

UNIVERSITY OF CAPE COAST

GOVERNMENT CAPITAL EXPENDITURE, RECURRENT EXPENDITURE
AND ECONOMIC GROWTH IN GHANA

BY

ABEL NYARKO – ASOMANI

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degree in Economics

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DECLARATION

Candidate's Declaration

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

Candidate's Signature Date

Name:

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature Date

Name:

Co-Supervisor's SignatureDate

Name:

ABSTRACT

This study sought to find out the relationship between government expenditure and economic growth in a further disaggregated level in Ghana. Focusing on the period 1990 to 2015, it considered the major sub-components of recurrent expenditure (thus non-interest and interest-payment) and capital expenditure and their relationship with economic growth. Using a quarterlized time series data, this work employed the Autoregressive Distributed Lag model (ARDL) to estimate the relationship among these variables of interest. Furthermore, to establish the direction of causality that lies between these government expenditures and economic growth, this study resorted to the Granger Causality test to arrive at the direction of causality among the variables.

Based on the ARDL results, capital expenditure and non-interest recurrent expenditure promotes economic growth in the long-run period while interest-payments retards economic growth in the all periods. The short-run results show that capital expenditure and non-interest recurrent expenditure increases economic growth while the lagged values for capital expenditure decreases economic growth. The granger causality test indicates a unidirectional causality running from the government expenditures to economic growth, except for that of interest payment whereby causality runs from Economic growth to interest-payment expenditure.

Based on the findings, these recommendations were suggested to the Ministry of Finance: increase funding for capital expenditure, increase and intensify the monitoring aspect of non-interest expenditure and capping of the levels of public borrowings within a year to decrease interest-payment burden.

KEY WORDS

Autoregressive Distributed Lag Model (ARDL)

Capital Expenditure

Economic Growth

Ghana

Interest-Payment Recurrent Expenditure

Non-Interest Recurrent Expenditure

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DEDICATION

To my beloved parents of blessed memory and my dear family

TABLE OF CONTENTS

Title	Page
DECLARATION	ii
ABSTRACT	iii
KEY WORDS	iv
ACKNOWLEDGEMENTS	v
DEDICATION	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF ACRONYMS	xii
CHAPTER ONE: INTRODUCTION	1
Background to the Study	1
Statement of the Problem	8
Research Objectives	10
Research Hypotheses	11
Significance of the Study	12
Scope of the Study	13
Organisation of the Study	14
CHAPTER TWO: OVERVIEW OF THE GHANAIAN ECONOMY	15
Introduction	15
Trends of Macroeconomic Variables	19
Trend of Gross Capital Formation in Ghana (K)	20
Trend of Labour Force in Ghana (L)	21
Trend of Non-Interest Recurrent Expenditure in Ghana (NREX)	22
Trend of Interest-Payment Recurrent Expenditure in Ghana (INTX)	23
Trend of Capital Expenditure in Ghana (CAPEX)	24
Trend of Broad Money Supply in Ghana (MONEY)	25
The Trend of Gross Domestic Savings (SAV)	26

Trend for Total Revenue (TR)	27
Trend of Economic Growth in Ghana	28
The Concept of Public Expenditure	29
Non – Interest Recurrent Expenditure	30
Interest Payment Recurrent Expenditure	31
Capital Expenditure	32
Conclusion	33
CHAPTER THREE: LITERATURE REVIEW	35
Introduction	35
Theoretical Literature	35
Economic Growth	36
The Wagner’s Theory	37
The Peacock and Wiseman Theory	41
Development Models	44
The Solow Growth Model	46
Aggregate Production Function	49
The Classical Theory of Growth	52
The Keynesian Model	55
The Process of Government Expenditure	57
Review of Empirical Literature	60
Country-Specific Studies	60
Cross-Country Studies	66
Conclusion	68
CHAPTER FOUR: METHODOLOGY	69
Introduction	69
Research Design	69
Theoretical Model Specification	71
Justification, A priori Expectation and Measurement of Variables	73
Sources of Data	79
Empirical Model Specification	80

Estimation Technique	81
Stationarity Test	82
Data Analysis	93
Conclusion	94
CHAPTER FIVE: RESULTS AND DISCUSSION	95
Introduction	95
Descriptive Statistics	95
Lag Order Selection	103
Bounds Test Result for Cointegration	104
Long-Run Estimation Results	105
Results of the Short-Run Dynamic Model	113
Model Diagnostic and Stability Test	120
CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	132
Introduction	132
Summary	132
Conclusions	137
Recommendations	139
Limitations of the Study	141
Directions for Future Study	141
REFERENCES	142
APPENDICES	156
A Results of plots of variables at levels	156
B Results of plots of variables at First Difference	158
C Unit Root Tests at Levels and First Difference with Intercept Only	160
D Unrestricted Vector Autoregression (VAR)	161
D Full Short-Run Estimation	161

LIST OF TABLES

Table	Page
1 Summary Statistics of the Main Variables of Interest	97
2 Summary Statistics of the Control Variables	98
3 Unit Root Test at Levels I(0) (Trend and Intercept)	100
4 Unit Root Test at First Difference I(1) (Trend and Intercept)	101
5 VAR Lag Selection Criteria	104
6 Bounds Test Result for the Existence of Cointegration	105
7 Long-Run Estimated Results	107
8 Estimate of the Short Run Results	114
9 Summary Statistics of the Regression	121
10 Model Diagnostics	121
11 Granger Causality Test (Between Captial Expenditure and Real Gross Domestic Product)	126
12 Granger Causality Test (Between Non-Interest Recurrent expenditure and Real Gross Domestic Product)	127
13 Granger Causality Test (Between Interest-Payment Recurrent Expendiure and Real Gross Domestic Product)	128

LIST OF FIGURES

Figure	Page
1 Trend of Capital Expenditure (CAPEX) and Recurrent Expenditure (RECEX) in Ghana	5
2 Trend of Non-Interest Recurrent Expenditure (NREX) and Interest-Payment Expenditure (INTX) in Ghana	7
3 Trend of Gross Capital Formation	21
4 Trend of Labour Force Participation in Ghana (15-64 years)	22
5 Trend of Non-Interest Recurrent Expenditure	23
6 Trend of Interest Payment Recurrent Expenditure (INTX)	24
7 Trend of Capital Expenditure	25
8 Trend of Broad Money Supply (MONEY)	26
9 Trend of Gross Domestic Savings (SAV)	27
10 Trend of Total Revenue (TR)	28
11 Trend of Real Gross Domestic Product in Ghana (RGDP)	29
12 A plot of Cumulative Sum of Recursive Residuals	124
13 A plot of Cumulative Sum of Squares of Recursive Residual	125

LIST OF ACRONYMS

ADF	Augmented Dicky-Fuller Test
AfDB	African Development Bank
AIC	Akaike Information Criterion
AR	Autoregressive
ARDL	Autoregressive Distributed Lag Model
CEPA	Centre for Policy Analysis
CUSUM	Cumulative Sum of Recursive Residuals
CUSUMSQ	Cumulative Sum of Squares of Recursive Residuals
DL	Distributed Lag
ECM	Error Correction Model
ECT	Error Correction Term
EIU	Economist Intelligence Unit
ERP	Economic Reform Program
GDP	Gross Domestic Product
HIPC	Highly Indebted Poor Country Initiative
I	Integrated
IMF	International Monetary Fund
INTX	Interest Payment Recurrent Expenditure
IS-LM	Investment-Savings and Liquidity Preference Money Supply
ISSER	Institute of Statistical, Social and Economic Research
MDRI	Multilateral Debt Relief Initiative
MFEP	Ministry of Finance and Economic Planning
MLE	Maximum Likelihood Estimation
MONEY	Broad Money Supply
NREX	Non-Interest Recurrent Expenditure

OLS	Ordinary Least Squares
PP	Phillips-Perron
RESET	Regression Specification Error Test
SBC	Schwarz Bayesian Criterion
SBP	Structural Adjustment Programme
TFP	Total Factor Productivity
Q	Quarter Period
UECM	Unrestricted Error Correction Model
VAT	Value Added Tax

CHAPTER ONE

INTRODUCTION

Sustainable and equitable economic growth has become a crucial objective for most developing countries in this 21st century. Over some decades now, the desire to achieve this objective especially in Ghana have been largely determined by public expenditure. This is because efficient management of public expenditure according to Keynes (1936) can serve as a catalyst for growth in the country. While some economic agents are of the view that public expenditure is contributing to economic growth in Ghana, others are of the view that it is not serving this purpose in the country.

Background to the Study

In every economy, a vital factor that determines the economic growth of a country is the investment into the various sectors of the economy. Investment by definition refers to the purchase of goods and services not consumed today but are used in the future to create wealth (Investopedia Dictionary, 2000). Investment by nature can be classified in every economy into private and public forms of investment. In most Sub-Saharan African countries such as Ghana, the government's investment in the form of public expenditure is a very critical component of the economy.

Public expenditure according to Aigheyisi, (2013) refers to the expenses incurred by the government for the maintenance of itself and the provision of goods and services to foster economic growth and improve the welfare of people

in the society. Through the provision of social amenities in the form of health facilities, transfer payments, education, infrastructure and the rest, the government reaches out to its citizens in order for them to make a living in the country. Government expenditure can generally be categorised into expenditures on administration, defence, internal securities, health, education, foreign affairs etc. However, expenditures in all sectors of the economy can be grouped into two broad forms. These are Capital expenditures and Recurrent expenditures (Aigheyisi, 2013; Centre for Policy Analysis, 2006). Capital expenditures refers to the amount spent in the acquisition of fixed (productive) assets (whose useful life extends beyond the fiscal year), as well as expenditure incurred in the upgrade of existing fixed assets as lands, building, roads etc (Aigheyisi, 2013). Recurrent expenditure on the other hand refers to expenditure on the purchase of goods and services, wages and salaries, operational cost of running a government agency as well as current grants and subsidies (usually classified as transfer payments). An annual budget makes provision for the direction of the expected expenditure, as it contains details of the proposed expenditure for each year, though the actual expenditures may differ from the budgeted figures due, for example, to extra-budgetary expenditures or allocations during the course of the fiscal year may be used to support the government's expenditure (Aigheyisi, 2013).

Historically, the issue about the relationship between government expenditure and economic growth became a world popular issue in the 1930s as a result of the worldwide Great Depression that brought about severe economic depression in most part of the world. After the occurrence of the Great depression,

which increased unemployment in the United States of America by 25 percent and averaged more than 17 percent in a decade (Cohn, 2007), Keynes (1936) saw the inability of the classical economists to explain the causes of the Great Depression and thus questioned the policy recommendations of the laissez-faire system which was advocated by the classical economist for responding to the high rate of unemployment at that time. Keynes believed that the American economy at that time was capable of moving from the depression when expansionary government policies were put in place. Such policies according to Keynes could increase aggregate demand, re-employ people who would then re-spend their incomes and that will stimulate production to increase and so on – multiplier effect (Appiah, 2014) . From the viewpoint of Keynes, what prevented the economy from recovering was the laissez-faire system of the classical economist that assured every individual that the economy would automatically move out of the depression in the long-run. The Great Depression persisted within the 1930s in the U.S. but through a massive government expenditure the situation was rescued in America.

The aftermath of the Great Depression prompted many countries to see the need to efficiently manage their public expenditures in order to achieve economic growth. Before Ghana's attainment of independence in 1957, the then British colonial masters established a ceiling of about 10% of GDP on government expenditure. But on the assumption of office, the newly formed Dr. Kwame Nkrumah's government removed the cap from government expenditure and this resulted in the rise in government expenditure (Ackah, Adu, & Ohene-Manu, 2014). The rise in government expenditure has persisted over the past years till

present day. For instance, in the year 2000, total government expenditure relative to GDP increased to 27.7 percent compared with 26.2 percent in 1999. However, in absolute terms, there was a 47.6 percent increase in total expenditure in 2000 (African Development Bank, 2002).

Economic growth on the other hand is extremely important because the bottom line for any economy is its ability to satisfy human wants (Van Den Berg as cited by Gadinabokao & Daw, 2013). Interestingly the behaviour of economic growth in Ghana over the years has not shown the same upward trend as in the case of government expenditure. Economic growth since 1965 showed an annual rate of 4.5 percent compared to the annual average in real expenditure of 8.5 percent. Between the period 1995 to 2010, the economy's growth recorded an average of 5.8 percent instead of 8 percent as desired by the Vision 2020 while at the same period government expenditure grew at 13 percent showing a wide disparity between economic growth and government expenditure in Ghana (Adu & Ackah, 2015). In the year 2015, economic growth continued its slow pace of growth from an estimated rate of 4 percent in 2014 to a lower rate of 3.7 percent in 2015. The slow rate of growth according to the African Development Bank (2006) was as a result of both internal and external economic challenges such as the power crisis, rising fiscal deficit and public debt levels, a significant external sector deficit and unpredictably low world market prices for the country's oil and gold exports. In view of this, the performance of government expenditure in the economy has not shown up clearly over the decades.

Furthermore, budgetary allocations in every year has always been uneven between the recurrent and capital expenditure in most Sub-Saharan African countries. In the case of Ghana, public expenditures have been dominated by recurrent spending (Institute of Statistical, Social and Economic Research, 2015). The trend of these two major components of public expenditure can be shown in figure 1. The trend from figure 1 depicts that over the study period (1990-2015), public expenditure has been dominated by recurrent expenditure (RECEX) as against capital expenditure (CAPEX) which has been receiving lesser funding from government's budget.

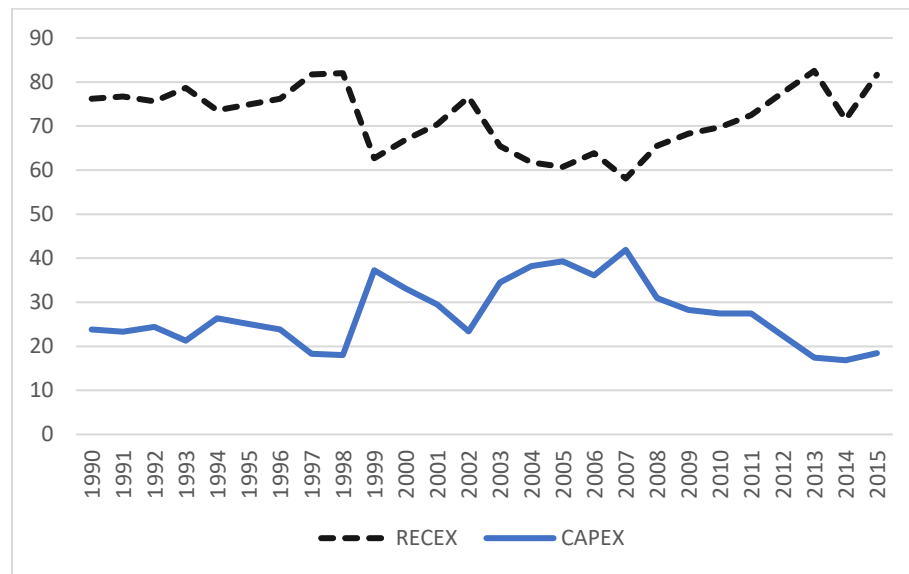


Figure 1: Trend of Capital Expenditure (CAPEX) and Recurrent Expenditure (RECEX) in Ghana

Source: Graphed from Institute of Statistical, Social and Economic Research data (1990-2015).

Moreover, the share of recurrent spending out of the country's total spending has greatly increased since 2011. However, it fell in 2014 to 71.5 percent from the 2013's share of about 82.6 percent but in 2015, it increased to 81.7 percent while the rest of funds went to capital expenditure as shown in figure 1

(ISSER, 2015). Furthermore, the recent 2017 budget has allocated 12.6 percent of total expenditure to capital expenditure while the remaining 87.4 percent has been allocated to recurrent expenditure (Ministry of Finance, 2017). Recurrent expenditure in Ghana can be grouped into two categories. These are non-interest recurrent expenditure and interest payment expenditure (Centre for Policy Analysis, 2006). Non-interest recurrent expenditure includes personnel emoluments, administrative and service cost in public sector, payments to organizations on government subventions, government transfers and utility price subsidies. While interest recurrent expenditure consists of domestic and external interest payment on debt (CEPA, 2006; ISSER, 2015).

However, within the recurrent expenditure, it is the non-interest expenditure that receives the largest share of financing for the past years compared to interest payment expenditure (ISSER, 2015). Figure 2 shows the trend of non-interest recurrent expenditure which has been higher than interest payment expenditure over the decade with the exception of 1998 in which interest payment was higher than non-interest expenditure by 1.8 percent. According to the Centre for Policy Analysis (1999), the increase could be attributed to the phenomenal increase in domestic interest payments by almost 37 percent in the face of the reduction in Treasury bill rate from 47.5 percent from 1997.

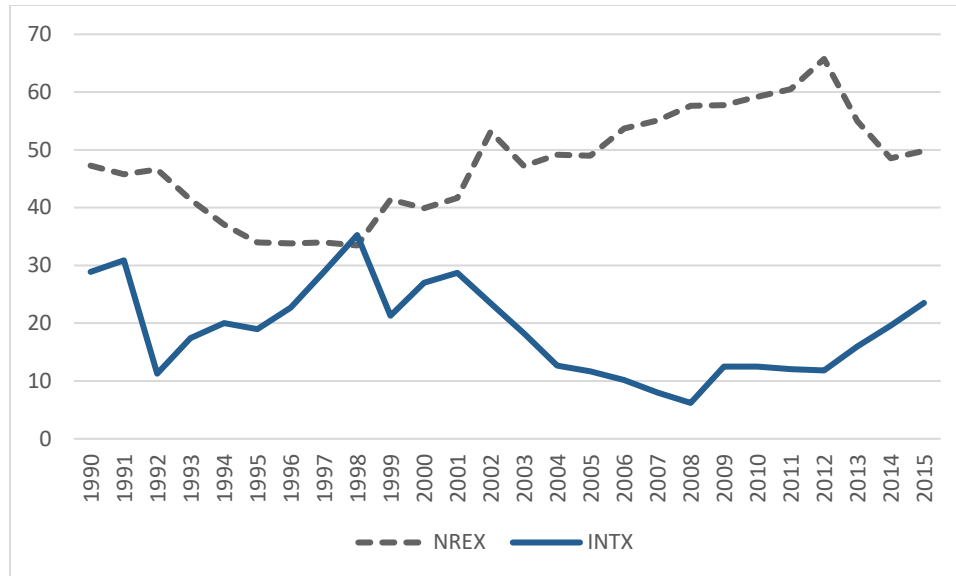


Figure 2: Trend of Non-Interest Recurrent Expenditure (NREX) and Interest Payment Expenditure (INTX) in Ghana

Source: Graphed from Institute of Statistical, Social and Economic Research data (1990-2015).

One important component on the non-interest recurrent expenditure is the wage bill of the country. The wage bill according to the Fairwages and Salaries Commission (2013) accounts for over 40 percent of recurrent budget, 46 percent of all tax revenues and about a quarter of overall government expenditure. The last two decades in the history of Ghana’s economy has witnessed a significant increase in public sector wage bill reaching a ratio of 11.3 percent of Gross Domestic Product in the year 2008 (FaireWages and Salaries Commission (FWSC), 2013). A further increase in the wage bill was also incurred when Government adopted the Single Spine Pay Policy (SSPP) in 2009. (FWSC,2013 ; Adu & Ackah, 2015). However, a closer look at the World Bank’s World development Indicators (2011) and data from the Ministry of Finance, shows that, while public expenditure is increasing at an increasing rate, the level of economic growth has stagnated until

2011 where economic growth recorded about 14.5 percent due to the oil production in commercial quantities (Adu & Ackah,2015).

Statement of the Problem

The expenditure approach of the national income accounting includes government expenditure as an important factor that positively affects the size of the economy. However, it could act as a two – edged sword (Aigheyisi, 2013). Though according to the Keynesian theory, it could boost aggregate output especially in developing countries where there is the predominance of market failures and poverty traps, it could also result in inflation surprises especially when economic agents do not have such information (according to the Lucas Critique) in the economy (Wang and Wen as cited in Aigheyisi, 2013).

Furthermore, as stated earlier by Ackah and Adu (2015) government expenditure from WDI data is increasing at an increasing rate, while economic growth level has stagnated until 2011 where it recorded about 14.05 percent due to the production of oil in commercial quantities. In view of this, many studies have delved into disaggregated government expenditure issues in Ghana while others have undertaken investigations into the whole aggregated government expenditure and its relationship with economic growth. For instance, in Ghana Ackah et al., (2014) focused on an aggregated government expenditures and economic growth dynamics in Ghana for the period 1970 to 2010 and concluded that government recurrent spending should be controlled in other to ensure an optimal level that will trigger a positive ripple effect to other sectors of the economy. A critical question that can be posed from the study is about the actual performance of the various sub-

components in public expenditure to the growth of the economy. Appiah (2014) also considered both the aggregated and the disaggregated study in Ghana but failed to consider the various sub-components under public expenditure. However, Appiah stressed that in order to make definite policy recommendations, a further disaggregated analysis must be undertaken by considering the various sub-components under both capital and recurrent expenditure.

Subject to this idea, this current research work contributes to knowledge in this area by considering the relationship between the sub-components under recurrent expenditure and Ghana's economic growth. These sub-components according to the Centre for Policy Analysis (2006) are the non-interest recurrent expenditure and interest payment recurrent expenditure. Recurrent expenditure from figure 1 shows that it receives the highest share of public spending, however knowledge about the specific aspect under that component that propels economic growth could assist policy makers in making proper resource allocation concerning the component.

Furthermore, it will indeed be significant for policy makers to also know the actual performance of the sub-components for capital expenditure which are the domestically funded and foreign funded capital expenditure but due to data constraints, this study considered the entire capital expenditure and its relationship with economic growth. Existing literature depicts a disturbing conclusion about the actual relationship between capital expenditure and economic growth. For instance, the works of Appiah (2014) and Aigheyisi (2013) produced as positive relationship with economic growth while the works of Okafor et al., (2012) and Nasiru (2012)

concluded on a negative relationship with economic growth. As such this study also considers the relationship between capital expenditure and economic growth in order to make a case about the current relationship between capital expenditure and economic growth in Ghana.

In addition, the viewpoint of the Wagner's law states that public expenditure responds to any increase in economic growth while the Keynesian theory points to the fact that it is rather the increase in public expenditure that causes economic growth in the country. Subject to these two conflicting viewpoints this study further evaluates the direction of causality that exists between these expenditure components (capital expenditure and recurrent expenditure sub-components) and economic growth of Ghana in order to inform policy makers about the current sources of growth so that they can focus their policies on and also to justify which theory holds in the country.

Research Objectives

The main objective of this study is to empirically estimate the relationship between the sub-components of recurrent expenditure and economic growth as well as that of capital expenditure and economic growth from the year 1990 to 2015 in Ghana.

Specifically, the study seeks to achieve the following specific objectives:

1. Determine a long-run relationship between government capital expenditure and economic growth as well as the sub-components of government recurrent expenditure and economic growth in Ghana.

2. Estimate a short-run relationship between government capital expenditure and economic growth and that of government recurrent expenditure sub-components and economic growth in Ghana.

3. Explore the direction of causality that lies between the recurrent expenditure sub-components and economic growth as well as capital expenditure and economic growth in Ghana.

Research Hypotheses

Subject to the specific objectives set up by this study, the following theoretical hypotheses were tested:

1. **H_0** : Government capital expenditure does not have a positive long-run relationship with the economic growth of Ghana.

H_1 : Government capital expenditure does have a positive long-run relationship with the economic growth of Ghana.

2. **H_0** : There is no positive long-run relationship between government recurrent expenditure sub-components (thus non-interest and interest payment) and economic growth of Ghana.

H_1 : There is a positive long-run relationship between government recurrent expenditure sub-components (thus non-interest and interest payment) and economic growth of Ghana.

