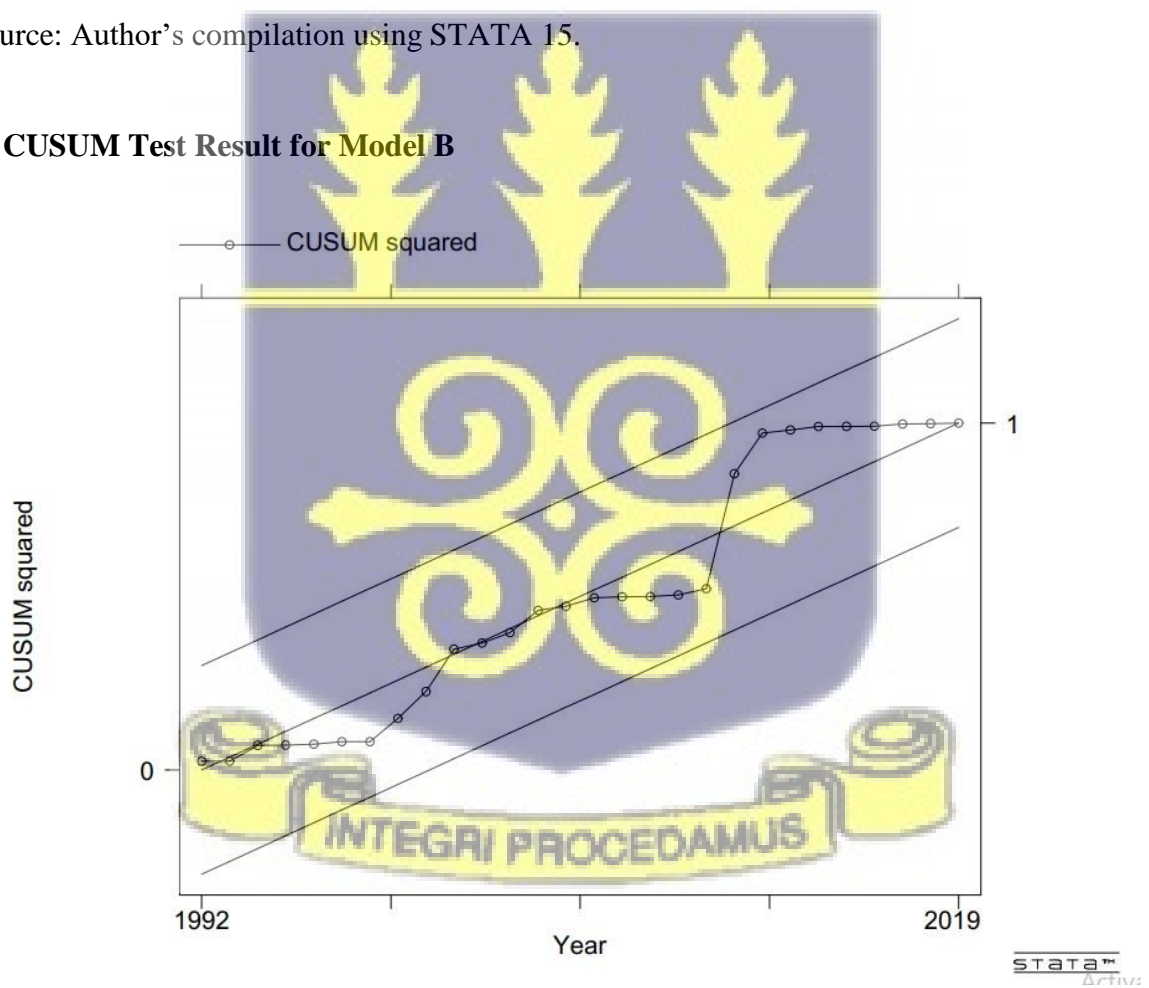**E: White's Test Result for Heteroscedasticity – Model B**

Chi2 (34) = 35
Prob > chi2 = 0.4204

Ho: homoscedasticity

Ha: unrestricted heteroscedasticity

Source: Author's compilation using STATA 15.

F: CUSUM Test Result for Model B

Source: Author's derivation using STATA 15.