3. **H_0** : Government capital expenditure does not have a positive short-run relationship with economic growth in Ghana.

H_1 : Government capital expenditure does have a positive short-run relationship with the economic growth of Ghana.

4. H_0 : Government recurrent expenditure sub-components does not have a positive short-run relationship with economic growth in Ghana.

H_1 : Government recurrent expenditure sub-components does have a positive short-run relationship with the economic growth of Ghana.

5. H_0 : There is no causal relationship between government capital expenditure and economic growth of Ghana.

H_1 : There is a causal relationship between government capital expenditure, and economic growth of Ghana.

6. H_0 : There is no causal relationship between government recurrent expenditure sub-components and economic growth of Ghana.

H_1 : There is a causal relationship between government recurrent expenditure sub-components and economic growth of Ghana.

Significance of the Study

The aim of this study is to contribute to knowledge about the resource allocation of capital expenditure and recurrent expenditure sub-components and their relationship with economic growth. Recent government trade off of resource allocation between the capital expenditure and recurrent expenditure has intensified the interest of many researches in knowing which expenditure component actually propels economic growth in Ghana. Therefore, it is important to undertake such study because it will assist policy makers to know the empirical relationship that

lies between these two forms of government expenditure and Ghana's economic growth. Since one basic constraint that faces the Ghanaian economy is financial resource constraint, it is vital for policy makers to make efficient resource allocative decisions on which aspect of government expenditure that effectively affects economic growth based on empirical research findings and not on other interest.

Scope of the Study

This study is limited to the period 1990 to 2015 where the Ghanaian economic growth is modelled to incorporate capital and recurrent expenditure sub-components (non-interest and interest payments) and other control variables which are macroeconomic factors in assessing the relationship that the variables of interest have with economic growth in Ghana. The period chosen for this study was dependent on the data availability and significant happenings during the period. These happenings such as the introduction of the Single-Spine Salary Structure in 2009, the adoption of the Highly-Indebted Poor Countries (HIPIC) initiative in 2001 and the Extended Credit Facility from 2014 to 2017 were some of the significant events that have affected the public expenditure of this country and they have influenced the need to study such relationship.

In this view, this current study used an Autoregressive Distributed Lag (ARDL) model, with a bounds test approach to Cointegration developed by Pesaran, Shin, and Smith (2001) on a quarterlized time series data set that spans from first quarter of 1990 to last quarter of 2015 to investigate the relationship.

Organisation of the Study

The study is divided into six chapters. Chapter one deals with the introduction and a background information on the study, statement of problem, objective of the study, statement of hypothesis, significance and the scope of the study. Chapter two delves into an overview of Ghana's economy, a trend analysis of the variables considered in this study and explanations of various important concepts in this study. Chapter three also digests both the theoretical and empirical literature associated with the phenomenon under study. Chapter four then discusses the methodology to be used together with the estimation techniques and data sources and analysis issues. Chapter five also focuses on the estimated model, analysis and presentation of empirical results. Finally, chapter six presents the summary, conclusions, recommendations, and limitations of the study and then suggests directions for future research.

CHAPTER TWO

OVERVIEW OF THE GHANAIAAN ECONOMY

Introduction

This chapter begins by providing a brief overview of the Ghanaian economy. This is then followed by the trend analysis of the macroeconomic variables that were considered in this study from the period 1990 to 2015. It then advances further to give explanations to the concept of Public Expenditure, Capital Expenditure, Non-Interest and Interest Recurrent Expenditure.

The Economy of Ghana

The Ghanaian economy over the decade relied on its various rich natural resources. After independence in 1957, the economy appeared to be stable and progressing. Ghana was the world's leading producer of cocoa, boasted with a well-developed infrastructure to service trade and enjoyed relatively advanced educational system (Berry, 1994). The government at the time led by Dr. Kwame Nkrumah began the process of moving the economy from primary production to a mixed agricultural industrial economy. Using revenue from cocoa, the government took out loans to set up industries for import substitution but unfortunately the price of cocoa collapsed in the mid-1960s and this resulted in huge debt cycle on the economy (Berry, 1995). Furthermore, the economy declined by about 30 percent from the 1970s to early 1980s (ISSER,2013).

As a result of the decline in the economy, the government of Ghana with the assistance from the World Bank and International Monetary Fund (IMF)

established the Economic Recovery Program (ERP) and the Structural Adjustment Program (SAP) in the April 1983 (Aryeetey, Fosu, & Bawumia, 2002). These reform programmes started with the Economic Recovery Programme (ERP) to stabilize the economy. Specifically, the ERP was a market-oriented programme which was intended to stop the downward economic spiral. Commencing in 1986, the second phase of ERP was supported with the Structural Adjustment Programme (SAP) to correct structural imbalances in order to attain a sustained healthy economic growth (Aryeetey et al.,2002).

After the success story of the two programs in late 1980s and early 1990s, the macroeconomic fundamentals of the country became weakened again as a result of the government's inability to maintain the SAP and ERP measures on the economy (African Development Bank, 2002). Both fiscal and monetary positions of the economy deteriorated in response to poor domestic policies and external constraints. The rate of inflation increased sharply, cost of borrowing sky-rocketed and foreign exchange of the cedi depreciated massively (AfDB,2002).

Although the year 2000 was marked as Ghana's Golden Age of Growth, the century begun with a world economic crisis. The economy suffered its worst growth performance for about 3.7 per cent in 2000 (AfDB, 2002). The 2000 performance continued for four successive years and this was attributed to the deterioration of the terms of trade as the prices of the country's main export commodities thus gold and cocoa fell while the main import commodity of the country's crude oil rapidly rose. These happenings led to a severe reduction in foreign exchange earnings. Poor domestic economic performance that made fiscal imbalances and excessive

monetary growth alongside the external problems at the time led to a reduction in production and consumption (AfDB,2002).

In the year 2001, the newly elected government led by President John Agyekum Kufuor decided to opt for the enhanced debt relief under the Highly Indebted Poor Country (HIPC) Initiative of the World Bank and the IMF (Pant & Subedi, 2006). The programme was undertaken due to the weakened economy they inherited at the time. The economy was characterised by a rapid exchange rate depreciation, high inflation and very low external reserves. Besides the crisis was partly as a result of the high debt service requirements that affected the government's budget and negatively affected the balance of payments. After the implementation of the HIPC Initiative, the level of debt servicing dropped from US \$ 544.8 million in 2000 to US\$ 306.6 million in 2001 indicating a reduction of about 43.7 percent. In addition, as a result of the programme, Ghana received an amount of US\$ 275.2 million and in 2003, an amount of US\$290.8 million, US\$318.3 million as at Nov 2004 (Pant & Subedi,2006) .

Furthermore, the Ghana Statistical Service in 2010, announced a rebasing of the national account from the year 1993 to 2006. This increased the estimated GDP in 2010 by 75 per cent, from 25.6 billion Ghana cedis (US \$ 17.7 billion) under previous definition to 44.8 billion Ghana cedis. This was done because of the old national accounting system which did not take into account important emerging sectors of the economy such as communication, oil sector activities and other important elements of the service sectors (Economist Intelligence Unit, 2010). Despite the change in the size of the economy as a result of the rebasing which

ushered Ghana into a lower-middle-income status, certain significant sectors of the economy were still not showing signs of improvement. For instance, agriculture dropped in 2010 from 35.6 per cent to 30.2 per cent (EIU,2010).

Furthermore, in the year 2007, Ghana discovered crude oil in commercial quantities along the coast of the Western Region of Ghana. The Jubilee Oilfield was discovered by the Kosmos Energy Limited in the Gulf of Guinea's Tano Basin. Records show that close to 278 million barrels of oil were expected to be produced in over 20 years (Tullow as cited in Asafu-Adjaye, 2010). As a result of that, Ghana's growth rate reached its peak of about 14.5 percent in the year 2011, making it to become one of the fastest growing economies globally during that year (Aryeetey & Baah-Boateng, 2015). In 2014, Ghana earned an amount of US \$ 978.87 million equivalents to 3.0 billion Ghana cedis from oil export from the Jubilee Oilfield. Additional oil projects are being developed and are expected to start operation in a few years to come (Ghana Extractive Industries Transparency , 2014).

Starting from 2011, Ghana's growth was supported by oil exports, but that could not last long. In 2013, the non-oil GDP growth rate was 6.6 percent compared with 7.3 per cent for overall GDP. In 2014, the non-oil GDP growth rate was 3.9 per cent, while the rate for overall GDP was 4.0 per cent. However, in 2015, non-oil GDP growth was 4.1 per cent while overall GDP growth was 3.9 per cent. Thus, for the first time since 2011, non-oil GDP growth outpaced total GDP growth (ISSER, 2015). Recently, Ghana's fiscal consolidation program under the IMF's Extended Credit Facility Program is on course. Following a substantial reduction

of the fiscal deficit from 10.2 percent of GDP in 2014 to 6.3 per cent in 2015, the government was still aiming at further narrowing down from 5 per cent of GDP in 2016 (The World Bank, 2016).

Performance of the various sectors of the economy also has been dominated by the service sector recently registering a growth rate of 5.7 percent in 2015, only marginally higher than the 5.6 percent rate in 2014 (ISSER, 2015). The Industry which is the second sector grew slightly faster in 2015 at 1.2 percent than the 0.8 percent rate in 2014. Moreover, growth rate of the agricultural sector in 2015 was nearly one-half in 2014 (ISSER). In July 2016, Ghana reviewed its budget to reflect the likely shortfall in domestic revenue due to unexpected technical problems from the Jubilee Oilfield and a fall in oil prices. In the external market, Ghana issued her fifth Eurobond on September 9th 2016 for US\$ 750 million with a coupon rate of 9.25 per cent. The bond which was more than five times oversubscribed with total orders of 4.5 billion had a weighted average tenor of five years (The World Bank, 2016). Though the economy of Ghana is facing with both internal and external challenges, most economic analysts are still optimistic about the future prospects of the economy if effective policies and programmes are put in place alongside proper institutional structures.

Trends of Macroeconomic Variables

This subsection explains the trends in all the variables of this study, which are the Gross Capital Formation, the Labour Force Participation Rate, Non-Interest Recurrent Expenditure, Interest Payment Recurrent Expenditure, Capital Expenditure, Gross Domestic Savings, Total Revenue, Broad Money Supply and

Real Gross Domestic Product. Annual data for these variables were obtained from World Development Indicators (2015) with the exception of capital and recurrent expenditure sub-components which were compiled from the yearly publication titled “*The State of the Ghanaian Economy*” which is published by The Institute of Statistical Social and Economic Research (ISSER) from 1990 to 2015 and the Total Revenue data was obtained from the International Monetary Fund database. The annual data points for each variable were then graphed in a line form to represent the trend for each variable in this study.

Trend of Gross Capital Formation in Ghana (*K*)

Figure 3 shows a line graph of the trend in gross capital formation of Ghana which represents capital inputs used in the aggregate production function in this study. It spans from 1990 to 2015 in Ghana. The trend analysis of the input shows an unstable character with a gradual fluctuating movement from 1990 to 2015. The diagram though negatively skewed has a mean of about 22.97 percent. The minimum level of capital formation was experienced in the year 1992 with a level of 12.8 percent while the year with the maximum level of capital formation was experienced in 2012 with a 31.78 percent level of capital formation. The low level of capital formation in 1992 could be attributed to the large fiscal imbalances which resulted in heightened inflation and currency depreciation at that time which served as an obstacle for capital formation from 1991 (Enu, 2009). However, the high level of capital formation experienced in 2012 can also be attributed to revenue additions to the nation’s income as a result of the oil exportation that was possible due to its extraction in commercial quantities in year 2011. The revenue came in the form of

foreign exchange from the export of crude oil which were extracted from the newly found Jubilee oilfield in the Western Region of Ghana which contributed in the growth of the economy reaching its peak at 14.5 percent in 2011 (Aryeetey & Baah-Boateng, 2015).

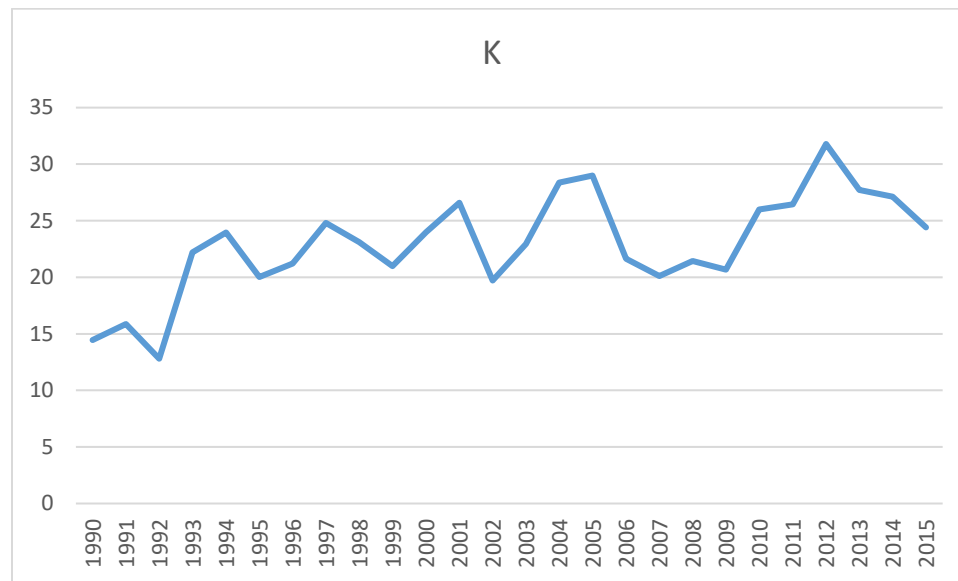


Figure 3: Trend of Gross Capital Formation (K)

Source: Graphed from World Development Indicator data (2015).

Trend of Labour Force in Ghana (L)

The trend of labour force in Ghana which was measured as a percentage the total population with ages between 15 and 64 years can be shown in a line graph from figure 4. The diagram which is negatively skewed has a mean of 55.80 percent of the total population with a maximum value of 57.78 percent experienced in year 2015 and a minimum value of 53.41 per cent of total population also experienced in 1990. A cursory glance at the labour force participation diagram shows a gradual up rising trend from the year 1990 to 2015. However, it starts to become stable from 2010 to 2015. As a result of the neo-liberal economic policies such as the structural

adjustment program in the 80s and the 90s, employment in the formal sector became very low while the informal sector became the haven for people desperately seeking for employment. In view of this, the size of the informal sector according to the Ghana Statistical Service was estimated at 80.3 percent in terms of the share of total employment.(Otoo, Osei-Boateng, & Asafu-Adjaye, 2009). This could account to the gradual rise in labour from 1990 to 2010.

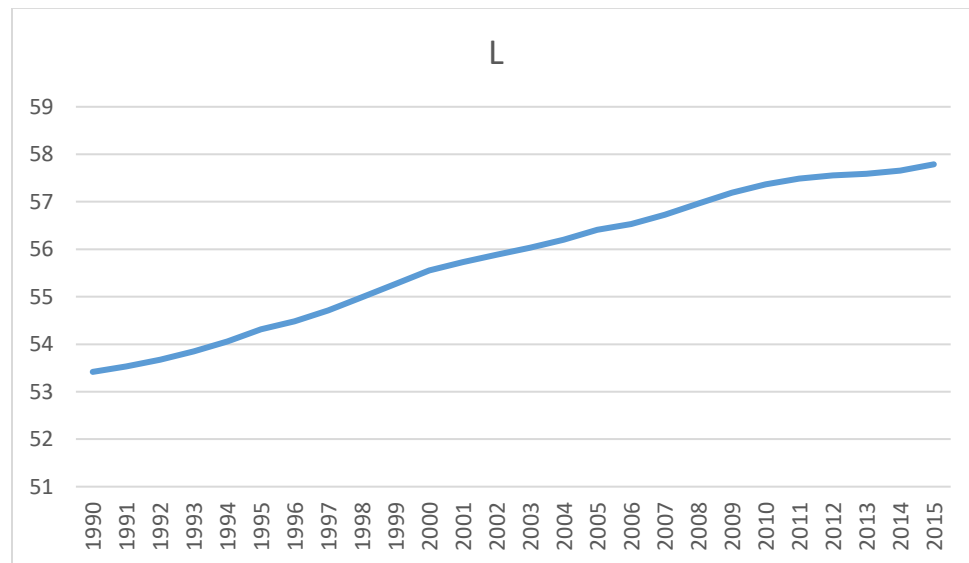


Figure 4: Trend of Labour Force Participation in Ghana (15-64 years)
Source: Generated from World Development Indicator data (2015).

Trend of Non-Interest Recurrent Expenditure in Ghana (NREX)

Figure 5 also shows the trend of non-interest recurrent expenditure in the country. The variable from the diagram shows a relatively unstable trend which is positively skewed and has a mean value of 47.61 percent of total expenditure. It has a minimum of 32.46 percent which happened in 1998 while its maximum was experienced in 2012 with a value of 65.75 percent of total expenditure. The fluctuations in the expenditure can be attributed to the unstable nature of the

personal emolument component in the expenditure. For instance, in 2013, 34.52 percent went into personal emoluments while in 2014 it fell to 28.91 per cent (ISSER, 2015). The maximum value experienced in 2012 was due to the increase in personal emoluments as a result of the increase in the Single Spine Salary Scheme of the public sector wages (Adu & Ackah, 2015)

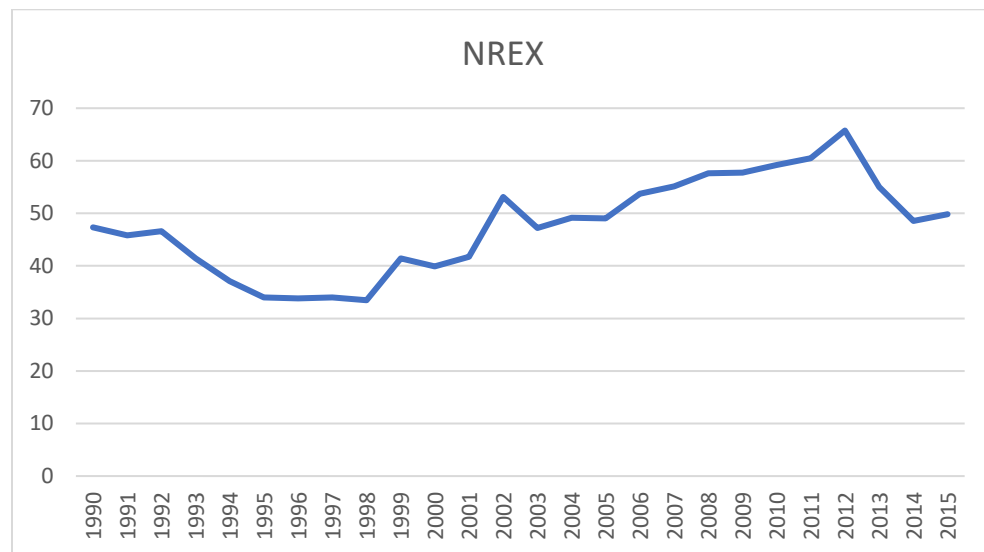


Figure 5: Trend of Non-Interest Recurrent Expenditure (NREX)
 Source: Graphed from Institute of Statistical, Social and Economic Research data (1990-2015).

Trend of Interest-Payment Recurrent Expenditure in Ghana (INTX)

Figure 6 also presents the line graph of Interest-Payment, a major sub-component of Recurrent Expenditure in Ghana. This variable is made up of payment of interest on domestic and external debt from the year 1990 to 2015. The line graph for the variable in figure 6 shows an unstable trend throughout the years for this study. This variable for the study period has a mean of 18.83 percent and a maximum of 35.26 percent which was experienced in 1998. However, over the years extra efforts have been put in place to manage the debt situation in the country

as such this could account for interest payment on government borrowings which has gradually decreased and this trend can be seen from figure 6. The minimum for interest payment was 6.21 percent and this was experienced in 2008 from the graph.

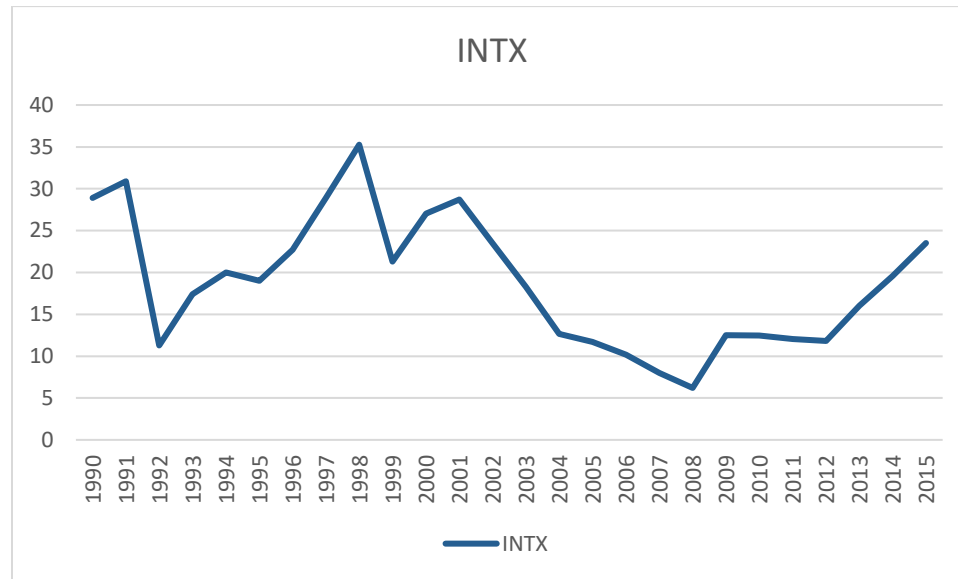


Figure 6: Trend of Interest Payment Recurrent Expenditure (INTX)
 Source: Graphed from Institute of Statistical, Social and Economic Research data (1990-2015).

Trend of Capital Expenditure in Ghana (CAPEX)

Capital expenditure trend in Ghana can be seen in figure 7. From the graph, capital expenditure shows an unstable character and is positively skewed with a mean of 27.19 percent. Its maximum was experienced in 2007 with a value of 41.19 per cent and the minimum value also happened in 2014 with a value of 16.84 per cent. Ghana experienced a period of a new phase of political leadership which came along with new fiscal policies during the period of 2001-2008. Ghana experienced a significant and continues rise in growth rate at 5.2 percent exceeding the projected 4.7 percent for the year (Ministry of Finance, 2004) , as such the Government of Ghana increased its expenditure on capital commodities during the period 2007

with the aim of tackling poverty in the country. This was largely due to some solid macroeconomic programmes coupled with major debt reliefs and foreign assistance (mainly as part of the HIPIC Initiative). However, capital expenditure was low in the 2014 perhaps due to the reduction in revenue and the slow disbursement of some capital project.

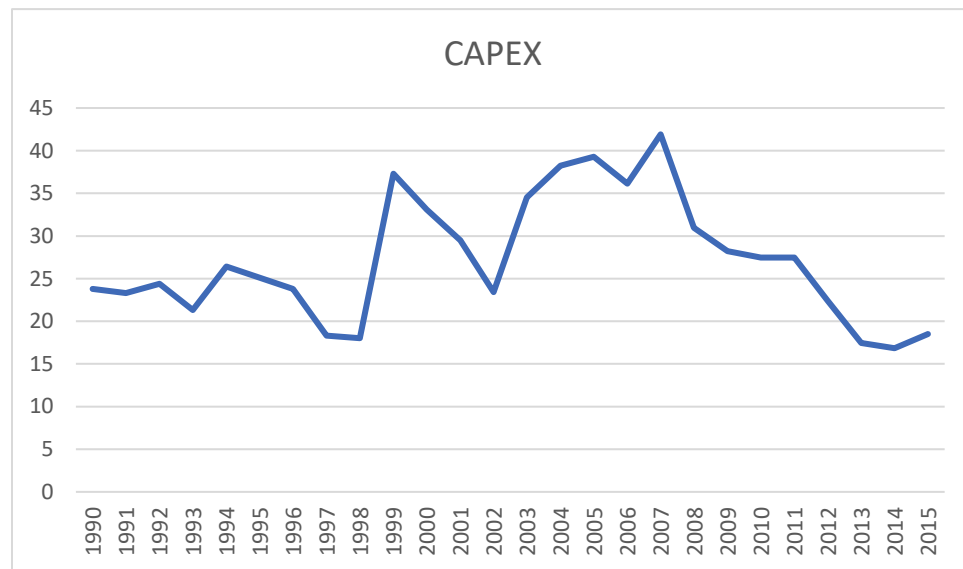


Figure 7: Trend of Capital Expenditure

Source: Graphed from Institute of Statistical, Social and Economic Research data (1990-2015).

Trend of Broad Money Supply in Ghana (MONEY)

Another explanatory variable that was considered for this study in explaining variations in economic growth is the broad money supply of the country. Broad money supply in this study is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency (The World Bank, 2016). The trend of broad money supply can be seen in figure 8. The nature of the variable from the diagram depicts a gradual upward

trend from 1990 to 2002 then falls but begin to rise gradually from 2006 to 2015. The trend of the variable is negatively skewed, has a mean of 26.40 percent with a maximum of 34.10 percent experienced in 2002 and minimum value of 14.14 percent in 1990. Though the Central Bank focused on tighten monetary policy through open market operations (MFEP, 2001), the country enjoyed high increase in foreign investment due to the smooth electoral process in December 2000 and government transmission in 2001. The inflow of foreign investment increased the amount of money supply circulating within the economy in 2001.

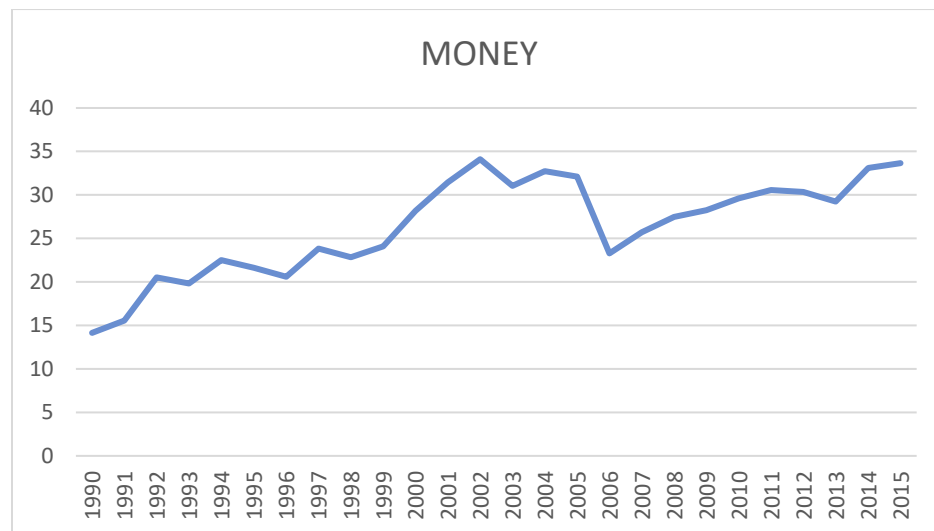


Figure 8: Trend of Broad Money Supply (MONEY)

Source: Graphed from World Development Indicator, (2015).

The Trend of Gross Domestic Savings (SAV)

Gross Domestic Savings is also another important macroeconomic variable considered in this study. It's trend as shown in figure 9 depicts a relatively unstable U-shaped trend from 1990 to 2015. The trend is positively skewed and has a mean of 8.52 percent. Its maximum value is 19.33 percent in 2012 which could be due to

the increased revenue in 2011 from oil revenue while its minimum value of 1.26 was experienced in 1992.

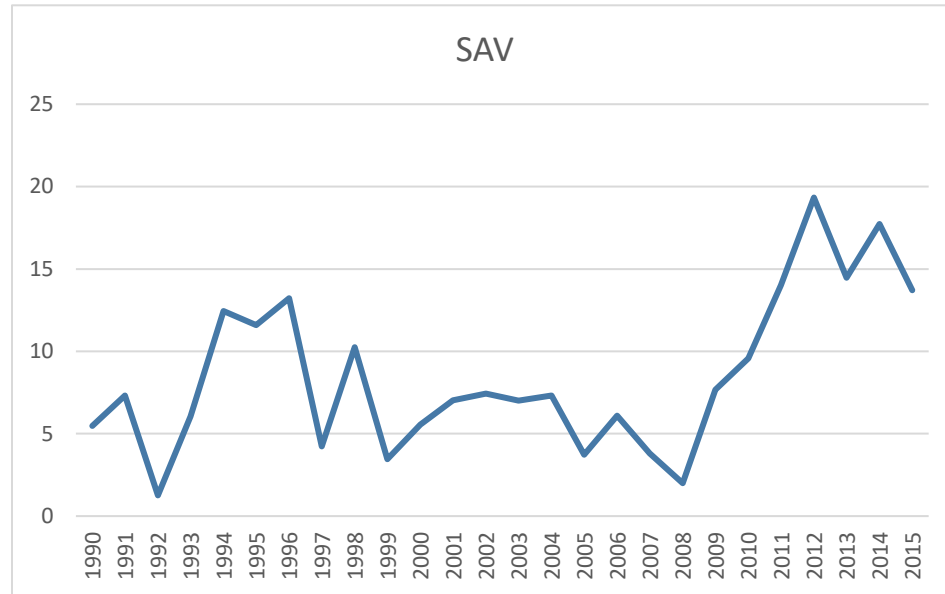


Figure 9: Trend of Gross Domestic Savings (SAV)

Source: Graphed from World Development Indicator, (2015).

Trend for Total Revenue (TR)

Another control variable considered in this study is the Total revenue of the country. The total revenue of the country for the study period is also presented in figure 10. The variable shows an upward sloping trend from 1990 to 2015. The variable has a mean of 13.84 with a maximum value of 19.16 which happened in 2011 as a result of the commercial production of oil which increased growth rate to 14.5 percent in 2011 (Aryeetey & Baah-Boateng, 2015). A minimum value of 7.41 in 1990 was incurred due to lower international cocoa prices and a resulting deterioration of the external current account (The World Bank, 1990).

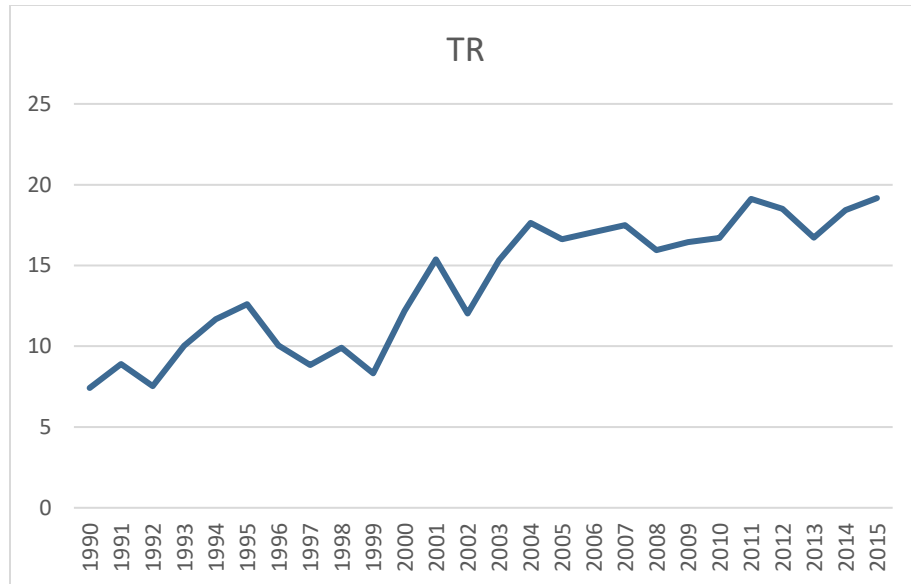


Figure 10: Trend of Total Revenue (TR)

Source: Graphed from International Monetary Fund Database.

Trend of Economic Growth in Ghana

This study considered economic growth as the dependent variable to show how capital expenditure, non-interest and interest-payment recurrent expenditure relates to it. Economic growth which is proxied by the real gross domestic product (2010 US\$) as shown in figure 11 has over the years experienced an unstable character from 1990 to 2015. Its trend has been generally an upward sloping curve with a gradual stable trend from 1990 to 2005 before it starts to rise upwards. Ghana's economic growth has a slope which is positively skewed with a maximum value of US\$ 1696.081 which was experienced in 2015 and a minimum value of US\$ 823.58 in year 1990. The maximum level of growth was in 2015 could be attributed to revenue from oil export which served as an addition to the traditional sources of revenue to the government (Taxes).

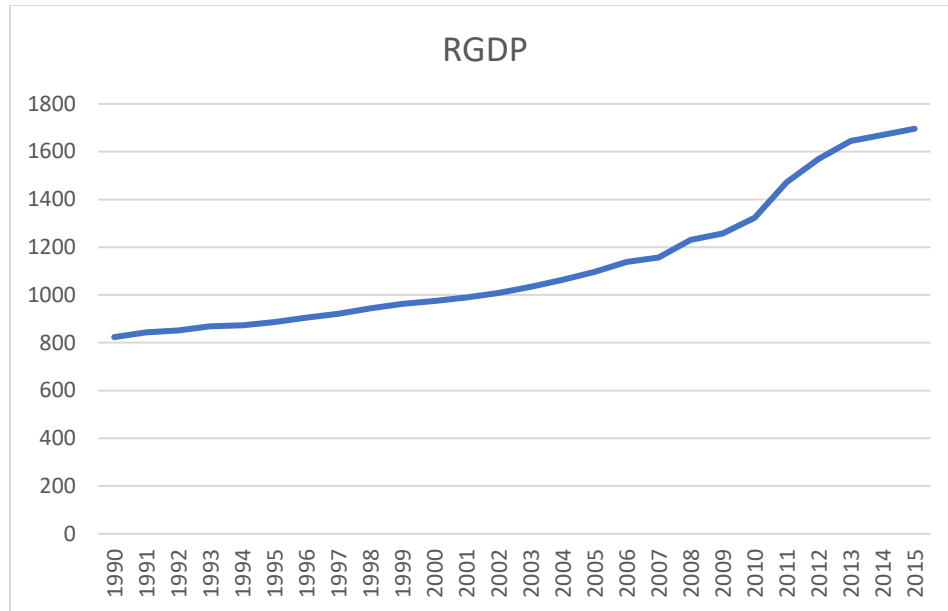


Figure 11: Trend of Real Gross Domestic Product in Ghana (RGDP)
 Source: Graphed from World Development Indicator database (2015).

The Concept of Public Expenditure

Generally, public expenditure is defined as the spending by a government on collective needs and wants such as wages and salaries, infrastructure and basic human needs that assist economic agents to make a living. Specifically, the definition for the concept of public expenditure can be divided into two categories – narrow definition and broader definition. On the narrow definition, public expenditure is seen as the act of providing goods and services to individuals in the country. The broader definition also entails the narrow definition in addition to public sector induced expenditures. Thus, it includes government rules and regulations to internalize externalities and by so doing forces the private sector to spend on the economy. Public expenditure includes government expenditures on all sectors of the economy such as defence, education, health, sports etc (Tuffour, 2016).

Government expenditure, can be grouped into sector expenditures such as administration, defence, internal securities, health, foreign affairs and each sector incurs both a capital and recurrent expenditure components (Aigheyisi, 2013). In view of this, public expenditure can be categorised into two broad forms. These forms are Recurrent Expenditure and Capital Expenditure (CEPA, 2006). Recurrent expenditure can be subdivided into non-interest and interest payment recurrent expenditure while capital expenditure is made up of domestic-funded and foreign-funded capital expenditure (CEPA, 2006).

Furthermore, under the Medium-Term Expenditure Framework, public expenditure can also be grouped into two components. These are the discretionary and statutory components (ISSER, 2015). Discretionary expenditures are those payments under which the government can exercise some judgement with respect to the quantum of resources it allocates to such items. In any fiscal year, commitments to discretionary expenditure are based on the priorities of the government at the time and availability of resources for the purpose. Statutory expenditures are also obligations defined by legislative instruments or backed by law. Discretionary expenditures include personal emoluments, administration and service, total investment, VAT refunds and the likes while statutory expenditures include external debt service, domestic interest payments, transfer to household, road fund, education trust fund, petroleum related fund and the likes (ISSER, 2015).

Non – Interest Recurrent Expenditure

It is one sub-component of the recurrent expenditure in which its spending does not incur any further interest spending in the course of their payments. This

sub-component includes personal emoluments, administrative and service cost in public sector, payments to organisations on government subventions, government transfers and utility price subsidies (ISSER, 2015). Among the expenditure items under non-interest recurrent expenditure, personal emoluments which normally contains the wage bill receives about 60 percent of the total non-interest recurrent expenditure and about 12 percent of GDP (Ministry of Finance and Economic Planning, 2013).

Non-Interest recurrent expenditures are generally operational expenses and are vital in the day-to-day operations of government institutions. Since it forms part of the government's discretionary expenses the trend of their increase varies over time depending on the priority of the government. In controlling the public expenditure, government appears to be succeeding in managing recurrent expenditure following the enactment of a number of legislative measures such as the Financial Administrative Act in 2003, the Internal Audit Act and the Procurement Law in 2004 (AfDB, 2006). One important aspect of the non-interest recurrent expenditure is the wages and salaries of government workers as a result of the establishment of the Single Spin Salaries Scheme.

Interest Payment Recurrent Expenditure

Interest payment under the recurrent expenditure is the payment of interest on government's borrowings from both domestic and foreign sources. It includes long-term bonds and other public debts. In 2015, interest payment of Ghana amounted to 9,075.34 million Ghana cedis, of which payment to domestic debt accounted for 7,312.91 million Ghana cedis while foreign debt accounted to about

1762.43 million Ghana cedis. From 2007, domestic debt relative to external interest payment has been higher than foreign interest payment because government deficit financing has been high and dominated by domestic borrowing coupled with a high domestic interest rate (ISSER, 2015). Moreover, according to the Institute for Fiscal Studies (2016), as a result of the rapid rise in government borrowing, the country's fiscal deficit has been recording double-digit figures since 2012 causing the country to encounter huge and increasing interest payment burden. In view of this interest costs to the government are now higher than capital expenditure and threatening to equal or even overtake wages and salaries if public borrowing is not controlled (IFS,2016).

Capital Expenditure

Capital expenditure refers to the expenditure on fixed assets, infrastructure and commodities that have a long-term effect on the economy. Expenditures such as the building of schools, construction of roads, setting up of hospital, establishment of factories and the likes are examples of government capital expenditure. Thus, these kinds of expenditures are done on goods that have lasting impact on the economy and helps provide a more efficient productive economy (Modebe et al., 2012). Investopedia dictionary (2016) defines capital expenditure as the funds used by a government to acquire or upgrade physical assets such as property or investments by a government. These funds are sometimes used to increase the scope of a physical asset or prolong the useful life of an existing capital asset.

In Ghana, capital expenditures comprise of two broad categories. They are domestic and foreign-financed expenditures (CEPA, 2006). Government finance certain projects by borrowing domestically from financial institutions within the country, through treasury bills and the bond markets or from the revenue from taxes, foreign exchange and the Internally Generated Fund of departments. Under domestic financed, expenditures that go into development are: The District Assembly Common Fund (DACF), the Ghana Education Trust Fund (GETF), the Road Fund, the Petroleum Related Fund, The National Health Fund, Net lending and other cash, are captured here. Highly Indebted Poor Countries (HIPC)-financed, grants and Multilateral Debt Relief Initiative (MDRI)-financed expenditures all fall under foreign-financed expenditure (ISSER, 2012). Characteristically, capital expenditure receives less amount of resources from the government purse every year as compared to recurrent expenditure. Its trend over the years can be seen in figure 1 and 7.

Conclusion

In this chapter, a brief discussion about the overview of the Ghanaian economy was initially presented. The brief overview touched on the various economic reforms and programs that the Ghanaian economy has experienced from independence to the year 2015. It also delved into the trend of the macroeconomic variables considered for this study from the period 1990 to 2015. It can be realised that generally these macroeconomic variables were unstable as a result of both internal and external challenges that the economy encountered over the period. It then concluded by giving a detailed explanation to the concept of Public

Expenditure, Non-Interest Recurrent Expenditure, Interest Payment Recurrent Expenditure, and Capital Expenditure.

CHAPTER THREE

LITERATURE REVIEW

Introduction

This chapter is dedicated to a review of the theoretical and empirical literatures which gives detailed explanation to the relationship that the sub-components of recurrent expenditure (Non-Interest and Interest Payments) and capital expenditure have with economic growth. It begins by explaining economic growth as a concept and then reviews various theories that explains the relationship between public expenditure and economic growth. This is followed by the next section which reviews empirical studies and is subdivided into country-specific studies and cross-country studies under this area.

Theoretical Literature

Various related studies have used variety of economic theories in explaining the nexus between government expenditure and economic growth. Other theories also decompose government expenditure into various components and discuss their relationship with economic growth. In this study, theories that are considered to be reviewed are the Wagner's Law, the Peacock and Wiseman theory on public expenditure, Development model, the Aggregate Production Function, the Solow Growth Model, the Classical Theory of Growth and the Keynesian Model. It begins by explaining economic growth, the main concept for the study. It then ends by reviewing the theories by giving an explanation of the process through which government spending enters the economy from the approval of the national budget by parliament to the accounting stage. It is important to give a fair idea about such

a process in order to appreciate the need for prudent measures to be implemented to manage Public Expenditure in the country.

Economic Growth

Economic Growth refers to the ability of an economy to improve its production of goods and services over a period of time using the factors of production within the economy. (Popkova, Shakhovkaya, & Mitrakhovich, 2008). Economic Growth is usually calculated in real terms thus inflation-adjusted terms – to eliminate the distorting effect of inflation on the price of goods produced.

Several theories have been developed to explain the economic growth of a country. For example, W.W. Rostow, an American economist developed the Rostow's Stages of Growth model in which it explains the idea about the transition of an economy from underdevelopment status to a developed status through various stages a country must precede. Thus, a country must precede from a traditional stage (in which the foundations for growth are based on subsistence production) to a "take off" stage (in which development starts to accelerates), to a matured stage of development. Roy – F Harrod in 1939 and Evsey D. Domar in 1947 also developed the Harrod – Domar Growth model from the Keynesian model. The model with specific assumptions such as a scarce capital resource, constant capital and output with consumption and savings being a constant proportion of income, the main thrust of the model was that the rate of savings was the principal determinant of the growth of the economy under given levels of productivity of capital (incremental capital output ratio) and a state of technology. In this study,

economic growth is measured by gross domestic product per capita (constant 2010 US\$) from WDI database and used as the dependent variable.

Theories Explaining Public Expenditure and Economic Growth Relationship

The Wagner's Theory

This theory which was developed by a German Economist Adolph Wagner (1835-1917) was also known as the 'law of increasing state spending'. According to the theory, "as the economy develops over time, the activities and functions of government increases" (Lamarthina & Zaghini, 2011). Specifically, Wagner's law viewed public expenditure as a behavioural variable that positively responds to the dictates of a growing economy. The hypothesis tries to find a positive relationship between government spending and income and a unidirectional causality running from economic growth spending to government expenditure (Muthui et al., 2013) .

With the ratio of public expenditure to Gross National Product (GNP) as the unit of analysis, the law spelt out that as per capita income in an economy grows, the relative size of the public sector also grows. The increase in the size of public sector, according to Wagner was as a result of three reasons. First, industrialization and modernization would lead to a substitution of public for private activity. In a rising complex society, the need for public protective and regulative activity would rise. Moreover, the higher division of labour and urbanization accompanying industrialization would require greater expenditures on contractual enforcement as well as law and order so as to guarantee the efficient performance of the economy. Second, Wagner argued that the growth in real income would propel the relative widening of income elastic "cultural and welfare" expenditures. Wagner cited

education and culture as the particular areas where collective producers perform generally better than private ones. Finally, Wagner asserted that economic development and variations in technology required the taking over by government in managing natural monopolies so as to enhance economic efficiency. In the same vein the required scale of investment was in some cases so large that its financing may not be controlled effectively by private joint stock companies (Henrekson, 1993).

Wagner's Law follows the process of growth in an industrialised economy in which such an economy passes through three stages. These are the Pre-industrialised stage, Industrialised stage and Post-industrialised stage. The Pre-industrialised stage is where the private sector dominates the economy and per capita income is low as a result of the economy's subsistent nature. Production is dominated by the production of raw materials. From the pre-industrialised stage, a society enters into an industrialised stage where per capita income increases, demand for essential services like health increases. Such goods require collective consumption and also the government has to provide them as a result, the real per capita income of the public goods increases rapidly. The Wagner's Law is then applied in the second stage. Thus, where there is a positive relationship between expenditure and income. Finally, the society reaches its final stage which is the Post-industrialised stage where the standard of living has increased, government is providing enough public goods and with additional increasing per capita income, society tends to have additional private goods. At this stage, a large public sector activity is resisted since too large public sector means more taxes, market activities

are more preferred and public sector activities impact reduces (Tuffour, 2016). Adolf Wagner pointed out that public spending is an endogenous factor, which is determined by the growth of national income. Therefore, it is national income that causes public expenditure to rise. The Law tends to be a long-run phenomenon as such the longer the period for time-series, the better the economic interpretations and statistical inferences.

However, at the end of the nineteenth century, many critiques were levelled against this law. One of such critiques was by Scharmer, (2002) on the fact that the stages were seen as individual since it only acted without considering the citizens of the country. Thus, people had no choice in their government activities. According to the law, government is seen as a representative of a superior individual who makes decisions without paying attention to the individual human beings that form the government. Wagner thus completely disregards the relationship between individual preferences and government actions. (Scharmer,2002).

Gemmell (1993) also based his argument on the fact that the theory was formulated in Germany at the end of the nineteenth century, therefore it is only applicable in economies that are similar to Germany where rising income was observed as a result of industrialisation. The basic condition such as increasing per capita income, technological and institutional change and democratization reduces the possibility of empirically testing the law (Gemmell,1993).

Instead of coming out with a positive theory, many researchers such as Scharmer (2002) believed that the “Law” only includes the subjective and

normative assumptions of Wagner. Wagner reveals his view point on what ought to happen to an economy when it is industrialised (Seeber & Dockel, 1978). However, although Wagner claims his “Law” is a positive theory, he implicitly employs a normative approach using simple statements which weakens his arguments of his theory if critically analysed (Bird as cited in Scharmer, 2002).

The impact of war on public expenditure (Gemmell, 1993) also became a topical issue against the Law. Wagner developed his theory at the end of the 19th century under the optimistic assumption that fewer wars would occur in the future which unfortunately did not happen during the 20th century (Bird, 1971). Moreover, the “organic” self-determining idea of the state in most Western nations has been criticised a lot. In the viewpoint of Wagner, the state represents a superior individual who takes decisions without paying attention to the individual human beings that specifically form the state. Wagner thus completely ignores the relationship between individual preferences and government actions (Bird, 1971) which is a strong simplification.

Furthermore, the law is a demand-sided theory (Barkin, 2006) since per-capita income growth stimulates demand for public sector growth which leads to an increase in public expenditure, it therefore ignores the supply-side form of theory. Thus, a situation where an increase in government expenditure in terms of recurrent or capital expenditure could trigger progress in economic activities which will lead to economic growth in the long-run (The Keynesian Theory of Aggregate Demand). The establishment of factories using government’s capital expenditure could bring out employment to citizens in a country, increase production of goods

and service and increase export of goods to other countries which reap foreign exchange to the country.

The Peacock and Wiseman Theory

In the late nineteenth century, growth of the public sector, propounded by Adolf Wagner (1890) referred to as Wagner's Law, accorded well with the comparative advantage doctrine. With the growth of the industrial economy, a complementary demand was established with industrial and manufacturing expansion, transport and communication services, energy and waste disposal. Governments were regarded as possessing a comparative advantage in providing services, justifying Wagner's Law that government expenditure would continuously increase as a percentage of gross domestic product in a growing economy (Rowley & Tollison, 1994).

Alan T. Peacock and Jack Wiseman as part of their seminal study of the generality of Wagner's Law introduced their famous "displacement effect hypothesis" to explain the time path of the growth of government in democratic countries (Rowley & Tollison, 1994). Peacock and Wiseman however rejected Wagner's dependence upon the organic state, and instead relied on political propositions that governments like to spend more money. Since people do not wish to pay more taxes, the governments need to pay some attention to the wishes of their people. According to Rowley and Tallison, the theory was based on the decisions about public expenditure which are taken politically and can be influenced through the ballot box or by any media that can be used by people to bring pressure upon the government. Political choices about the use of resources

were seen to differ from choices made through the market system. Particularly, people could have ideas about desirable public expenditure which are different from and probably incompatible with, their ideas about reasonable burdens of taxation (Rowley & Tallison, 1994).

If societies are not being subjected to unusual pressures, according to the theory individual's ideas about tolerable burdens of taxation, translated into ideas of reasonable tax rates, tend also to be fairly stable. However, if ideas are fixed and low, rates of taxation are obviously compatible with growing public expenditures if real output is increasing. In this case, there may be some relationship between the rate of growth of real output and the rate of growth of public expenditure. More rapid rates of expenditure growth are unlikely in stable times, when views about taxation are likely to be more influential than ideas about desirable increases in expenditure in determining the size and rate of growth of the public sector. In such a situation, there may persist a significant divergence between ideas about desirable public spending and ideas about the limits of the public sector (Rowley & Tallison, 1994).

This divergence may be obstructed by large-scale social disturbances, according to the theory and this may bring about displacement effect moving public revenues and expenditures to new levels. At the end of the disturbances, new tolerable ideas about tax levels emerge and a new level of expenditure (recurrent and capital expenditure) of gross national product which is different from the former. Displacement effect according to the theory has two aspects. People within a country will accept during crisis period methods of raising revenue previously

regarded as unacceptable. Accepting that new level of tax remains once the disturbance, which was not important for implementation subsequently becomes possible. In the same time, social unrest brings about new and continuing obligations in wartime and as the result of variations in social ideologies, the consequence of an inspection effect which should not be disregarded.

Peacock and Wiseman apart from the displacement effect identified another influence called the Concentration Process, which relates to the alterations in the responsibility for public expenditures. The theory regarded periods of displacement as lowering barriers that protects local autonomy and thus bringing about pressures for increases in the concentration of power over public expenditure in the hands of central government. This evaluation is different from the displacement effect, because the forces favouring the concentration operate in normal as well as in disturbed times. However, the process of public expenditure centralization involves the period of displacement as very vital in its process.

Cullis and Jones, (1992) questioned Peacock and Wiseman's argument that after social upheavals government expenditures will remain at higher levels than pre-upheaval levels because government will be left with the duty of maintaining security after a social uprising. Also, the reconstruction of the area in which the activity took place all calls for expenditure by government at the long-run. Brown, Jackson, and Mcleod (1990) showed that there are at least three possibilities. According to them, public expenditures in the post war period can return to their original growth path, or public expenditure can rise or trend experienced during the war can continue into the post war period. Moreover, writers such as Assefa (2014)

have expressed their view that the growth in public expenditure has become a compulsion as such the disturbance situations matter less.

Development Models

The fundamental basis of developmental models of public expenditure growth is based on the studies by Musgrave in 1969 and Rostow in 1971. These models spell out that in the early stages of economic growth and development, public sector investment is very high. The public sector provides the social and economic infrastructures, such as roads, electricity, transport system, sanitation system, law and order, education and health, and human capital investment. These infrastructural overheads are very vital to trigger the economy to take-off into the stage of maturity of development. However, since most of the infrastructure overheads have larger external benefits, or require large capital outlays with the returns spread over a large period of time, such infrastructures do not lend themselves readily to private provision. But as the economy reaches the maturity stage, the mixture of public expenditures will move from expenditures on infrastructure to increasing expenditures on education, health and welfare services. Thus, more from capital expenditures to recurrent expenditures in the economy.

In the period of high mass consumption, expenditure on income maintenance programmes and programmes established to redistribute welfare will increase significantly relative to other items of public expenditure and also relative to Gross National Product (Mthethwa, 1998). The transfer expenditure increases at that stage, but however, it depends on whether income inequality decreases or increases as per capita income increases. Two factors according to Musgrave and

Peggy (1984)'s argument that could lead to public expenditure growth are technological and demographic changes. Technological change may reduce or increase the relative importance of goods that has large external benefits and may be provided by government. Changes in demography such as an increase or a decrease in the population growth or age distribution may show up in the changes in expenditure on health, education, and welfare services.

Despite the fact that this theory is quite pleasing to many researchers, Musgrave admitted that the theory has one strong limitation. According to him, while the stages-of-development approach was undoubtedly true in the early stages of development, the size of public expenditure could not be clearly predicted in the early stages. Due to the fact that changing private consumption patterns due to rising per capita income at the public share increases again so as to meet the rising demand of public goods such as infrastructure, education, social security, health system, sports etc. It depends on the level of income and on the needs of individuals if the public share increases or decreases (Musgrave as cited in Scharmer 2002). Therefore, Musgrave "remained ambivalent" (Gemmell 1993) concerning which tendency of public expenditure that could be the dominant in the last stage of development (Scharmer, 2002). In addition, it is also often not possible to define one single stage of development for a particular economy. Especially in developing countries, several stages can be observed simultaneously. While in urban areas the economy might be placed in a later stage of development, rural areas are still often far behind and are situated in early stages (Black et al, as cited in Scharmer (2002)).

Thus, one cannot determine the development of public share because of the variety of various stages within one economy.

Another major flaw of the stage theory is their observed circulatory. There seem to be a starting stage that in order for a Less Developed Country to achieve Take-off, it must possess the conditions of Take-off. This is very obscure indeed since Europe's economic development took a natural course driven by agriculture and industrial development on a sense of stages. This pattern of development may not realistically be expected to be emulated by present day LDCs. Moreover, it is not clear whether developed countries have achieved self-sustaining growth though societies are not totally stagnant and are different in terms of economic characteristics. Furthermore, Rostow's approach did not show how the characteristics and processes of one stage move a society to the next stage. How does one explain the relatively effortless self-sustaining growth after take-off? (Nafziger, 2006).

The Solow Growth Model

In 1956, Robert. N. Solow propounded the Solow Growth Model which is widely referred to the Neoclassical Growth model because the model employed a mix of both the authorodox classical and Keynesian formulations. According to the model the growth of national income or output is presumed to depend on the combination of resources: Physical Resources encompassing natural and capital resources, which are together denoted as "K", and human resources encompassing labour and entrepreneurial ability denoted as "L". These resources are related to

natural output by the technologically augmented implicit model. Assumed to be homogenous of degree one. The model can be expressed as below:

$$Y = Af(K, L) \dots\dots\dots(1)$$

$$S = s Y$$

$$I = \frac{dK}{dt}$$

$$s Y = \frac{dK}{dt} \dots\dots\dots(2)$$

$$\frac{dK}{dt} = sAf(k, L) \dots\dots\dots(3)$$

$$k = \frac{K}{L}$$

$$K = k L$$

$$\frac{dk}{dt} = k \frac{dL}{dt} + L \frac{dk}{dt} \dots\dots\dots(4)$$

$$sAf(K, L) = k \frac{dL}{dt} + L \frac{dk}{dt} \dots\dots\dots(5)$$

$$sAf(k) = \frac{k \frac{dL}{dt}}{L} + \frac{dk}{dt}$$

$$\frac{dk}{dt} = sAf(K) - g k \dots\dots\dots(6)$$

Where $\frac{dL}{dt} =$ the growth rate of (Population) Labour force

Model Explanation

The parameter “A” represents an index of technological change indicating that technological process is a shift parameter in the aggregate production function, thus technological progress raises the capacity of output. Solow’s model also assumes the equality of savings and investment similar to the Harrod Domar assumptions thus defining savings as the total amount saved out of GDP and defining investment as the time rate of growth of capital stock. In equation (3), the

model presumes that the amount of capital per worker/man in the economy is of crucial importance in determining the capacity output $k = \frac{K}{L}$ which means that the total level of capacity stock is given by $K = k L$. To determine the rate of growth of capital labour ratio, this relationship is differentiated with respect to time to obtain equation (4). As equation (3) and (4) both define the economist's level of investment depicting the rate of growth of capital stock overtime, the two can be equated as equation (5). In equation (5), dividing through by L since the labour force has to be equipped. In equation (6) g_k is the growth of capital per man and $g_L = \frac{dL}{L}$ gives the growth population of labour force. Equation (6) is the popularly acknowledged Solow equation which depicts that the rate of growth of the economy's capital labour ratio is a function of the savings rate (s), the state of technology (A), the existing level of capital stock per worker (k) and the labour force or the population growth rate (g). Viewed together, equation (6) indicates that the proportional change in the level of capital per worker $\frac{dk}{dt}$ equals the total level of savings out of GDP. $sAf(k)$ minus the level of investment required to keep an initial level of capital per worker constant (gk).

This means that the economy's capacity or ability to grow will depend on what is left from the total level of current savings and what is left from the level of current savings depends on the level of population growth or labour force growth which needs to be sustained by the level of resources saved. In applying this model to Less Developed Countries for example, Solow stressed that domestic investment through government (recurrent and capital) and private expenditures and foreign

investments (FDI) and thus the rate of capital accumulation would have a similar effect as raising domestic savings, which enhances the level of capital per worker and therefore GDP per head. The capacity to grow therefore depends on the ability to save through government and private expenditures on investment. As the government increases its expenditure, it increases production in the economy and this increases income of economic agents who then allocate part of their income for savings for further investment.

However, the assumption of an exogenously determined growth rate of technology were not satisfied by Romer, (1990), as such he further established models which endogenize a country's technology and that model was known as the Endogenous Growth model. In addition, many growth economists argue that the idea of treating technologies as nonrival and non-excludable goods in the neo-classical model is not appropriate. They argue that it is indefensible to assume a constant common growth rate of technology in cross-country regressions. The levels and growth rates of technologies should differ across economies.

Aggregate Production Function

The Aggregate Production Function describes a boundary or frontier representing the limit of output obtained from each feasible combination of input. It is actually a specification of the minimum input requirements needed to produce designated quantities of output.

Mathematical Model

A production function is a mathematical relation between inputs and outputs. Such a function can be represented in equation as:

$$Y = AF(K, L)$$

Where Y is output (real GDP), K is the quantity of physical capital (plant and equipment) used in production, L is the quantity of Labour, and A is a measure of the productivity of the economy. More on each of these shortly.

The production function indicates how different amounts of capital and labour may be combined to produce output. One critical component of the function is the total productivity function 'F'. The function has the following properties:

1.As more inputs are added in production, output also keeps on increasing. In economic terms, the marginal products of capital and labour are positive. In mathematical terms, the function 'F' increases in both K and L: $\frac{\partial F}{\partial K} > 0, \frac{\partial F}{\partial L} > 0$

2.Diminishing marginal products of capital and labour. Increase in capital and labour lead to increases in output, but they do so at a decreasing rate: the more labour that is added, the less additional output is produced. This can be showed in figure12: for a given capital stock K, increasing labor by Δ starting from L1 has a larger effect on output than increasing labor by the same amount starting from L2.

That is: $AF(K, L1 + \Delta) - AF(K, L1) > AF(K, L2 + \Delta) - AF(K, L2)$. This condition translates into properties of the second derivatives of the production function: $\frac{\partial^2 F}{\partial K^2} < 0, \frac{\partial^2 F}{\partial L^2} < 0$.

3.Constant returns to scale. The rate at which an input is increase will yield the same rate of increase in the output. Thus, if the inputs for production increases by an amount ($\lambda > 0$), it then causes output to increase by the same amount ($\lambda > 0$).

This can be represented by:

$$AF(\lambda K, \lambda L) = \lambda AF(K, L).$$

The APF encapsulates both the conventional inputs and the non-conventional inputs. While the conventional inputs are the capital and the labour inputs, the non-conventional inputs contain other inputs which contributes to the production aside capital and labour inputs. The APF has several key properties which are implicit in its function. First, the output in which the function produces increases when there are increases in capital, labour or other inputs. Second, the increase in output from adding more inputs declines as more and more inputs are applied to the production process in the long-run (Diminishing Marginal Returns). And finally, aside the “conventional inputs” made up of labour and capital that are vital in the neoclassical production function, the APF further incorporates “non-conventional inputs” such as Government Capital Expenditure and Non-Interest and Interest Payment Recurrent Expenditure , Gross Domestic Savings and among others in the model to capture their contributions to the economic growth of the country (Appiah-Konadu et al., 2016). In the model, labour and capital inputs are able to explain a greater portion of the variations in economic growth in the country. In addition, other explanatory variables which are seen as non-conventional inputs are vital in estimating changes in output, such variables have been considered as

the basis of the theoretical underpinnings as well as country-specific characteristics (Boakye, 2008).

The Classical Theory of Growth

The Classical School was the primary school of thought in economics until the 1930's and the time of the Great Depression. Great thinkers and writers during this period who were referred to as The Classical Economists were Adams Smith, David Ricardo, Rev. Thomas R. Malthus, Jeremy Bentham and those who studied the model were Friedrich Engels and Karl Marx. Although Ricardo was the most analytically accomplished among these writers, the most famous among the Classical Economist was Adams Smith due to his major work in 1776 – “*The Wealth of Nations*” (Smith, 1776).

The first principle of the Classical Economist was a laissez – faire system which was mostly referred to as Economic Liberalism. Economic Liberalism by its definition refers to a situation whereby the forces of demand and supply in a free competitive market guide production, exchange and distribution. They believed that the economy was self – adjusting and tending towards full employment without government intervention in the form of public expenditure. The Economists with the important exception of Ricardo emphasized the existence of harmony of interest among individuals in a society. By seeking their own interest, each individual serves the best interest of the society to make a living without the social intervention from the government.

Besides, they were concerned with the causes of long run growth in national income and the process by which this happen. Thus, they sorted to promote

maximum economic growth and development with their basis on the belief that the individual's innate desire to accumulate wealth is an end in itself. Hard work and limited consumption were the means to increase one's capital drive and unlimited acquisition was justified by the claim that it was rooted in human nature. As such producers and merchants in any economic system provided goods and services with a profit motive and workers provided their labour services with the desire to obtain wage payments while consumers on the other hand purchased goods and services to satisfy their needs and wants.

The model in brief, spells out that in an economy, given a certain level of employment of labour (thus assuming the labour theory of value) at certain level of production, wages will be paid to workers according to the level of subsistence and any "surplus" will be accumulated by the capitalists. Such accumulation will increase the demand for labour and with a given population, wages will tend to rise. As wages exceed the level of subsistence; population will increase according to the Malthusian theory. With a growth of population, the supply of labour will be increased and wages will again fall back to the level of subsistence. This is referred to as the Iron Law of Wages (Wolf, 2015). As wages become equal to the subsistence level, a surplus will emerge again to encourage capital formation, the demand for labour, and the whole production value, leaving no surplus for capital accumulation, expansion and growth of population. These dynamics of growth ends as the law of diminishing returns sets in and wages eat up the whole production value, leaving no surplus for capital accumulation, expansion and growth of population again.

Classical economists assumed that there is free competition in the product and factor markets. This is not realist because in the modern capitalist economies there are strong tendencies towards the establishment of monopolies. This hinders the working of the free forces of demand and supply in the product and factor markets. Gontijo, (2000) cited in his paper "*On the criticisms to the classical method*" that many political economists, such as Maurice Dobb, Paul Sweezy, Joseph Steindl, Donald Harris, and Edward Nell all share similar view about the failure of this free competition by the classical economists. According to those economists, at the end of the last century, capitalism revealed an inherent tendency toward oligopolization, with increasing concentration and centralization of capital. In these new industrial structures which are based on large corporations and oligopolies, capital movement across sectors has been restricted and prices become sticky. As a result, the old tendency for a uniform profit rate has been substituted by profit rates differentials among sectors, and price uniformity has been substituted by price differentiation within each sector. Harris, for instance, stressed that in a modern economy there are various forms of "barriers to entry" derived from intrinsic production features, innovation, financial markets, labour markets, and the formation of demand, preventing capital (and labour) from moving from one sector to another. As a consequence, instead of a tendency toward a uniform profit rate, "there are in actuality powerful factors at work to oppose that tendency and to push the economy in the opposite direction towards a persistent differentiation in profit rates" (Harris, 1988). The same position was held by Nell, who, following the post-Keynesian tradition of Echnner and Kregel, (1975), asserted

that in modern economy mark-up pricing, that generated different profit rates across sectors, prevailed (Nell, 2005). Keynes also pointed out that a laissez faire economy (free economy) has a natural tendency to fail and this situation could be remedied only through state intervention in the form of public investment and other fiscal measures by the government. Keynes justified state intervention in clear contradiction to the concept of free enterprise economy presented by the classical economists.

The Keynesian Model

After the Great Depression, the classical economists agitated that strong trade unions prevented wage flexibility which resulted in high unemployment. However, on the contrary, Keynesians such as John Maynard Keynes (1883-1946) supported the intervention of government to correct market failures within the economy (Appiah, 2014) . The basic equation of the Keynesian system is aggregate income equal to aggregate expenditure ($AD = AS$). This means that one could only receive any income in the form of money when another economic agent also spends an equal amount. Thus, every expenditure by an economic agent brings about an equivalent monetary income for another economic agent. Aggregate expenditures according to Keynes can be categorized into two basic types. These are services that have been produced during the period, which equals consumption. Another expenditure on the means of production of these goods which equals investment. Thus, in an economy, monetary income brings about consumption decisions to spend and investment decisions.

The theory of Keynes was based on the timing of government spending. He argued that against-the-grain, fiscal policy could trigger the business cycle, which he regarded as a natural outgrowth of the wild animal spirits of the market. In a booming economy, where unemployment is low and there is strong growth, Keynes advised that government must decrease expenditure and run a surplus and this will reduce demand and lowering the overheating up of the economy. However, in a recession he advised that government must increase expenditure and run a large deficit to increase demand and propel the economy back to a growth path (Aziz, 2014).

Keynes' theory, in other words, is just as compatible with small, lean governments as it is with large, powerful governments. And the real reasons for Keynesian enthusiasm for government spending in a slump are not ideological but technical (Aziz, 2014). First, government expenditure can directly decrease unemployment by creating jobs. However, the conditions for greater private expenditure in no way offer more jobs. Second, investment by private economic agents risks their own supply of money. In the time of a slump, especially in a recession, many companies are unwilling to reinvest in the economy due to the fear of loss of investment. The amount of additional activity you get from a dollar spent (multiplier) in a recession is not necessarily higher than at any other time, it may be the only option available during a severe depreciation. It would be good if the magic of the free market time the economy took a turn for the worse. But in the real world, investors and markets can stay depressed for months, years or decades (Aziz, 2014).

However, Pettinger (2012) criticised the Keynesian theory on the basis of the fact that borrowing causes higher rates of interest and crowding out. The theory advocated a higher budget deficit during a recession but according to Pettinger (2012), that would cause crowding out of firms since a higher interest rate would increase the cost of investment and as such private sector have less to invest on private projects. In addition, fiscal expansion problem often comes too late when the economy is on the verge of recovering from a recession and this brings about inflation. Moreover, the aftermath of higher spending by government after a recession leaves behind a government with higher spending which needs higher taxes to finance the higher spending regime (Pettinger,2012).

The Process of Government Expenditure

This section deals with the process of spending during a fiscal year by the government. Normally, it is the aim of every government to execute its expenditure in order to be on track with the provisions of its budget or hold expenditure below target revenue development but however, in most cases especially in developing countries expenditure is always above the revenue set aside for the expenditure provisions in the national budget as such most developing countries borrow to supplement their budget within a fiscal year. Before a national budget can be executed, funds allocated for its implementation passes through various stages before it enters the economy. According to the *Guidelines for Public Expenditure Management* by the International Monetary Fund (1997) , national budgets usually passes through six main stages of spending process after a budget has been accepted

by parliament. Below are the various stages through which government expenditure is executed according to the International Monetary Fund:

The first stage is the authorization stage whereby after an acceptance of a national budget by parliament, the various ministries are then authorized to spend the funds in accordance with the legal appropriations and allocations for each line of item. Where parliament has not yet accepted the budget, government is then allowed to start spending on a “Vote on Account” basis (a temporal authorization). Quiet often such spending is restricted to one-twelfth per month of the previous year’s expenditure. In some Commonwealth countries, such as Ghana, the period of authorization is set on quarterly basis by warrant.

The second stage in the spending process is the Commitment Stage. This is the stage whereby future obligations to pay is incurred. By definition, a commitment arises when a purchase order is made or a contract is signed meaning the commodities will be delivered or services will be rendered and that a bill will be paid later on. However, most commitments come with various complications. Thus, its existence does not ensure that the goods will be delivered or service will be rendered since the ministry or spending agency can disagree with the supplier. Moreover, the nature of commitment varies by economic categories of expenditure. An important dimension is the lag between entering the commitment and associated cash payment especially for the purchase of capital goods and nonwage goods or services. In addition, signing of a commitment does not mean that a payment will be effected within the same fiscal year. It can be made in the following year especially when it involves an investment expenditure. It must be said that in

Ghana, a commitment is normally made after the process of procurement has taken place

The third stage is the Verification Stage in which the goods or services contracted will have to be verified or inspected to ensure that the goods or services have been delivered or executed fully or partially according to the contract. Physical delivery can be followed by verification by some period of time. The line ministry or spending agency making the purchase usually has the finance and administrative responsibility to check the bill to ensure that the goods or service is in accordance with the terms and conditions agreed upon. The bill at this stage is seen as a liability of the public sector in an accrual accounting sense.

After the stage of verification, the next stage is the payment order stage. In most systems, the issue of payment orders is typically the duty of the financial officer with delegated responsibility for this function. In Ghana, the issue of payment orders and checks with spending ministries executing the task, reports to a centralized treasury department called Accountant General's Department within the Finance Ministry. This department acts as both the paymaster and prepares the final accounts of the government.

The Payment Stage is the preceding stage where the bill is paid by cash, cheque or electronic transfer. In some economies, payment is done via a single ministry of finance account held at the central bank or in a designated bank. However, in some other countries payment is made through a commercial banking system that has a bank account which is held in the name of the individual ministries.

The last stage is the Accounting Stage where the cash transactions are recorded as complete in the books to allow for reconciliation from the cash based “above-the-line” fiscal accounts with the financing deficit below the line. Government expenditure at this stage is said to have been executed or implemented into the economy.

Review of Empirical Literature

The purpose of this review of literature is to find the appropriate approach for this study. This empirical review discusses many studies that have analysed the relative relationship that capital and recurrent expenditure have on economic growth of Ghana. Since literature on the relationship between recurrent expenditure sub-components (non-interest and interest payment) and economic growth are few, this empirical literature also considers research works that disaggregated government expenditure into capital and recurrent expenditure. It then reviewed various empirical works according to a country- specific studies and cross-country studies.

Country-Specific Studies

One of such empirical literature was undertaken by Adu and Ackah (2015) who investigated government expenditure in Ghana. The study was set out to investigate the relationship between economic growth and government spending at the disaggregated level with an Autoregressive Distributed Lag (ARDL) model with annual data spanning from 1970 to 2010 to advice policy makers on the dynamics of growth. The study concluded that in both the long-run and short-run, government capital expenditure has a significant negative impact on economic

growth but recurrent expenditure has a positive effect on economic growth in both the long run and short run. It further suggested for a fiscal discipline and efficiency in disbursement of capital expenditure to trigger positive benefits in the future. However, the study did not consider any sub-component of recurrent expenditure which is actually causing the positive effect on economic growth. In the light of that, this study delves deeper into recurrent expenditure by taking into consideration non-interest and interest payment recurrent expenditure which together receives the highest amount of funds each year as shown in figure 1 and estimate its relationship with economic growth. In addition, although the study could not consider the sub-components of capital expenditure due to data constraint, knowledge about its current relationship with economic growth will be a useful information to policy makers. As such this study considers the study period 1990 to 2015 to provide recent information about the knowledge of the relationship between capital expenditure and economic growth in Ghana.

In Nigeria, similar study was done by Aladejare (2013) in Nigeria. The study examined the relationships and dynamic interactions between government capital and recurrent expenditures and economic growth for the period 1961 to 2010. Using Real Gross Domestic Product (RGDP) as a proxy for economic growth, it employed the analytical technique of Vector Error Correction model and Granger causality estimation technique. Based on the results, it was evident that the Wagnerian and Rostow-Musgrave hypothesis were applicable to the relationship between the fiscal variables used in the study in Nigeria. The study recommended that there should be effective channelling of public funds to productive activities to

economic growth. In addition, there should be joint partnership between government and private sector in providing important infrastructural services to promote economic growth and development. However, the Wagnerian and Rostow-Musgrave hypothesis were formulated based on an industrialised economy which has its characteristics which cannot be the same as a developing country like Nigeria.

The impact of public expenditure composition on economic growth in Kenya from 1964 to 2011 was also undertaken by Muthui et al., (2013). The study disintegrated government expenditure into various sectors such as infrastructure, health, defence and public order and security on economic growth in Kenya. In the study, an annual Kenyan data period from 1964 to 2011 was employed and a stationarity test, causality test and a cointegration test were all undertaken before using a Vector Error Correction model to estimate the data. The study concluded that though government expenditure on education was positively related to economic growth it does not trigger any significant change in growth. As such investing in more and better-distributed education in the labour force will help create conditions that could result in higher productivity and an enhanced economic growth. On health, the study supports the case of investment in health as a form of human capital formation. The study recommended for government to support research and development in the health sector. It also advocated for government policies that will bring about a balance between the two. The reality in African economies is that achieving a balance in terms of government expenditure in the various sectors is very difficult due to the huge debt situation that they face. As

such it is important for African economies to know which component of government expenditure effectively propels the economy so that it can channel enough resources to that component. Moreover, expenditure to all these public sectors all entails recurrent and capital expenditure as such it is important to estimate their performance with growth in Ghana.

Twumasi, (2012) also studied on the impact of fiscal policy on Economic Growth in Ghana. In his study government expenditure was used as one of the fiscal variables in addition to other variables such as government investment expenditure, government transfer payment and taxes. While private investment, labour force and terms of trade were used as the non-fiscal category. It was based on a time series data covering the period 1981-2008. The study applied the Dicky-Fuller-Generalised Least Squares (DF-GLS) test for stationarity and bounds test approach to cointegration for the estimation of an Autoregressive Distributed Lag (ARDL) model. The model concluded that the long-run government investment and government transfer payments affects economic growth positively whereas taxes and government consumption spending had a negative relationship with growth. Similarly, government investments and transfer payments have positive effects on economic growth in the short-run. The study however suggested that efforts of taxes and government consumption expenditures on short-run economic growth were both insignificant. In addition, it also suggested that budget policies in Ghana should be tailored towards decreasing government consumption expenditure and increasing those expenditures that improves economic growth. (Twumasi, 2012).

The relationship between government expenditure and economic growth in South Africa was also investigated by Gadinabokao and Daw (2013). The hypothesis for the study was investigated using a Johansen Cointegration technique on an annual secondary data spanning from 1980 to 2011. The study confirmed the long-run positive relationship that exists between the two variables under study and further showed that capital formation granger causes economic growth in South Africa. The result from the study indicated that initiatives directed towards growing the economy via infrastructure projects are essential in both the short-run and the long-run. As such the South African government needs to spend more money on infrastructure programmes, which are mostly directed towards job creation, since they are more ideal for economic growth (Gadinabokao & Daw.2013). It must be emphasised that knowledge about the causal relationship between government expenditure and economic growth is important to policy makers, a deeper knowledge about the causal relationship between the sub-components of expenditure and growth will be very useful in making effective policies for the country (Appiah, 2014).

In addition, the need for private sector investment was re-echoed in a recent empirical literature in Nigeria by Okafor et al., (2012). The study also disaggregated government expenditure into capital and recurrent expenditure and estimated their relationship with economic growth from 1987 to 2010. Three variable multiple regression model was adopted and capital and recurrent expenditures were used as independent variables in addition to other macroeconomic variables while Gross Domestic Product was used as the dependent variable. The result from the study

revealed that recurrent expenditure had positive and non-significant impact on economic growth while capital expenditure had negative and non-significant impact on economic growth. In a growing economy, government spending can be re-directed to the business sector. The efficiency of the private sector in the South African economy cannot be over emphasized according to the study.

Appiah (2014) also investigated the relationship between government and economic growth of Ghana and further took into consideration a disaggregated government expenditure analysis. The study employed an annual time series data from 1985 to 2012 for the aggregated analysis of government expenditure and an annual time series data from 1985 to 2010 for the disaggregated government expenditure. A Maximum likelihood estimation (MLE) technique and a cointegration among the variables were ascertained within the framework of autoregressive distributed lag (ARDL) model was employed. In addition, a piece-wise linear regression was used to examine the possibility of government expenditure threshold effect. The result of the study concluded that government expenditure negatively affects growth in the long run but positively affect growth in the short run. Furthermore, a unidirectional causality running from economic growth to government expenditure which buttresses the Wagner's Law was found from the granger causality test. At the disaggregated level, capital expenditure was found to promote economic growth while total recurrent expenditure retards growth in Ghana. It also found out that there exists a government expenditure threshold effect in Ghana. As a result of the findings, the study recommended that government must restructure its expenditure by cutting down its recurrent

expenditure while increasing capital. Also, increase in government expenditure should be done carefully since its excess will deter economic growth in the long run. However, the study also recommended that further studies should consider the sub-components of capital and recurrent expenditure in other assess their effects on economic growth. As such this study considered non-interest and interest payment recurrent expenditure which are the main sub-component under recurrent expenditure as important variables of interest in this study.

Cross-Country Studies

The relationship between the government expenditure components and economic growth has also been investigated across countries within and outside the African continent. This section reviews some of such studies. In a panel data for 30 developing countries over the 1970s and 1980s. Bose, Haque, and Osborn (2007) focused on disaggregated government expenditures. The methodology used was a Seemingly Unrelated Regression (SUR) method which explicitly recognized the role of the government budget constraint and possible biases arising from omitted variables. The study found out that the share of government expenditure in GDP is positive and significantly correlated with economic growth but current expenditure was insignificant. In addition, at the disaggregated level, government investment in education and total expenditures in education are the only outlays that are significantly associated with growth on the budget constraint and omitted variables are taken into consideration (Bose et al., 2007). Though government expenditure was positive in the study, it could not reflect the country specific characteristics that

make it have a positive correlation with economic growth among the individual countries used for the study.

Among 48 Asian Countries, Lahirushan and Gunasekara, (2015) undertook a similar study to estimate the impact of government expenditure on economic growth from the year 1970 to 2013. The main objective of the study was to analyse whether government expenditure causes growth among Asian countries. Using a secondary panel data, the methodology that the study adopted was the cointegration, panel fixed effects model and granger causality test and the model used was the random effects panel OLS model. In its empirical findings, it exhibited a positive impact of government expenditure on Gross Domestic Product in the Asian Region. In addition, government expenditure and economic growth indicated a long-run relationship among Asian Countries and there was a unidirectional causality from economic growth to government expenditure and from government expenditure to economic growth hence validating the Keynesian theory and Wagner's Law. As such it concluded that the role of government expenditure is very important in economic growth among Asian Countries. However, if government does not find out what the economy needs, the effectiveness of its expenditure might not be felt and this will make society to pay the cost of their loss.

Shonchoy, (2010) also focused on the recent pattern of government expenditure in developing countries and estimated the determinants which have influenced government expenditure. The study considered a period of 1984 to 2004 for a panel data set for 111 developing countries. It was evident from the study that political and institutional variables as well as governance variables were significant

in influencing government expenditure. It also identified new evidence of the Wagner's Law which states that peoples' demand for service and willingness to pay was income-elastic therefore the expansion of public economy was influenced by the larger economic influence of a country according to (Cameron as cited by Shonchoy, 2010). In addition, while corruption was found to be very influential in explaining economic growth, other variables used such as the size of the economy and linguistic fractionalization were found to be significantly negative in explaining government expenditure. In military dictatorship periods, the study found evidence to show that public expenditure significantly shrinks as compared to other forms of governance.

Conclusion

The aim of this chapter was to review theoretical and empirical literature about the relationship between government expenditure components and economic growth of Ghana. Theories considered were the Wagner's Law, Peacock and Wiseman theory, Developmental models, the Classical and Keynesian theory and an explanation on the process of government expenditure was also reviewed. It also reviewed empirical works of some country-specific studies and other cross-country studies in order to assess how the area of public expenditure have been explored so far.

CHAPTER FOUR

METHODOLOGY

Introduction

The aim of this chapter is to present the methodological framework appropriate for undertaking this study. It gives a detailed discussion of the methods and tools adopted for this study. Specifically, the chapter entails the research design, a detailed explanation of the theoretical and empirical model specification, the justification and measurement of variables, the data source, the estimation procedure which contains the stationarity test, lag selection and the Cointegration estimation of the Autoregressive Distributed Lag model, the Post Estimation Diagnostic Tests and a Granger Causality test using an E-views 9.0 package.

Research Design

Many Social Science researchers have come out with different methods of scientific research in solving and understanding numerous problems that economic agents encounter in the society. While others have employed a panel data technique, others have adopted a time series technique in estimating the relationship between economic variables. However, the decision to apply any of the possible different alternative methods of research largely depends on the data availability, the reliability and variability of the research and the objectives underlining the study. Capital expenditure can cause an increase in economic growth when such expenditure serves as an investment in a production process. The building of factories, construction of roads and schools are some examples of capital infrastructures which are done with the aid of capital expenditure. Also, non-

interest recurrent expenditure which is a sub-component of recurrent expenditure can also stimulate economic growth by facilitating the daily operations of a production process when labour is given the needed resources daily. Wages and salaries, operational cost in various institutions and departments are all financed in the non-interest recurrent expenditure in Ghana. While interest-payment when duly paid at scheduled time can help reduce the debt burden of a country.

In line with the objectives of this study, a positivist philosophy was adopted in analysing the relationship that capital expenditure, non-interest and interest payment recurrent expenditure have on the economic growth of Ghana using a quarterly data from 1990 to 2015. The positivist approach was adopted because positivists argue that there is stability in reality and as such it can be observed and described in an impartial point of view without interfering with the phenomena being understudied (Levin, 1988). This approach enables the study of a social process in an objective manner in order to provide an explanation to a relationship between variables (Appiah, 2014). As such it allows for the formulation of suitable mathematical models to estimate relationships in a quantitative manner. Based on this philosophy, this study adopted a quantitative approach which is suitable for this work and specifically uses an explanatory research under the quantitative approach due to the objectives of this study.

This research work provides detailed methods and tools of analysis and specifically discusses the theoretical and empirical specification of the method. This chapter begins with the theoretical model specification where the basic theoretical model which is the Aggregate Production Function which was used in

the Solow Growth Model is discussed to include other variables. The next section presents the empirical model specification where the cointegration method which is an Autoregressive Distributed Lag (ARDL) model with a bounds test is used as the estimation technique for the model. This is then followed by a justification and measurement of the variable and the data source. The next section is the diagnostic tests of the model. And the final section is a test for the granger causality to determine the direction of causality between the variables of interest and economic growth.

Theoretical Model Specification

In order to estimate the relationship between capital and recurrent expenditure sub-components of government on economic growth of Ghana, this study followed the works of Ackah et al. (2014) and Appiah (2014) by employing the Aggregate Production Function which was also adopted by the Solow Growth Model. The Aggregate Production Function (APF), by definition is a function that shows the relationship between total production of the output of an economy and the amount of inputs used in production

The function can be expressed to factor in the conventional and non-conventional inputs to determine economic growth level of Ghana as:

$$Y_t = A_t L_t^{\beta_1} K_t^{\beta_2} \dots \dots \dots (1)$$

From equation (1), Y_t represents the aggregate output of the economy (real GDP per capita) at time (t). The variable L_t and K_t , are represented by the stock of labour measured as the Labour Force Participation which is a percentage of the total

population between the ages 15 and 64 years and the capital input was measured as an amount of gross capital formation at time (t) respectively and β_1 and β_2 are the coefficients of elasticity of labour and capital. The variable A_t represents the Total Factor Productivity (TFP) which accounts for other factors aside labour and capital that causes production to increase. Thus, it is a vector of other independent variables that theoretically and empirically have effects on the dependent variable. Solow Growth model includes it as a shift parameter in explaining growth of the economy. These other factors which the study included are the variables of interest which are government capital expenditure, non-interest and interest payment recurrent expenditure and other explanatory variables. The theoretical basis for including government expenditure components is found in the Keynesian multiplier process. In which, a rise in government expenditure transmits into series of processes that create jobs and subsequently increases income levels in the economy (Adu & Ackah, 2015). The TPF function can be written as:

$$A=f(CAPEX, NREX, INTX, MONEY, SAV, TR)=$$

$$CAPEX_t^{\beta_3} NREX_t^{\beta_4} INTX_t^{\beta_5} MONEY_t^{\beta_6} SAV_t^{\beta_7} TR_t^{\beta_8} \dots\dots\dots(2)$$

Where CAPEX is the government capital expenditure measured as a percentage of total expenditure, NREX is the government non-interest recurrent expenditure also measured as a percentage of total expenditure, INTX represents government interest payment recurrent expenditure as a percentage of total expenditure, MONEY represents Broad Money Supply, SAV represents the gross domestic savings which is a percentage of GDP and the variable TR is the Total Revenue also as a percentage of GDP.

Substituting equation (2) into equation (1) will give us equation (3) and expressing it in an econometric form as:

$$Y_t = L_t^{\beta_1} K_t^{\beta_2} CAPEX_t^{\beta_3} NREX_t^{\beta_4} INTX_t^{\beta_5} MONEY_t^{\beta_6} SAV_t^{\beta_7} TR_t^{\beta_8} e^{\varepsilon_t} \dots\dots\dots(3)$$

From equation (3), we take the natural logs of only the dependent variable, non-interest and interest payment recurrent expenditure to obtain a semi-log equation. This is done in order to operationalize the model for the real GDP of Ghana in an econometric form as:

$$\ln Y_t = \beta_0 + \beta_1 \ln L_t + \beta_2 \ln K_t + \beta_3 \ln CAPEX_t + \beta_4 \ln NREX_t + \beta_5 \ln INTX_t + \beta_6 \ln MONEY_t + \beta_7 \ln SAV_t + \beta_8 \ln TR_t + \varepsilon_t \dots\dots(4)$$

Where the β_i are the slopes of the variables and $i = 1, 2, 3, 4, 5, 6, 7, 8$

Equation (4) gives us the long-run equilibrium equation (cointegration) which expresses the relationship between real GDP per capita and the government expenditures (capital expenditure, non-interest and interest payment recurrent expenditure) and some other explanatory variables. All variables in the model with the exception of ε_t (white noise error term) are defined by time (t).

Justification, A priori Expectation and Measurement of Variables

Labour inputs (L)

It expresses the number of man-hours that an individual can offer in a production process. Ghana’s economy has been characterized by a labour-intensive form of production from over the years. In the export of raw materials such as cocoa, gold, bauxite and diamond, labour is involved in their extraction,

transportation and processing of some of the raw materials into finished goods. Though the public sector has not been able to absorb most of the skilled labour in the country, the activities of the informal sector and the private sector cannot be over emphasized. Due to this the structure of the economy remains highly informal with a shift in the country's national output composition from the agriculture to low-value service activities in the informal sector (Aryeetey & Baah-Boateng, 2015). As such this study deems it very critical to be one of the explanatory variables used in estimating the economic growth of the economy. Labour input (L) which is one of the traditional inputs is measured as the percentage of the population between the ages 15 and 64 years is expected to cause an increase in real GDP per capita. This means that holding all other factors constant, an increase in the labour input will increase production and this will cause an increase in real GDP per capita. Hence, labour inputs (L) is expected to have a positive coefficient. ($\beta_1 > 0$)

Capital inputs (K)

Capital inputs are inputs that produce power to enhance production. Though the Ghanaian economy is not characterized by highly-sophisticated capital inputs, the role of capital inputs in the few industries within the country in the production processes in the economy is very important. Few factories that have been established in the country use capital inputs to ensure efficiency, save time, reduce cost and hence increase production. Gross Capital Formation according to the World Development Indicators database is a measure for capital inputs consists of outlays on additions to fixed assets of the economy plus net changes in the level of

inventories. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales and “work in progress”. Capital inputs can be in the form of roads, buildings, factories, machinery, farm machinery, computers etc. It is theoretically expected to have a positive impact on the real GDP per capita. (Appiah-Konadu et al., 2016). Thus, holding all other factors constant an increase in capital formation will stimulate investment which will increase production and then bring about an increase in real GDP per capita of the economy. As such, the coefficient of capital input is expected to be positive. ($\beta_2 > 0$)

Capital Expenditure (CAPEX)

This variable which is one of the main variables of interest is made up of government’s expenditure on all fixed assets which are those commodities that are used repeatedly in the production process for more than a year. (Adu & Ackah, 2015). These commodities are construction of roads, schools, factories, hospitals etc. One advantage about this kind of expenditure is that they create jobs when they are established and subsequently raises the income levels of economic agents in the economy. They also last long when the appropriate materials are purchased for their establishment and appropriate procurements are made for the right type of supplier. Furthermore, gross capital formation also brings revenue to the government through taxes from the individuals who have acquired a job from the establishment of these fixed assets. Barro and Sala-i-Martin, (1992) stressed that high rate of investment in capital goods promotes high economic growth in a country. As such its coefficient in this study is expected to be positive when all other variables are held constant. ($\beta_3 > 0$)

Non-Interest Recurrent Expenditure (NREX)

Another variable of interest is government non-interest recurrent expenditure which is a sub-component of the recurrent expenditure. In Ghana, this variable is made up of Personal Emoluments, Administration and Services, Subventions, Transfers and Utility Price Subsidies (ISSER,2015). This type of expenditure by government is used for the smooth running of various government departments, agencies and ministries. Also, the increased wages and salaries from the Single Spine Salary Scheme is expected to improve the lives of the Ghanaian labour force since their purchasing power for goods and services increases and enhance productivity of labour. As such non-interest, recurrent expenditure is expected to increase the growth of the economy holding all other variables constant. The coefficient is therefore expected to be positive in this study. ($\beta_4 > 0$)

Interest Payment Recurrent Expenditure (INTX)

The Recurrent Expenditure of Ghana also includes interest payment as one of the major sub-component which is made up of domestic and foreign interest payment on debt of the country (ISSER,2015). Interest payment has in recent years risen astronomically in Ghana due to the large budget deficits registered over the years, especially since 2012. Moreover, the increase to the debt stock of Ghana and the rising interest cost are the result of the interest hikes and exchange rate depreciation in Ghana (IFS, 2016) . According to Fitch Ratings (2015), the country's interest burden is the highest amongst its rated Sub-Saharan African countries. Other analysts describe as worrying the escalating interest on the country's debts due to the fact that very soon the country will have to use nearly

one-third of the domestic revenues it generates to pay its interest on loans (IFS). Interest payments on debt retards the growth of a country due to the fact that, revenues that can be used for development purposes are rather channelled to the payment of these interest on governments borrowings. Subject to this, the coefficient for interest payment is expected to be negative. ($\beta_5 < 0$)

Broad Money Supply (MONEY)

A common characteristic of the Ghanaian economy is the amount of money that is circulating within the economy. Broad money supply by definition is the sum of currency outside banks, demand deposits other than those of the central government, the time, savings, and foreign currency deposits of resident sectors other than the central government, bank and traveller's checks and other securities such as certificates of deposit and commercial paper (World Bank Group, 2016). The Central Bank of Ghana has over the years used money supply to arrest the deterioration of macroeconomic stability within the economy. Through monetary targeting the Bank helps to restore inflation situations in the economy.

This is normally done by setting up a single digit inflation target to attain at the end of every year and the Central Bank's Monetary Policy Committee (MPC) formulate tight liquidity control measures in order to achieve such target and promote higher growth rates through the 'crowding-in' of the private sector (CEPA, 2006). In order to achieve a lower interest rate, the MPC reviews the prime rate downwards to help the financial sector thrive within the economy. Furthermore, to maintain the money supply within the economy, the Central Bank also introduces monetary management policies which affects the level of money supply in the

economy. For instance, the Central Bank of Ghana in 2005 introduced new money market instruments in the second half of the year to enhance monetary management and prolong the term structure of interest rates which provided the further impetus towards financial deepening of the money market. Though a high level of money supply circulating within the economy can bring about inflation, its maintenance at moderate levels leaves the interest rate of the economy at bearable levels which increases investment and hence increases economic growth in the country (CEPA, 2016). As such the coefficient of Broad money supply is expected to be positive in this study. ($\beta_6 > 0$)

Gross Domestic Savings (SAV)

Many Ghanaians do not use to save at the commercial banks due to their strict terms and conditions and low interest rate attached to it, but recently due to the emergence of the institution of microfinance, many economic agents especially the low-income earners are able to save and have access to credit which would not have been possible from the formal financial system. Savings in Ghana has been made possible by Microfinance Institutions (Kumah & Boachie, 2016) and this has increased the number of small scale enterprises within the economy. The start-up capital of most traders is made possible by saving at the microfinance institutions, others have also expanded their production base as a result of savings. In general, when savings is used as investment, it improves production which then enhances the gross domestic product in the country. In view of this Gross Domestic Savings in this study is expected to have a positive coefficient in this study. ($\beta_7 > 0$)

Total Revenue (TR)

This study also considers as one of the control variables, the total revenue of the country. In Ghana, the main source of revenue to the government is through taxes and non-tax revenues (CEPA, 2006). Total revenue that comes in the form of taxes provides developing countries with a stable and predictable fiscal environment to promote growth and to finance their social and physical infrastructural needs. Combined with economic growth, it contributes to the reduction on the long term reliance on foreign aid and good governance. (Romer & Romer, 2010). The availability and mobilization of revenue is the basic factor with which the economy is managed in the country (Ilyas & Siddiqi, 2008; Takumah, 2014). Revenue from taxes which is one of the main sources of revenue to the country is an instrument in the hands of the government to fulfil expenditures and it helps in acquiring sustained growth targets (Takumah, 2014). Due to the immense contribution of total revenue to the growth of the country, the coefficient of total revenue is expected to be positive. ($\beta_8 > 0$)

Finally, $\beta_0 > 0$ is the intercept of the regression.

Sources of Data

This research work employed a secondary time series annual data which was further quarterlized from the year 1990 to 2015 with the aid of Eviews 9.0 package. Furthermore, the time series data was acquired from the World Development Indicators database. These variables were Labour force participation rate with ages between 15-64 years as a percentage of total population, Gross Capital Formation, Broad Money Supply, Gross Domestic Savings. While the

capital expenditure, non-interest and Interest Payment recurrent expenditure by government which are the main variables of interest were compiled from *The State of the Ghanaian Economy* (1990-2015), which is an annual publication by the Institute of Statistical, Social and Economic Research (ISSER) in Ghana. And total revenue data is obtained from the International Monetary Fund database.

Empirical Model Specification

In order to test for existence of a relationship that government capital, non-interest and interest payment recurrent expenditure have with economic growth, it is vital to take into account all the dynamic responses in the dependent variable that results from changes in its own lags and the lagged values of other explanatory variables (Ackah et al., 2014). In view of this idea, this current study employed an Autoregressive Distributed Lag (Bounds test) cointegration approach developed by Pesaran and Shin (1996) which was modified in 1997 and further modified by Pesaran et al., (2001) . This technique was chosen because of the following reasons:

1. Since this study is using an infinite sample data, the technique will produce a relatively more efficient result compared to other methods like Ordinary Least Squares (OLS).

2. The problem of endogeneity is fixed when the appropriate lag is used (Pesaran et al., 2001)

3. Conventional OLS method cannot be used especially when at least one variable is $I(0)$ while others are $I(1)$ because they will not behave like constants which is required in OLS. Most of them are changing in time, hence OLS will mistakenly

show high t-values and significant results but in reality, it would be inflated due to common time component.

4. In addition, this technique is applicable irrespective of whether the regressor variables are $I(0)$, $I(1)$ or mutually cointegrated.

However, the procedure of the technique crashes when there is the presence of an $I(2)$ series. In view of that there are two preconditions that should be checked before the technique can be used. These are:

1. None of the variables should be $I(2)$ in normal conditions (ADF test)

2. None of the variables should be $I(2)$ in structural break.

In using a time series data set one perennial problem that cannot be avoided is the problem of non-stationarity. As such before using the ARDL model, the data set for the variables were tested to determine the level of stationarity using a unit root test with the help of an Augmented Dickey Fuller test and Phillips-Perron test.

Estimation Technique

To investigate the relative relationship that capital expenditure, non-interest and interest payment recurrent expenditure have with economic growth in Ghana, the Autoregressive Distributed Lag (ARDL) with a bounds test was applied in this study. The estimation procedure involved the following steps. The study first investigated the statistical properties of the data (Stationarity test) with the aid of the Augmented Dickey-Fuller (ADF) and the Phillips-Perron tests. This stationarity test was done to ascertain whether the data for the variables have a unit root or not. In the next step, the bounds test was tested by using the F-Statistics within bounds

test after the appropriate Lag-order was determined by estimating an unrestricted Vector Autoregressive model (VAR) and then selecting the lag length criteria according to the selection of the Schwarz Criterion. After establishing the existence of cointegration using the bound test, the next step was the estimation of the long and short-run of the relative relationship between capital expenditure, non-interest and interest payment recurrent expenditures and economic growth in Ghana. The next step was the diagnostic test which entailed the serial correlation, functional form misspecification test, heteroskedasticity test, stability test and normality test. And the final step was the granger causality test to determine the direction of causation between the variables of interest.

Stationarity Test

Regression analysis conducted on non-stationary series can produce misleading results (Wu, 2015). In view of that, time series analysis requires a regression analysis that has the properties of a standard estimation and testing techniques that depends on variables which are stationary in order to avoid a “spurious regression result” (Granger & Newbold, 1974). Stock and Watson (1988) have also shown that the usual test statistics including the summary statistics will not possess standard distributions if some of the variables in the model have unit roots. A variable can be said to be stationary if its statistical properties do not depend on time (thus the mean, variance and covariance do not depend on time). In other words, such variable has no unit root. Granger and Newbold (1974) maintained that spurious regression “produces statistically significant results between series that includes a trend and otherwise random. Philips and Perron,

(1988) also shows that when the series is not stationary, the ordinary least squares (OLS) estimator is not consistent and t and F statistics do not have a standard normal distribution (Wu, 2015).

A solution that could make a non-stationary variable change into a stationary variable is the differencing technique. This technique is used to transform the variable into a stationary series. If a variable is stationary without differencing, then such a variable can be said to be integrated at levels or zero usually denoted as I(0). On the other hand, if it is integrated at first differencing, the variable is then integrated at order one or denoted as I(1). Generally, if a variable is stationary at order P differencing then the variable is referred to as integrated of order P or I(P). In testing the stationarity of a variable, several techniques can be used. However, this study employed the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron test (PP) in determining the stationarity of each variable. The equation below is used to test the stationarity of a variable by the use of the ADF test:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \rho Y_{t-1} + \sum \beta_i \Delta Y_{t-i} + U_t \dots\dots\dots (5)$$

From equation (5) Y_t denotes the time series at time t, Δ is the difference operator, $\alpha_0, \alpha_1, \rho, \beta$, are parameters to be estimated and U is the stochastic random disturbance term. The Akaike Information Criterion (AIC), Schwarz Criterion or any significant criterion can be used to determine the optimal number of lags. However, this study considered the Schwarz Criterion in lag selection since it chooses a parsimonious model. The hypothesis for both the ADF and PP unit root test are as follows:

H_0 : Series contain unit root (non-stationary)

H_1 : Series contain no unit root (stationary)

The decision rule is that, if the ADF and PP statistic are higher (in absolute terms) than the critical values, then we fail to accept the null hypothesis and conclude that there is no unit root meaning the series is stationary. However, if the ADF and PP statistic are less than the critical values then we fail to reject the null hypothesis and conclude that there is unit root meaning the variable is non-stationary. This study used the ADF technique and Phillips-Perron techniques to test the stationarity of the variable. The PP test was chosen in addition to the ADF since it has some superior qualities over the ADF test. These reasons are as follows: First, ADF is unable to discriminate between stationary and non-stationary series that have a high degree of autocorrelation. Second, ADF test does not consider cases of heteroscedasticity and non-normality that are regularly present in the raw data of economic time series variables. Lastly, in circumstances where the time series variables under study have serial correlation and structural breaks the PP test becomes more useful than the ADF test.

Cointegration Test

After determining the level of Stationarity for each variable, this study then estimated the existence of a long-run relationship (cointegration). If economic series are non-stationary but their linear combination is stationary, then the variables are said to be co-integrated. Most economic theories normally suggest that certain group or pair of variables are linked by a long-run relationship. Such

long-run equilibrium relationship is referred to as cointegration. Specifically, cointegration implies that the variables may drift away from each other in the short run but may not divert from each other in the long-run co-movement (Enders, 2014). Over the past decade considerable attention has been paid on empirical economics in testing for the existence of long-run relationships in levels between variables. Most of the analysis used are based on cointegration techniques (Pesaran et al., 2001). Several cointegration techniques have been adopted by many researchers in testing relationships. Some of these are the Engle Granger Approach by Engle and Granger (1987) which test the cointegration between two variables, the Fully Modified Ordinary Least Squares (FMOLS) Approach by Hansen and Phillips (1990) which is a modified method of least squares that takes into account serial correlation effects and for the endogeneity in the regression that results from the existence of cointegrating relationship and the Johansen cointegration technique. Most of these techniques rely on cases in which the underlying variables are integrated of the same order. In view of this, a pre-testing needs to be undertaken and this increases the degree of uncertainty into the analysis of levels (Pesaran et al., 2001).

However, recently, a new approach to testing for the presence of a relationship between variables in levels which is applicable irrespective of whether the underlying regressors are purely $I(0)$, purely $I(1)$ or mutually cointegrated has been developed. This new approach which was developed by Pesaran et al. (2001) is known as Autoregressive Distributed Lag (ARDL) model with a bounds test. The ARDL model is made up of an Autoregressive (AR) component whereby a

dependent variable explains its own variations and a Distributive Lag (DL) component whereby other variables are involved in explaining the variations in the dependent variable. The model has some advantage over the other forms of cointegration techniques. Unlike other techniques such as Johansen that requires larger data samples for validity, the ARDL model has an advantage of using small samples in order to establish a statistically significant cointegration (Ghatak & Siddiki, 2001). In addition, while other cointegration techniques requires the same order of integration before it can establish a cointegration, the ARDL model can be applicable whether the regressor are I (0) and / or I (1) or mutually cointegrated (Pesaran et al, 2001). The approach for the model according to Pesaran and Pesaran (1997) involves two steps. The F-test is used to determine the presence of any long-run relationship among the variables in the first step (cointegration). And in the second step, the coefficient of the long-run relationship is determined followed by the estimation of the short-run elasticity of the variables coupled with the error correction term of the ARDL model which determine the speed of adjustment to equilibrium.

To formulate the bounds test procedure for cointegration, the restricted (conditional) version of the ARDL model is estimated to determine the long-run cointegration between capital expenditure, non-interest, interest payment recurrent expenditure and real GDP coupled with some other explanatory variables.

The equation (4) can be written in an ARDL form as below:

$$\Delta \ln Y_t = \beta_0 + \delta \ln Y_{t-1} + \beta_1 L_{t-1} + \beta_2 K_{t-1} + \beta_3 CAPEX_{t-1} + \beta_4 \ln NREX_{t-1} + \beta_5 \ln INTX_{t-1} + \beta_6 MONEY_{t-1} + \beta_7 SAV_{t-1} + \beta_8 TR_{t-1} + \sum_{i=0}^q \phi_i \Delta \ln Y_{t-i} +$$

$$\begin{aligned} & \sum_{i=0}^q \phi_2 \Delta L_{t-i} + \sum_{i=0}^q \phi_3 \Delta K_{t-i} + \sum_{i=0}^q \phi_4 \Delta CAPEX + \sum_{i=0}^q \phi_5 \Delta InNREX_{t-i} + \\ & \sum_{i=0}^q \phi_6 \Delta InINTX_{t-i} + \sum_{i=0}^q \phi_7 \Delta MONEY_{t-i} + \sum_{i=0}^q \phi_8 \Delta SAV_{t-i} + \\ & \sum_{i=0}^q \phi_9 \Delta TR_{t-i} + \varepsilon_t \dots \dots (6) \end{aligned}$$

Where β_0 is the constant, β_0 , and β_i are the long-run elasticities, ϕ_i are the short-run elasticities (where $i=1,2,3,\dots$) and ε_t is the white noise in equation (6). Also Δ and q represents the first difference operator and the lag order selected respectively. In conducting the bounds test, the optimal lag length was first determined by first estimating an unrestricted Vector Autoregressive model (VAR) and then selected the lag length criteria according to the selection of the Schwarz (Bayes) Criterion from the VAR model. The appropriate values for the maximum lags can be selected from information criteria- Akaike Information Criteria (AIC), Schwarz (Bayes) criterion (SC) and Hannan Quinn (HQC) however the Schwarz (Bayes) Criterion was used to determine the lag length since it chooses a parsimonious model. The null hypothesis of no cointegration relationship is defined as $H_0 = \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$ as against the alternative hypothesis that shows the presence of cointegration relationship as $H_1 = \beta_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq 0$ was then tested. The magnitude of F-statistics was determined if there exists cointegration among the variables or not. In undertaking the bounds test, if the independent variables are I(d) (thus between 0 and 1), then the two sets of critical values provided by Pesaran and Pesaran (1997) provide a test for the different number of regressors and whether the ARDL model contains an intercept and /or trend (Appiah, 2014). The critical values for the F-test for a random mix of I(0) and I(1) variables are not available. In view of that Pesaran et

al (2001) provided bounds on the critical values for the asymptotic distribution of the F-statistics. They gave lower and upper bounds for each situation. In each situation, the lower bound is based on the assumption that all the variables are integrated at levels or zero (I (0)), and the upper bound is based on the assumption that all the variables are integrated of order one (I (1)). If the F-statistics falls within the critical bound, the test is inconclusive as such the model needs to be re-specified. If it is higher than the upper bound the null hypothesis of no cointegration is rejected and as a result the alternate hypothesis is accepted meaning there is the existence of cointegration. (Appiah-Konadu et al., 2016). However, if it falls below the lower bound then we conclude that there is no cointegration in the model meaning all the variables are integrated at levels (I (0)). Once cointegration relationship was established, the long-run relationship and error correction estimates of ARDL (q, r, s, t, u, v, w, x, y) were obtained. Below was the specification for the long-run effect equation:

$$\begin{aligned} \ln Y_t = & \tau_c + \sum_{i=1}^q \delta_1 \ln Y_{t-i} + \sum_{i=0}^r \beta_6 L_{t-i} + \sum_{i=0}^s \beta_7 K_{t-i} + \sum_{i=0}^t \beta_8 CAPEX_{t-i} + \\ & \sum_{i=0}^u \beta_9 \ln NREX_{t-i} + \sum_{i=0}^v \beta_{10} \ln INTX_{t-i} + \sum_{i=0}^w \beta_{11} MONEY_{t-i} + \\ & \sum_{i=0}^x \beta_{12} SAV_{t-i} + \sum_{i=0}^y \beta_{13} TR_{t-i} + u_t \dots \dots (7) \end{aligned}$$

where τ_c is the constant, δ_1 and β_i are the long-run elasticities and the white noise error is u_t in equation (7). (i=1,2,3.....12)

Furthermore, the error correction and the short-run representations of the series were specified as:

$$\Delta \ln Y_t = a + \sum_{i=1}^q \phi_7 \Delta \ln Y_{t-i} + \sum_{i=0}^r \phi_8 \Delta L_{t-i} + \sum_{i=0}^s \phi_9 \Delta K_{t-i} + \sum_{i=0}^t \phi_{10} \Delta CAPEX_{t-i} +$$

$$\sum_{i=0}^u \phi_{11} \Delta \ln NREX_{t-i} + \sum_{i=0}^v \phi_{12} \Delta \ln INTX_{t-i} + \sum_{i=0}^w \phi_{13} \Delta MONEY_{t-i} + \sum_{i=0}^x \phi_{14} \Delta SAV_{t-i} + \sum_{i=0}^y \phi_{15} \Delta TR_{t-i} + \omega ECM_{t-1} + v_t \dots \dots \dots (8)$$

Where ‘a’ is the constant and ϕ_i are the short-run elasticities, ω is the speed of adjustment parameter and ECM is the Error Correction Model which is the residuals obtained from equation (7). The coefficient of the lagged error correction term was expected to be negative and statistically significant to further confirm the existence of the cointegration relationship.

Diagnostic Tests

In order to ensure that the model used was robust and passes the goodness of fit tests, this study further carried out post estimation tests or diagnostic tests. The diagnostic tests of the ARDL model from the short-run estimate (normality, specification, heteroscedasticity and serial correlation test) were tested. Specifically, the normality test was undertaken to determine whether the distribution of the data used has the properties to be normally distributed (thus mean, mode, and median are equal and has a symmetric curve). This was done with the aid of the Histogram-Normality test. Its null hypothesis was a normally distributed data while the alternate hypothesis was a non-normally distributed data. The study also went through a Regression Specification Error Test (RESET) developed by Ramsey (1969) to ascertain whether the model was correctly specified and its null hypothesis was correctly specified model while the alternate was not correctly specified model (Appiah 2014). The RESET test was undertaken to test for the presence of an omitted variable, incorrect functional form and the

correlation between regressor and the error term (Hall, Lilien, & Johnston, 1995). Furthermore, in order to determine whether the variance of the error term is constant or not, this study tested for the presence of heteroskedasticity with the aid of the Breusch-Pagan-Godfrey test. This was done in order to avoid the consequences of heteroskedasticity which are: biased standard errors and biased parameter estimates. Its null hypothesis was the presence of a constant variance (Homoskedasticity) while the alternate was the presence of variance which was not constant (Heteroskedasticity).

It further tested the serial correlation to determine whether there is a relationship between observations of the same variable over specific periods of time. This was done to ensure that the estimates obtained are efficient. Its null hypothesis was no serial correlation presence while its alternative hypothesis was the presence of a serial correlation. This was done with the aid of the Breusch-Godfrey serial correlation Lagrange Multiplier (LM) test. The LM test has some advantage over other similar tests such as the Durbin-Watson test in the fact that unlike the Durbin-Watson statistic, the LM test can be used to test for higher order Autoregressive Moving Averages (ARMA) errors and can be used whether or not there are lagged dependent variables (Appiah, 2014).

The decision rule for each test was that, if the P-value was greater than all the levels of significance (0.01,0.1 and 0.05) then we fail to reject the null hypothesis for the test but if the P-value is less than any of the levels of significance then we fail to accept null hypothesis hence the alternative hypothesis is accepted. This research work further tested for the stability of the model via the use of the

Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squared Recursive Residuals test (CUSUMSQ) developed by Brown, Durbin, and Evans (1975) to examine the stability of the model in this study. The null hypothesis tested was that there is no structural break, meaning the coefficient vector is the same in every period against the alternative hypothesis that there is a structural break which also means the coefficient vector is not the same in every period of the model. If the relationship is stable, then the test will lie between the critical bounds at the traditional levels of significance. If it is not stable, then it will lie outside the critical bounds at the traditional levels of significance.

Granger Causality Test

In order to determine the direction of causality between government capital expenditure, non-interest and interest payment recurrent expenditure on the economic growth of Ghana, this study employed the Granger causality test. This section is motivated by the fact that the Wagner's Law points to the fact that public expenditure responds to an increase in economic growth while the Keynesian theory stresses that it is rather the increase in public expenditure that increases economic growth. Subject to these two conflicting theories about the direction of causality between public expenditure and economic growth, this section tries to empirically ascertain which theory applies in the case of Ghana. Granger Causality is a statistical hypothesis test used for determining whether one-time series is useful in forecasting another time series variable, thus it is used to check the direction of causality. In fulfilling the demands of objective three of this study, the hypotheses for the relationships between capital expenditure (CAPEX) and non-interest

recurrent expenditure (NREX), interest payment recurrent expenditure (INTX) and economic growth (RGDP) were specified below as:

$$H_0: \sum_{t=1}^n \beta_{2i} = 0 \text{ and } \sum_{t=1}^n \alpha_{2i} = 0$$

$$H_1: \sum_{t=1}^n \beta_{2i} \neq 0 \text{ and } \sum_{t=1}^n \alpha_{2i} \neq 0$$

The test was specified as follows:

$$\ln Y_t = \beta_0 + \sum_{t=1}^n \beta_{1i} \ln Y_{t-i} + \sum_{t=1}^n \beta_{2i} \text{CAPEX}_{t-i} + U_t \dots \dots \dots (8a)$$

$$\text{CAPEX}_t = \alpha_0 + \sum_{t=1}^n \alpha_{1i} \text{CAPEX}_{t-i} + \sum_{t=1}^n \alpha_{2i} \ln Y_{t-i} + \eta_t \dots \dots \dots (8b)$$

$$\ln Y_t = \beta_0 + \sum_{t=1}^n \beta_{1i} \ln Y_{t-i} + \sum_{t=1}^n \beta_{2i} \text{NREX}_{t-i} + U_t \dots \dots \dots (9a)$$

$$\text{NREX}_t = \alpha_0 + \sum_{t=1}^n \alpha_{1i} \text{NREX}_{t-i} + \sum_{t=1}^n \alpha_{2i} \ln Y_{t-i} + \eta_t \dots \dots \dots (9b)$$

$$\ln Y_t = \beta_0 + \sum_{t=1}^n \beta_{1i} \ln Y_{t-i} + \sum_{t=1}^n \beta_{2i} \text{INTX}_{t-i} + U_t \dots \dots \dots (10a)$$

$$\text{INTX}_t = \alpha_0 + \sum_{t=1}^n \alpha_{1i} \text{INTX}_{t-i} + \sum_{t=1}^n \alpha_{2i} \ln Y_{t-i} + \eta_t \dots \dots \dots (10b)$$

Where the error terms are assumed to satisfy the criteria $E(U_t) = E(\eta_t) = E(U_t U_s) = E(\eta_t \eta_s) = 0$ and $E(U_t U_t) = \sigma_u^2$, $E(\eta_t \eta_t) = \sigma_\eta^2$. Thus the causality in equation (8a) must run from capital expenditure (CAPEX) to real Gross Domestic Product ($\ln Y_t$) provided that the coefficient of the lagged variable is significantly different from zero. But if causality runs from real Gross Domestic Product ($\ln Y_t$) to capital expenditure (CAPEX) in equation (8b) then the lagged coefficient of real Gross Domestic Product ($\ln Y_t$) should be statistically significant from zero.

The same situation can be said in equations (9a) and (9b) as well as equations (10a) and (10b). Causality in equations (9a) and (10a) must run from non-interest recurrent expenditure (NREX) and interest payment (INTX) respectively to real Gross Domestic Product ($\ln Y_t$) in both equations provided that the coefficients of their lagged variables of non-interest recurrent expenditure (NREX) and interest payment (INTX) in equations (9a) and (10a) are significantly different from zero. But if causality in both equations runs from real Gross Domestic Product ($\ln Y_t$) to non-interest recurrent expenditure (NREX) in equation (9b) and interest payment (INTX) in equation (10b) then the lagged coefficient of real Gross Domestic Product ($\ln Y_t$) should be statistically significant from zero. However, a bidirectional causality can also happen whereby the coefficients of capital expenditure and real gross domestic product are all statistically significant from zero in equations (8a) and (8b) respectively. It can also happen in the recurrent expenditure sub-components equations (9a), (9b) and (10a), (10b) whereby the coefficients of non-interest recurrent expenditure, interest payment recurrent expenditure and real Gross Domestic Product are all statistically significant from zero. Such a situation happens when both variables influences the variations of each other in both equations.

Data Analysis

Descriptive and quantitative analysis were employed with the aid of a positivist approach to research analysis. Descriptive tables were adopted to assist in describing the basic features of the data for the variables used in the study. A stationarity test to determine the unit root of each variable was done to determine

the statistical properties of the variables used. With the aid of a bounds test, this study was able to determine whether there was the presence of cointegration among the variables. Furthermore, the study specified the model in an ARDL form to determine the long-run, short-run and error correction model coefficients. Diagnostic tests were also taken in this study to assess the robustness of the model and finally to determine the direction of causality among the variables, a granger-causality test was done with the aid of an E-views 9.0 software package was undertaken.

Conclusion

This chapter delved into the methodology of this research study. It commenced with an introduction and a research design. In the next section, the theoretical model which was based on the aggregate production function was elaborated and other variables were included in the theoretical model. Under this section, the variables considered under this study, their measurement and their a priori expectations were discussed as well as the sources of the data used. The next section was the empirical model specification. Under which the reasons why the study used the Autoregressive Distributed Lag were justified. This was followed by the estimation procedure whereby the scientific systematic steps to undertake the estimation of the relationships were elaborated. These steps were the stationarity test, the lag order selection, specification of the ARDL model, the long-run model and the short-run and the error correction model. It further discussed the diagnostic test and granger causality test for the variables of interest were specified. It finally concluded with a data analysis of the study.

CHAPTER FIVE

RESULTS AND DISCUSSION

Introduction

The purpose of this chapter is to present the empirical findings and discussions of the results of this study. This chapter is structured into six main sections. The first section provides the descriptive statistics of the variables employed under this study. The second section deals with the stationarity test to ascertain whether or not the variables used have unit root or not. This is followed by the third section which begins with the lag order selection and then followed by a cointegration test using a bounds testing approach to determine whether there is a long-run relationship or not. After establishing the existence of a cointegration between the variables of interest, the next section presents the coefficient results for the long-run and the short-run relationships and their detailed discussions. The fifth section is the diagnostic test to determine the robustness of the model and some statistics of the regression to determine how well the model fits the set of observations used in this study. This is then finally followed by the Granger Causality test which determines the direction of causality between capital expenditure and economic growth as well as non-interest and interest payment recurrent expenditure also and economic growth from the year 1990 to 2015.

Descriptive Statistics

In order to describe the basic features of the data set in this study, Tables 1 and 2 present summary statistics of the basic features of the data for the various variables. Table 1 presents the summary statistics for the main variables of interest

while Table 2 presents summary statistics of the control variables. The aim of this section is to provide prior information about the basic features of the data from the first quarter of 1990 to the last quarter of 2015 through descriptive statistics. These statistics include the mean, median, maximum, minimum, standard deviation, skewness, kurtosis, the Jarque-Bera, probability, sum, the sum of squared deviation and the number of observations.

From Table 1 and 2, it can be observed that all the variables under this study recorded positive average values (mean). It can also be seen from Table 1 and 2 that variables such as Labour Force Participation (L), Gross Capital Formation (K), Broad Money Supply (MONEY), Total Revenue (TR) all recorded negative skewed values indicating that majority of the values were greater than their means (Appiah, 2014). However, the other remaining variables which were real GDP per capita (RGDP), Non-Interest (NREX), Interest Payment Recurrent Expenditure (INTX), Capital Expenditure (CAPEX) and Gross Domestic Savings (SAV) recorded positive skewed values indicating that majority of the values were less than their means (Appiah, 2014).

In terms of the amount of variation or dispersion of the data set, the standard deviation from Tables 1 and 2 provides a clue about the deviations of the data points from their means. It can be realised from Tables 1 and 2 that, variables such as Labour force participation (L) had its standard deviation to be very low indicating that its data points tend to be closer to its mean while the remaining variables had their standard deviations which were very high as such their data points spread out over a wider range from their means. The Jarque-Bera statistic

which is a goodness of fit test was used to determine whether or not the null hypothesis that the series followed a normally distributed random process among all the variables. It can be seen from the probabilities of the Jarque-Bera test from Tables 1 and 2 that all the variables recorded insignificant probabilities for their Jarque-Bera test. As such the null hypothesis holds for all the variables. The variables used in this study had 26 observations each from an annual time series data from the year 1990 to 2015.

Table 1 : Summary Statistics of the Main Variables of Interest

Var	RGDP	CAPEX	NREX	INTX
Mean	1123.29	27.198	47.610	18.838
Median	1020.84	25.750	47.915	18.635
Maximum	1696.08	41.910	65.750	35.260
Minimum	823.58	16.840	33.460	6.210
Std. Dev.	277.76	7.323	9.095	7.830
Skewness	0.92	0.414	0.006	0.326
Kurtosis	2.55	2.117	2.115	2.098
Jarque-Bera	3.92	1.587	0.848	1.341
Probability	0.14	0.452	0.654	0.511
Sum	29205.58	707.140	1237.860	489.790
S.Sq. Dev.	1928791	1340.700	2067.995	1532.994
Obs.	26	26	26	26

Note: Obs. denotes Observations. Std. Dev. represents Standard Deviation and S. Sq. Dev. also denotes Sum of Squared Deviation,

Source: Computed by Author using Data from WDI (2016) and ISSER (1990-2015) using Eviews 9.0 Package.

Table 2 : Summary Statistics of the Control Variables

	L	K	MONEY	SAV	TR
Mean	55.807	22.977	26.402	8.528	13.849
Median	55.961	23.023	27.814	7.315	15.349
Maximum	57.788	31.785	34.108	19.335	19.169
Minimum	53.417	12.800	14.142	1.258	7.417
Std. Dev.	1.450	4.455	5.612	4.772	3.973
Skewness	-0.217	-0.361	-0.475	0.588	-0.257
Kurtosis	1.704	2.988	2.286	2.519	1.570
Jarque-Bera	2.023	0.566	1.531	1.750	2.501
Probability	0.363	0.753	0.465	0.417	0.286
Sum	1450.975	597.421	686.448	221.737	360.064
S.Sq. Dev.	52.576	496.227	787.237	569.332	394.798
Obs.	26	26	26	26	26

Note: Obs. denotes Observations. Std. Dev. represents Standard Deviation and S. Sq. Dev. also denotes Sum of Squared Deviation,

Source: Computed by Author using Data from WDI (2016) and IMF using Eviews 9.0 Package.

Results of the Stationarity Test

This study first of all examined the trends of each variable graphically in order to ascertain whether they show characteristics of non-stationary series. From the diagrams in Appendix A of this study, it can be seen that all the variables showed behaviours of non-stationarity in their graphical plots at levels. However, first difference graphical plots of all variables showed signs of stationarity in Appendix B.

In order to find out the level of stationarity of each variable, a unit root test or stationarity test was undertaken via the use of an Augmented Dicky-Fuller (ADF) test and the Phillips Perron (PP) test with a null hypothesis that the series contains unit root or it is non-stationary. The test was applied at levels and in first difference with trend and intercept and with intercept only option to establish the

order of integration. In order to have a parsimonious model the Schwartz-Bayesian Criterion (SBC) was employed to determine the optimal lag length for each variable. A rejection or an acceptance of the null hypothesis was based on the Mackinnon (1991) critical values and the probability values. The P-values in this test were used to take the decision (Appiah, 2014). In the decision when P-values are higher than all the levels of significance (1%, 5% and 10%), then the null hypothesis of the presence of a unit root was accepted. However, if the P-values were lesser than any of the significance levels, then the null hypothesis is rejected in favour of the alternate hypothesis meaning there is the presence of no unit root (Stationary series).

The ADF and PP test at levels with trend and intercept can be seen in Table 3. It can be realized that the null hypothesis of a unit root series or non-stationary series is accepted in the ADF and PP test in all the variables. This confirms the initial graphical plots in Appendix A which showed a non-stationary characteristic among the variables at level.

Table 3: Unit Root Test at Levels I(0) (Trend and Intercept)

Var	ADF	(LL)	(C.V)	(P.V)	PP Stats	(B.W)	(C.V)	(P.V)
Stats								
RGDP	-2.180	5	-3.456	0.495	-1.743	4	-3.454	0.725
L	-1.407	1	-3.454	0.853	0.064	8	-3.454	0.996
K	-2.120	12	-3.460	0.580	-2.531	1	-3.454	0.313
CAPEX	-2.052	5	-3.456	0.565	-1.221	0	-3.454	0.901
NREX	-2.730	9	-3.458	0.227	-2.061	2	-3.454	0.561
INTX	-0.964	9	-3.458	0.943	-1.468	0	-3.454	0.834
SAV	-2.955	9	-3.458	0.151	-2.153	9	-3.454	0.510
TR	-2.624	9	-3.458	0.271	-2.130	0	-3.454	0.523
MONEY	-2.383	9	-3.458	0.386	-1.741	0	-3.454	0.723

Note: ***, ** and * denotes 1%, 5% and 10% significant levels respectively. Also, (LL), (CV), (BW) and (P.V) are the Lag Length, Critical Value, Bandwidth and Probability Value respectively

Source: Estimated by Author using Eviews 9.0 Package.

Since all the variables were non-stationary at levels with trends and intercepts in the ADF and PP tests in Table 3, the study went further by estimating all the variables at first difference with trend and intercept. Table 4 presents the unit root results of all the variables at first difference with trend and intercept. From Table 4 it can be seen that the real GDP (DLRGDP), Capital Expenditure (DCAPEX) and Interest-Payment Recurrent Expenditure (DINTX) were all significant at 10 percent in the ADF test, the null hypothesis of the presence of a unit root was reject, meaning the alternate hypothesis of presence of no unit root test was accepted and thus integrated at order one (I[1]).However, all the variables with the exception of the Labour Force Participation were significant at 1 percent

in the PP test in Table 4 confirming that most of the variables were all integrated at order one. This can be seen in Table 4.

Table 4 : Unit Root Test at First Difference I(1) (Trend and Intercept)

Var	ADF	(LL)	(C.V)	(P.V)	PP	(B.W)	(C.V)	(P.V)
	Stats				Stats			
DLRGDP	-3.371	4	-3.456	0.062*	-4.752	13	-3.454	0.001***
DL	-3.097	0	-3.454	0.113	-3.075	6	-3.454	0.118
DK	-2.412	12	-3.461	0.371	-4.741	14	-3.454	0.001***
DCAPEX	-3.167	12	-3.461	0.098*	-4.799	21	-3.454	0.001***
DNREX	-2.760	8	-3.458	0.216	-4.907	18	-3.454	0.001***
DINTX	-3.986	8	-3.458	0.012*	-4.868	16	-3.454	0.001***
DSAV	-2.056	8	-3.458	0.563	-6.789	101	-3.454	0.000***
DTR	-3.092	8	-3.458	0.114	-5.023	16	-3.454	0.000***
DMONEY	-2.615	8	-3.458	0.275	-5.032	17	-3.454	0.000***

Note: D represents First difference, ***, ** and * denotes 1%, 5% and 10% significant levels respectively. Also, (LL), (CV), (BW) and (P.V) are the Lag Length, Critical Value, Bandwidth and Probability Value respectively

Source: Estimated by Author using Eviews 9.0 Package.

A further estimation to ensure that the variables were stationary at an order below two was also undertaken by computing for a unit root test with intercept only at levels with the ADF and PP test. It can be seen from Table 14 in Appendix C of this study that from the ADF test, it was only Gross Domestic Savings (SAV) which was statistically significant recording a rejection of the null hypothesis of the presence of a unit root, however all the other variables were not statistically significant, meaning the null hypothesis of the presence of a unit root was accepted

(non-stationary). In the PP test, all the variables with the exception Gross Capital Formation (K) were statistically insignificant at all levels in Table 14 from Appendix C. The Gross Capital Formation was however significant at 10 percent confirming its stationarity at levels.

An advanced unit root test was also carried out in Table 15 from Appendix C of this study. A unit root test at intercept only with a first difference can be shown from the Table 15 in Appendix C. From the Table, the variables log of real GDP (DLRGDP), Total Revenue (DTR) and Interest Payment Recurrent Expenditure (DINTX) were statistically significant at 5 percent while other variables such as Labour Force Participation (DL), Capital Expenditure (DCAPEX), Non Interest Recurrent Expenditure (DINTX) and Broad Money Supply (DMONEY) were significant at 10 percent showing that their null hypothesis of the presence of a unit root is rejected while the alternate hypothesis of no unit root test is accepted (stationary). However, variables such as Gross Capital Formation (K) and Gross Domestic Savings (SAV) were not significant at all levels. The PP test from the same in Appendix C shows that all the variables were statistically significant at 1 percent with the exception Labour Force Participation (DL) which was also significant at 10 percent. Generally, the unit root tests that were undertaken shows that almost all the variables were integrated at levels I[0] or order one I[1] as depicted by the first difference graphical plots shown in Appendix B of this study. This paves the way for an Autoregressive Distributed Lag Model to be used in this study.

Lag Order Selection

After establishing that all the variables used in this study were integrated of an order less than two, this research work proceeded to the estimation of the cointegration test. However, in conducting a cointegration test, it is important to determine the appropriate order of lags on the first differenced variables. The lag length plays an important role in diagnostic test as well as in the estimation of Vector Error Correction Models (VECM). Table 5 shows the optimal lag selection criteria based on the sequentially modified LR test statistic, Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ). In order to have a parsimonious model, this study based its lag order selection on the Schwarz Information Criterion. In selecting the lag length, an unrestricted Vector Autoregression (VAR) model was first estimated before selecting appropriate lag length with the aid of the SBC selection. The Unrestricted VAR model can be shown in Appendix D of this study.

Table 5 : VAR Lag Selection Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-279.830	NA	78.143	7.196	7.434	7.291
1	-268.019	20.965	59.653	6.925	7.193	7.033
2	-266.655	2.387	59.134	6.9164	7.214	7.036
3	-262.659	6.893	54.891	6.841	7.169	6.973
4	-223.432	66.686	21.120	5.886	6.243*	6.029
5	-222.666	1.283	21.257	5.892	6.279	6.047
6	-222.084	0.959	21.496	5.902	6.319	6.069
7	-222.084	0.000	22.059	5.927	6.374	6.106
8	-216.619	8.745*	19.748*	5.815*	6.292	6.006*

Note :*indicates Lag order selected by the criterion based on the Schwarz Information Criterion

Source: Estimated by Author using Eviews 9.0 Package.

From the Table 5, the optimal lag selection is 4 based on the selection of the Schwarz Information Criterion. Therefore, this study adopted Lag 4 as its optimal lag length to undertake the cointegration test.

Bounds Test Result for Cointegration

The bounds test result can be shown in Table 6 and the F-Statistic result which was computed within the framework of an Unrestricted Error Correction Model (UECM) model was 12.80633. This exceeds the upper and lower critical bounds at all the significance level. In view of this, the null hypothesis of no cointegration among the variables used in equation (6) was rejected, hence the alternate hypothesis of the existence of a cointegration was then accepted. This suggests the existence of a long-run relationship between economic growth and its explanatory variables (Appiah, 2014). Table 6 shows the Bounds testing result for cointegration presence.

Table 6: Bounds Test Result for the Existence of Cointegration (LRGDP as dependent variable)

Critical Value	10% Level		5% Level		2.5% Level		1% Level		
Bounds									
Intercept with	I (0)	I (1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
Trend									
K = 8	1.92	2.89	2.17	3.21	2.43	3.51	2.73	3.9	
Dependent Variable								F-Statistics	
F(DLRGDP)=F (DLRGDP/L, K, CAPEX,									
LNREX, LINTRX SAV, TR, MONEY)								12.80633	

Note: K denotes the number of regressor.

Source: Estimated by Author from WDI (2016) and ISSER (1990-2015) using Eviews 9.0 package; the critical values were obtained from Pesaran et al (2001)

The presence of a long-run relationship between economic growth and the government expenditure components (thus capital expenditure (CAPEX) and non-interest (NREX) and interest payment (INTX) recurrent expenditure) alongside other explanatory variables in the model indicates the existence of an error correction mechanism, as such this research work proceeded to estimate the long-run coefficient and its short-run dynamic coefficients in the next sections.

Long-Run Estimation Results

This section presents the long-run relationship results as spelt out in the first objective of this study and provides detailed discussion based on the results. Since the aim of the study is to empirically access the relative relationship that capital expenditure, non-interest and interest payment recurrent expenditure have on the economic growth of Ghana, a long-run period can be defined in this study as that

period of time which provides enough flexibility for the government to vary its level of expenditure in order to propel the economic growth of Ghana (normally done in a Budget review in Ghana).

Since the cointegration test result in the previous section indicates the existence of a long-run relationship between economic growth and its explanatory variables, this study continued to estimate the long-run coefficients of the explanatory variables on economic growth based on the ARDL framework. In fulfilling the analysis for the first objective that seeks to estimate the existence of long-run relationships between capital expenditure and economic growth as well as that of non-interest and interest payment recurrent expenditure and economic growth of Ghana, the null hypothesis of no positive long-run relationship between capital expenditure and economic growth was tested against the alternate hypothesis of the presence of a positive long run relationship between capital expenditure and economic growth of Ghana. In addition, the null hypothesis of no positive long-run relationship between non-interest recurrent expenditure and economic growth was also test against the alternate hypothesis of a positive long-run relationship between non-interest recurrent expenditure and economic growth in Ghana. The same null hypothesis is stated between interest-payment recurrent expenditure and economic growth in Ghana. Table 7 presents the result of the long-run relationship between economic growth and explanatory variables.

Table 7: Long-Run Estimated Results (Dependent Variable: LRGDP)

Variable	Coefficient	Std. Error	T-Statistic	P-Value
L	0.253	0.037	6.790	0.000***
K	0.020	0.005	3.856	0.000***
CAPEX	0.047	0.004	11.372	0.000***
LNREX	0.668	0.189	3.528	0.001***
LINTX	-0.185	0.074	-2.507	0.014**
TR	0.131	0.019	6.787	0.000***
SAV	-0.030	0.006	-4.731	0.000***
MONEY	0.093	0.007	13.800	0.000***
C	-8.454	1.836	-4.604	0.000***

Note: ***,**, and * denotes statistical significance levels at 1%, 5%, 10% respectively. For the Variables:

Source: Estimated from WDI (2016), IMF and ISSER (1990-2015) data using Eviews 9.0 package

Discussion

The long-run results as shown in Table 7 indicate that the coefficients of Labour Force Participation (L), Gross Capital Formation (K), Capital Expenditure(CAPEX) Log of Non-Interest Recurrent Expenditure (LNREX), Total Revenue (TR) and Broad Money Supply (MONEY) were all significant at 1 percent and met their a priori expectations with the exception of Gross Domestic Savings (SAV) which was significant at 1 percent but failed to attain the a priori expectation. However, the coefficient for Interest-Payment (INTX) was significant at 5 percent but failed to meet its a priori expectation.

Focusing on the coefficients of the variables, it can be observed that the Aggregate Production Function which was employed as the basic theory for this study was justified as the appropriate model to explain economic growth in the Ghanaian economy. This was because Labour (L) and Capital (K) inputs which were used as the conventional inputs in the model were found to be statistically significant at 1 percent and were in line with the a priori expectations. The positive coefficients for these conventional inputs were in line with the works of Adu and Ackah (2015) that also adopted the same model and concluded that such a result was expected since the Ghanaian economy is characterised by more labour-intensive method of production and few of capital intensive method. The coefficient for labour input indicates that a percentage increase in labour force participation will increase economic growth by 25.3 percent in the long run. Furthermore, capital input's coefficient also indicates that a 1 percent increase in gross capital formation will increase economic growth by 2 percent in the long run. The work of Appiah (2014) and Appiah-Konadu et al. (2016) as well as Adu and Ackah (2015) in Ghana confirmed this positive long run relationship.

Another observation about the long-run results was the sign of the coefficient of capital expenditure (CAPEX) which was one of the main variables of interest. The result indicates that the sign of the coefficient for capital expenditure was positive and in line with the a priori expectation and statistically significant at one percent. Specifically, the coefficient indicates that a one percent increase in capital expenditure in the long-run will increase economic growth by 4.7 percent holding all other variables constant. This result confirmed the viewpoint of the

Keynesian growth model which advocates for the usage of government expenditure to serve as investment which increases production and then to boost economic growth (Ackah et al, 2014). Moreover, most successive governments invest in capital projects which are mostly public goods have higher social returns than private returns due to its associated market failure which can be encountered when undertaken by private investors ((Stiglitz, 1989; Appiah 2014). Investment in capital projects like roads, schools, buildings, factories which are public goods are associated with positive externalities to the society due to its non-rivalry and non-excludable characteristics. Private provision of such capital goods is sub-optimal and creates a vacuum for further improvement that can be filled only through financing from government (Stiglitz, 1989; Appiah 2014). Besides an empirical work by Bose et al., (2007) on a panel data of 30 developing countries confirmed the positive relationship between capital expenditure and economic growth. In addition, Appiah (2014) also estimated the disaggregated government expenditure on economic growth and concluded that capital expenditure has a positive relationship with economic growth in Ghana. However, the works of Adu and Ackah (2015) in Ghana and Modebe et al., (2012) in Nigeria had a negative long-run relationship between the variables.

Switching to the sub-components of Recurrent Expenditure, the non-interest recurrent expenditure (LNREX) from Table 7 shows that the variable was statistically significant at 1 percent and recorded a positive sign for its coefficient as expected. It can be inferred from the coefficient of the variable that in the long-run, a one percent increase in non-interest recurrent expenditure will increase

economic growth by 0.668 percent holding all other variables constant within the Ghanaian economy. This positive long-run relationship is also in line with the Keynesian growth theory which advocates that government interventions in the form of public expenditure enhances production which improves growth in the economy. Furthermore, in a disaggregated analysis of government expenditure on economic growth in Ghana by Adu and Ackah (2015), the study revealed the same long-run positive relationship between recurrent expenditure and economic growth. Ayinde, Kuranga and Lukeman (2015) also employed the Principal Component Estimator to correct for multicollinearity and concluded on the same result. However, the study suggested the re-evaluation and re-assessment of the direction of recurrent expenditure.

Interest-Payment, another sub-component of the recurrent expenditure was also considered as one of the main variable of interest in this study. The coefficient for interest-payment (LINTX) from Table 7 revealed that its sign is negative and in line with the a priori expectation and statistically significant at 5 percent. The coefficient indicates that a one percent increase in interest payment will lead to a reduction in economic growth by 0.185 percent in the long-run period. The negative relationship could be attributed to the rising government borrowings to finance budget deficits recently (IFS, 2016). The increased government borrowings (especially domestically) have pushed up other interest rates in the economy and thereby causing an increase in the cost of credit and reducing the volume of investment, hence negatively affecting production which retards growth in the

country. This result is confirmed by Mensah and Okyere (2015) that concluded that interest rate has a negative relationship with economic growth in Ghana.

The Total Revenue (TR) of the country was also considered as one of the control variables in this study. From Table 7, it can be seen that the variable is statistically significant at one percent and in line with the a priori expectation of this study. The coefficient of variable implies that in the long-run, a one percent increase in the total revenue of the country will increase economic growth by 13.1 percent holding all other variables constant. The positive relationship could be justified by the fact that government's revenue in the form of taxes is used to finance infrastructure projects in the various sectors of the economy in the long-run (Appiah, 2014). The result is also confirmed in a study by Jones, Ihendinihu and Nwaiwu (2015) in Nigeria.

This study also considered gross domestic savings (SAV) as one of the explanatory variable to explain the variables in economic growth in Ghana. The long-run estimate from Table 7 indicates that the gross domestic savings was significant at one percent and not in line with the a priori expectation of this study. Specifically, the result from the Table 7 shows that a one percent increase in gross domestic savings will in the long-run decrease economic growth by 3 percent holding all other factors constant. This result defies the idea behind the Solow growth model which specifies that the capacity to grow relies on the country's ability to save in the country. The works of Nwanne, (2014) in Nigeria confirms this relationship and that of Mesfin, (2016) also concluded on a negative relationship when the study estimated the savings and economic growth

relationship in Ethiopia. On the contrary, a research work by Mehmood (2012) in Pakistan and Bangladesh concluded on a positive long-run relationship between gross domestic savings and economic growth.

Broad Money Supply, another control variable in this study was also significant at 1 percent and had a positive sign for its coefficient which was in line with the a priori expectation. The coefficient for the variable can be interpreted as a percentage increase in broad money supply in the long-run will increase economic growth by 9.3 percent holding all other variables constant. Thus, an increase in money supply will reduce interest rate and enhance investment by lowering the cost of investment. This increases production and propels economic growth in the country according to the IS-LM model. Empirically, a study in Nigeria by Usman et al., (2014) confirmed a positive long-run relationship between broad money supply and economic growth. The study therefore attributed the relationship to credits extended by deposit money banks to the private sector. However, a study by Alhassan (2014) in Ghana found a positive relationship and concluded that the potency of monetary policy in influencing real GDP is limited since important channels for monetary transmission are not fully functional in Ghana.

From the long-run result, the error correction term was generated as follows:

$$ECM = \log(RGDP) - (0.253*L + 0.020*K + 0.047*CAPEX + 0.668*LNREX - 0.185*LINTX + 0.131*TR - 0.030*SAV + 0.093*MONEY - 8.454*C)$$

Results of the Short-Run Dynamic Model

This section provides the results and analysis of the short run relationship between capital expenditure and economic growth and that of the sub-components of recurrent expenditure (non-interest and interest payment) and economic growth in Ghana. Since this study used a quarterlized data, it defines a short-run period as such a period which is three months. Specifically, it is that type of period in which the government cannot vary all the spending components of public expenditure within the economy. The presence of a cointegration relationship between the variables suggests the estimation of an Error Correction Model (ECM) that captures the dynamics of the short run system and its coefficient measures the speed of adjustment to attain equilibrium in the event of shocks to the system (Adu & Ackah, 2015). It is important to stress that the sign of the coefficient for the ECM shows how fast the variable converges to equilibrium as a result of a shock. In addition, the coefficient should be statistically significant with a negative sign (Appiah, 2014). The negative sign shows that any shock that happens in the short-run will be corrected in the long-run. If an error term is high in absolute terms it indicates a faster convergence to equilibrium (Acheampong, 2007). Furthermore, a high significant error correction term further confirms the presence of a long-run relationship (Bannerjee & Mestre, 1998).

This analysis tests the third and fourth hypothesis of this study which are the null hypothesis that government capital expenditure does not have a positive short-run relationship with the economic growth of Ghana and the null hypothesis that government recurrent expenditure sub-components (thus non-interest and

interest payment) do not have a positive short-run relationship with the economic growth of Ghana. Table 8 presents a parsimonious short-run estimated error-correction model which is selected based on the Schwarz Bayesian Criterion (1,3,0,4,1,0,4,1) lag selection on the ARDL model. However, the full short-run estimate can be found in Table 17 of Appendix D.

Table 8: Estimate of the Short Run Results (Dependent Variable LRGDP)

ARDL (1,3,0,4,1,0,4,1) selection on SBC

Variable	Coefficient	Std. Error	T-Statistics	P-Value
D(K)	0.005	0.003	2.110	0.038**
D(L)	-1.199	0.350	-3.426	0.001***
D(L(-2))	0.840	0.327	2.569	0.012**
D(LINTX)	-0.179	0.037	-4.783	0.000***
D(CAPEX)	0.006	0.002	3.863	0.000***
D(CAPEX(-1))	-0.005	0.002	-2.949	0.004***
D(CAPEX(-2))	-0.006	0.002	-3.220	0.002***
D(CAPEX(-3))	-0.006	0.002	-3.432	0.001***
D(LNREX)	0.233	0.123	1.891	0.062*
D(SAV)	-0.013	0.002	-5.274	0.000***
D(TR(-1))	-0.016	0.005	-3.044	0.003***
D(TR(-2))	-0.016	0.005	-3.014	0.004***
D(TR(-3))	-0.013	0.005	-2.453	0.016**
D(MONEY)	0.035	0.003	10.766	0.000***
ECM(-1)	-0.194	0.022	-9.010	0.000***

Note: ***, **, and * denotes statistical significance levels at 1%, 5%, 10% respectively. D denotes first difference

Source: Estimated from WDI (2016), IMF and ISSER (1990-2015) data using Eviews 9.0 package

Discussion

From Table 8, the coefficient of the lagged error correction term (ECM_{t-1}) was estimated to be negative and statistically significant at one percent. This specifically confirms the presence of a cointegrating relationship between the variables in the model. The error correction model represents the rate of adjustment to restore equilibrium in the dynamic model after been affected by a disturbance (Appiah, 2014). Thus, it implies that a shock to the model in the previous quarter returns to equilibrium in the long-run. The coefficient of the error correction term was -0.194 implying that about 19.4 percent of the deviations from the long-run economic growth caused by previous quarter's shock converges back to the long-run equilibrium in the current quarter. Thus, the study shows that the variables used in this model exhibits evidence of a slow response to equilibrium when shocked in the short-run.

Shifting to the coefficients for the short-run results, it can be realised that Labour force participation from Table 8 was significant at 1 percent for the current but the sign for its coefficient failed to be in line with the a priori expectation. However, its second lag value was significant at 5 percent and in line with the a priori expectation. Specifically, Larbi (2012) attributed such negative relationship for the current value of the labour variable to the low quality of labour force in the country as such productivity at the initial stages of their employment is very low due to the lack of skills and experience. The second lag coefficient value was

positive due to the accumulation of skills and experience that labour acquired in the previous period which helps him or her to function better at the workplace. This positive relationship is confirmed by Arkah et al., (2014) and Appiah-Konadu et al., (2016).

The result from Table 8 also confirms the a priori expectation that gross capital formation contributes positively to the growth of output. The variable was however significant at 5 percent. Specifically, the coefficient indicates that a percentage increase in gross capital formation will increase economic growth by 0.5 percent in the short-run period. The positive sign of the coefficient indicates that the capital stock of the country has the potential of contributing positively to economic growth in Ghana. Theoretically the result is also confirmed by the classical economic theory that regards capital stock as an important contributor to production in an economy.

Government Capital Expenditure (CAPEX), one of the main variables of interest in this study was found to be significant at 1 percent and positive as expected for its current value but the sign for its lags (thus lag 1,2 and 3) were negative and was found contrary to the a priori expectation though they were all statistically significant at 1 percent. The current coefficient value for CAPEX indicates that a one percent increase in government capital expenditure in the short run will increase economic growth by 0.6 percent when all other variables are held constant. This positive relationship in the current value was also found in the works of Onakya and Somole (2013), Appiah (2014) and Aigheyisi (2013) .It also buttresses the viewpoint of the Keynesian growth theory. Furthermore, the first lag

coefficient of CAPEX suggests that in the short-run a percentage increase in previous quarter's capital expenditure will decrease economic growth by 0.5 percent in the economy. Also, the second lag coefficient of capital expenditure indicates that a one percent increase in capital expenditure will decrease economic growth by 0.6 percent in the second lag series holding all other variables constant. And similarly, the third lag's coefficient of capital expenditure also indicates that if capital expenditure increases by one percent, it will decrease economic growth by 0.6 percent in the third lag series when all other variables are held constant in the short-run.

The negative lagged effect of government capital expenditure suggests that there are some other capital projects that may experience a gestation period before they can contribute positively to the economy. As such they may not contribute positively during the initial stages of their establishment. For instance, it takes some time for the contribution of a newly established educational institute to be felt in the economy. However, the works of Aladejare (2013) and Adu and Ackah (2015) confirms this negative relationship. Adu and Ackah (2015) attributed the negative relationship to the lack of proper procurement process to purchase the right type of materials for capital projects. Besides most funds are normally diverted to the personal interest of most individuals in-charge of such projects (Adu & Ackah, 2015).

This study was also interested in the short-run relationship between government non-interest recurrent expenditure (LNREX) and economic growth of Ghana. It can be observed from Table 8 that non-interest recurrent expenditure in

the short-run was statistically significant at 10 percent. Also, the sign for its current coefficient value was positive and in line with the a priori expectation. Specifically, the coefficient value shows that in the short-run period a percentage increase in non-interest recurrent expenditure will increase economic growth by 0.233 percent when all other variables are held constant. The result indicates that non-interest recurrent expenditure is efficient in propelling the growth of the economy through production in the short-run period. Non-interest recurrent expenditure which is dominated in Ghana by wages and salaries due to the implementation of the Single Spine Salary Scheme (FWSC, 2013) serves as an incentive which motivates public service workers to offer their best at workplaces to improve upon the performance of their workplaces. A study by Aigheyisi (2013) on the relative impacts of federal capital and recurrent expenditures on Nigeria's economy from 1980-2011 also confirms the positive short-run relationship between recurrent expenditure and economic growth in Nigeria. However, a research by Appiah (2014) in Ghana concluded on a negative short-run relationship.

Interest-Payment recurrent expenditure (LINTX), was also considered as one of the variable of interest in this study. The variable was significant at 1 percent, negative and in line with the a priori expectation. It can be inferred from its coefficient that in the short-run, as interest payment recurrent expenditure increases by a percentage, economic growth decreases by 0.179 percent when all other variables are held constant. The result is not surprising due to the fact that rising public debts which are as a result of cheaper external debt as compared to domestic debt (IFS, 2016) has contributed to the country's debt accumulation and this has

compounded the interest payment on these debts. According to the Institute For Fiscal Studies (2016), interest payment has become a major contributory factor behind the country's fiscal deterioration besides wages and salaries in the economy.

Total Revenue (TR) to the government was also used as one of the control variables in this study. From Table 8, the value for its lagged coefficients were all significant and had negative signs which were against the a priori expectation. Specifically, from Table 8 the lag one coefficient for total revenue indicates that as previous quarter period's total revenue increases by one percent, it leads to a reduction in economic growth by 1.6 percent in the short-run. In the same way, the lag two coefficient also shows that in the short-run a one percent increase in total revenue reduces the growth of the economy by 1.6 percent in the second lag period. Also, for the lag three coefficient, it suggests that a one percent increase in total revenue in the third lag period will reduce economic growth by 1.3 percent. The negative values for the coefficients for total revenue could be attributed to the long bureaucratic nature of revenue administration especially in the tax administration before it enters into the expenditure stream of the economy. According to Twumasi (2012), the principal source of government revenue in Ghana is the taxes which forms about two-thirds total government revenue.

Gross domestic savings (SAV) was also considered as one of the control variables in this study. The coefficient values for the variable from Table 8 were statistically significant at 1 percent for its value. However, the sign for its coefficient was contrary to the a priori expectation. Specifically, the coefficient value for SAV indicates that as gross domestic savings increases by one percent in

the short run it leads to a reduction of economic growth by 1.3 percent in the country. The result once again defies the Solow Growth model that stressed that the capacity for a country to grow depends on its savings. However, such a result could happen especially when savings do not enter into production as a form of investment. Though studies such as Larbi (2013) and Mesfin, (2016) confirmed the negative relationship, Misztal (2011) in a study among developing countries concluded on a positive relationship. Also, a study by Acheampong and Owusu (2015) in Ghana on the relationship between gross domestic savings and economic growth provides evidence to support this positive relationship.

Finally, the coefficient of Broad Money Supply (MONEY) from Table 8 was also significant at 1 percent besides, the sign for its coefficient was in line with the a priori expectation. From Table 8, the coefficient value of the variable postulates that in the short-run the economy will grow by 3.5 percent following a one percent increase in broad money supply in Ghana. It can be inferred from the IS-LM model that as money supply increases, the rate of interest falls causing investment to increase and this improves production which then propels economic growth. Usman et al., (2014) studied on broad money supply, foreign exchange rate regimes and economic growth in Nigeria and concluded that broad money supply was positively related to the Nigerian economy.

Model Diagnostic and Stability Test

In order to avoid bias estimate in the results, this study conducted diagnostic tests. Most estimated parameters of a time series data can differ over time (Hansen, 1992) , as such it is vital to undertake parameter tests to be sure that there is no

model misspecification that can emerge from unstable parameters. Table 9 provides the goodness of fit of the model while Table 10 presents the diagnostic tests for the model. The goodness of fit determines how well the model fits the set of observations used in this study.

Table 9 : Summary Statistics of the Regression

R-squared	0.862299	F-statistic	13.73629
Adjusted R-squared	0.799524	Prob (F- statistic)	0.000000
S.E. of regression	0.027565	Mean dependent Variable	0.012123
Sum squared resid.	0.051668	S.D. dependent Variable	0.061564
Log likelihood	236.5104	Schwarz Criterion	- 3.752813
Durbin-Watson Stat.	1.986125		

Note: Prob denotes Probability, Resid denotes Residuals, Stat. denotes Statistics, Log denotes Logarithm

Source: Computed by the author using Eviews 9.0 Package

Table 10: Model Diagnostics

Test Statistics		F-statistics	Probability Value
Serial Correlation	X^2_{auto}	F (2,66)0.145309	0.8650
Functional form	X^2_{Reset}	F (1,67)0.962649	0.3301
Normality Test	X^2_{Norm}	Not Applicable	0.7564
Heteroskedasticity	X^2_{BP}	F (15,68)0.961808	0.5350

Source: Computed by the author using Eviews 9.0 Package

From Table 9, the R-squared value of 0.862299 indicates that about 86% of the total variation in economic growth is explained by the government expenditure components and the other control variables in the model. This indicates that the explanatory variables used in this study are good predictors of economic growth in

Ghana. Furthermore, the R-adjusted which compensates for addition of variables and only increases if the new variable enhances the model was 0.799524. This shows that about 80 percent of the explanatory variables contributed in enhancing the model. Table 9 also shows the F-statistic which shows the joint significance of the model which is significant at one percent and has a value of 13.73629. This supports the fact that the explanatory variables used are good predictors of economic growth in Ghana. The presence of autocorrelation in the residuals was also test using the Durbin-Watson (DW) statistic test. The value of the test was 1.986125 which is approximately two (2), the threshold-point for the absence of autocorrelation. This therefore indicates the absence of autocorrelation in the model. Moreover, the value of the DW test is greater than the adjusted R-squared confirming the absence of a spurious regression for the model.

From the diagnostic test in Table 10, it can be seen that the study tested for the serial correlation of the model. This was done with the aid of the Breusch-Godfrey serial correlation test. It can be seen that it had an F-statistics of F (2,66) 0.145309 and a probability of 0.8650 which was statistically insignificant. This indicates that the null hypothesis of no serial correlation was accepted showing that the variables in the model are serially uncorrelated confirming the result from the Durbin Watson test.

It can also be realised that the model was devoid of non-normal distribution as indicated by the probability of the normality test which was 0.7564 and therefore insignificant. Thus, the null hypothesis of a normal distribution is accepted to indicate that the errors are normally distributed. The heteroskedasticity test was also

undertaken as one of the diagnostic test with the aid of a Breusch-Pagan-Godfrey test. The test has an F-statistic of $F(15,68) = 0.961808$ and with a probability of 0.5350. As such the null hypothesis of a constant variance is accepted. This indicates that the variance of the error term is constant and as such the consequences of heteroskedasticity which are biased standard errors and biased parameter estimates does not exist in this study.

The Regression Specification Error Test (RESET) developed by Ramsey (1969) was also undertaken to ascertain whether the model was correctly specified. From Table 10, it can be realised that with an F-statistic of $F(1,67) = 0.962649$, the probability of the model's functional form was 0.3301 and therefore insignificant. In view of that the null hypothesis of a correctly specified model is accepted meaning the model is correctly specified. Furthermore, this shows that the model is devoid of the presence of an omitted variable and incorrect functional form.

Finally, this study further adopted the Cumulative Sum (CUSUM) and Cumulative Sum of Square Recursive Residuals (CUSUMSQ) test to check for the stability of the entire model (Pesaran and Pesaran, 1997). Specifically, the CUSUM test is usually used in complement with the CUSUMSQ test to determine when a structural change clearly occurs within the study period of the model (Tanizaki, 1995). The plot of the CUSUM test indicates that all the coefficients of the estimated model were stable within the study period (Appiah, 2014). This can be shown in figure 12:

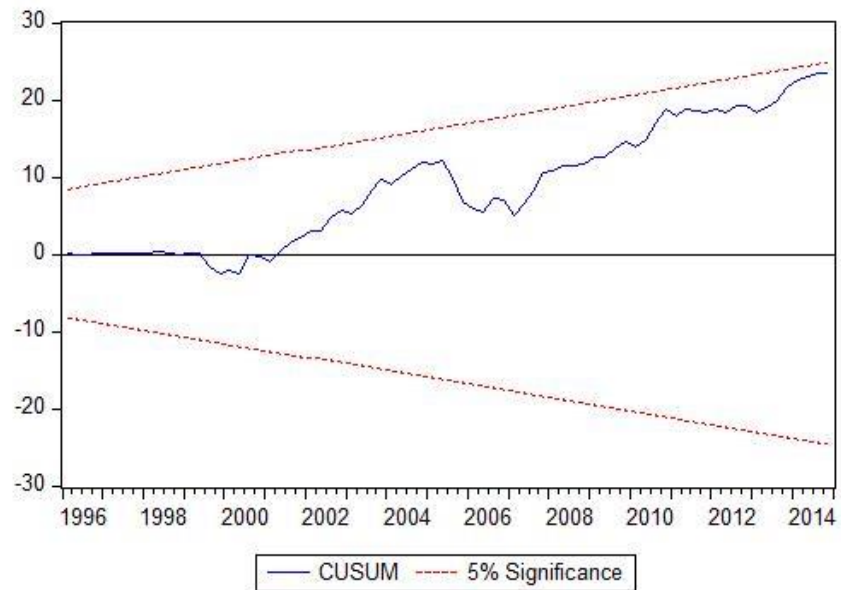


Figure 12: A plot of Cumulative Sum of Recursive Residuals

Note: Vertical Axis variable is the residuals and horizontal Axis is the years in quarters.

Source: Generated by the Author using Eviews 9.0 Package

From figure 12, it can be realised that the test lies between the critical bounds at a 5 percent significance level. This indicates that the coefficient vector is the stable within the study period and shows a convergence. In addition, a complement test to this test is the Cumulative Sum of Square test (CUSUMSQ). From figure 13, it can be seen that the test lies between the critical interval. This implies that the model is stable for the study period. In view of these two tests, it can be concluded that the model is stable.

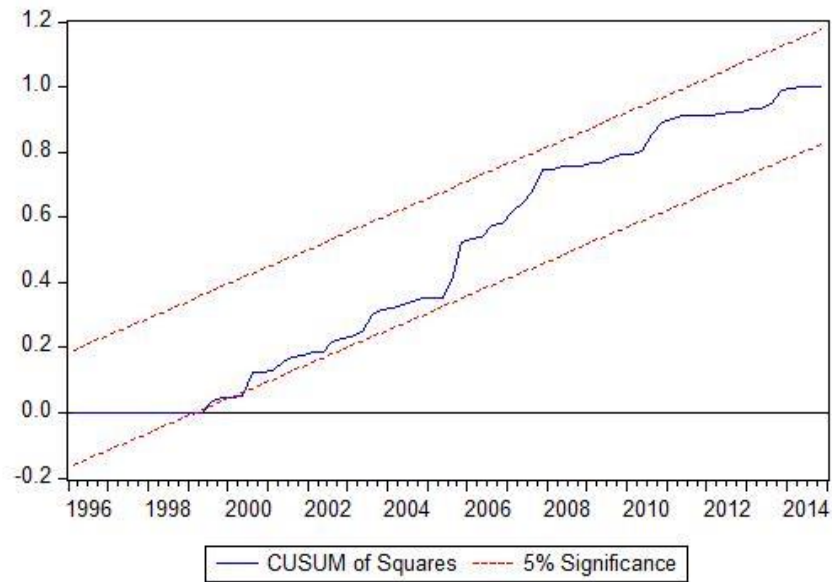


Figure 13: A plot of Cumulative Sum of Squares of Recursive Residual
Note: Vertical Axis variable is residuals and horizontal Axis is years in quarters.
Source: Graphed by the Author using Eviews 9.0 Package

Granger Causality Test

The third objective of this study seeks to investigate the direction of causality that lies between capital expenditure and economic growth within the Ghanaian economy as well as the sub-components of recurrent expenditure (non-interest and interest payment) and economic growth in Ghana. Using the Granger Causality test which was developed by Engle and Granger (1987), this section tests the null hypothesis of no causal relationship between government capital expenditure and economic growth as against the alternate hypothesis of the presence of a causal relationship between government capital expenditure and economic growth of Ghana. And the null hypothesis of a no causal relationship between recurrent expenditure sub-components and economic growth as against the alternate hypothesis of a causal relationship between recurrent expenditure sub-

components and economic growth. The Granger Causality test by definition is a statistical hypothesis for determining whether one-time series variable is useful in forecasting another variable (Engle & Granger, 1987). Table 11 shows the Granger causality test between capital expenditure and economic growth.

Table 11: Granger Causality Test (Between CAPEX and RGDP)

Null Hypothesis	F-Statistic	Prob	Remarks
CAPEX does not granger cause RGDP	5.45827	0.0931*	H_0 rejected
RGDP does not granger cause CAPEX	0.35052	0.9449	H_0 accepted

Source: Estimated from WDI (2016) and ISSER (1990-2015) data using Eviews 9.0 package.

Note: * denotes 10 % significance level, Prob represents Probability, CAPEX denotes Government Capital Expenditure and RGDP denotes Real Gross Domestic Product.

Based on the Granger Causality result from Table 11, the null hypothesis which spells out that government capital expenditure does not granger-cause real GDP is rejected at 10 percent significance level, meaning the alternate hypothesis which states that government capital expenditure granger-causes real GDP is accepted. Subject to this a unidirectional nature of government expenditure components can be identified here as the direction of causality runs from government capital expenditure to economic growth of Ghana. This shows that as government keeps on increasing expenditure on capital projects, they serve as investment which increases production and this enhances the growth of the economy. This result was also found by Nasiru (2012) in Nigeria.

This study also examined the causal relationship between government non-interest expenditure and economic growth. This can be shown from Table 12 that at five percent significance level, the null hypothesis that government non-interest recurrent expenditure does not granger cause real GDP is rejected, meaning the alternate hypothesis that government non-interest recurrent expenditure rather granger causes real GDP is accepted. Furthermore, the null hypothesis that real GDP does not granger cause government non-interest recurrent expenditure is accepted as its probability remained statistically insignificant at all levels. This result provides a clue that there is once again a unidirectional causality running from government non-interest recurrent expenditure to economic growth. It indicates that the government continues to finance non-interest recurrent expenditure in the form of Personal Emoluments, Administration and Service expenses, Transfers and Utility Price Subsidies, and this enhances production in the country which fosters economic growth in Ghana.

Table 12: Granger Causality Test (Between NREX and RGDP)

Null Hypothesis	F-Statistic	Prob	Remarks
NREX does not granger cause RGDP	4.02671	0.0052**	H_0 rejected
RGDP does not granger cause NREX	0.74439	0.5648	H_0 accepted

Source: Estimated from WDI (2016) and ISSER (1990-2015) data using Eviews 9.0 package.

Note: ** denotes 5 % significance level, Prob represents Probability, NREX denotes Government Non- Interest Recurrent Expenditure and RGDP denotes Real Gross Domestic Product.

Furthermore, this study also estimated the causal relationship between Interest-Payment recurrent expenditure and economic growth in Ghana. From

Table 13, the null hypothesis that interest payment recurrent expenditure does not granger-cause real GDP is accepted since its probability was insignificant. This means that interest payment does not cause the growth of the economy. However, from Table 13 at 10 percent significance level, the null hypothesis that real GDP does not granger cause interest payment recurrent expenditure is reject. This suggest that the alternate hypothesis that real GDP granger causes interest payment is therefore accepted. Thus, an increase in real GDP also increases the amount of revenue that the government receives. This causes the government to increase its payment of interest on the public debt of the country.

Table 13: Granger Causality Test (Between INTX and RGDP)

Null Hypothesis	F-Statistic	Prob.	Remarks
INTX does not granger cause RGDP	0.74439	0.5648	H_0 accepted
RGDP does not granger cause INTX	1.83277	0.0480*	H_0 rejected

Note: * denotes 10 % significance level, Prob. represents Probability, INTX denotes Government Interest-Payment Recurrent Expenditure and RGDP denotes Real Gross Domestic Product.

Source: Estimated from WDI (2016) and ISSER (1990-2015) data using Eviews 9.0 package.

These results from Table 11, 12 and 13 shows that government expenditure serve as significant sources of economic growth in the economy with the exception of interest-payment. Though the result for capital expenditure and non-interest payment on economic growth defies the idea of the Wagner’s Hypothesis, it rather supports the Keynesian viewpoint of government expenditure fuelling real GDP growth. (Ackah et al, 2014). However, the Wagner’s law holds in the relationship

between interest-payment and economic growth whereby causality runs from real GDP to interest-payment recurrent expenditure. An objective observation of the Ghanaian economy shows that government expenditure plays a decisive role in improving and serving as an investment which increases production of goods and services which then enhances economic growth in Ghana. But as the country's real GDP improves, it uses part of its revenue generated to service the interest on its public debt.

Conclusion

This chapter was dedicated to the empirical estimation of the relationships between government capital expenditure and economic growth as well as the sub-components of recurrent expenditure and economic growth. In view of that tables and graphical presentations coupled with discussions of the result of this study were presented in this chapter. From the chapter, descriptive statistics for each variable were provided to show the basic features of the variables used.

Furthermore, the Augmented Dicky-Fuller test and the Phillips Perron test were used to ascertain which variable had unit root or not. From the estimation, most of the variables were stationary at their first difference with the exception of gross domestic saving which was stationary at levels with intercept only. In view of this, an ARDL bounds testing approach as proposed by Pesaran et al., (2001) was employed to test the long-run relationship between the government expenditure components and economic growth. The result showed the presence of a long-run relationship among the variables.

In view of that, this study further estimated the long-run and short-run relationships between the variables of interest and economic growth. The result from the long-run relationship revealed that while non-interest recurrent expenditure was positively related to economic growth, interest payment on public debt retards economic growth. Capital expenditure on the other hand was also positively related to real GDP in the Ghanaian economy. In addition, all the other control variables with the exception of gross domestic savings were positively related to real GDP in the long-run period. For the short-run period, non-interest recurrent expenditure remained positive to real GDP. Same situation can be said in terms of capital expenditure's current coefficient however its lagged coefficient values were all negatively related to real GDP. Not surprising, interest payment on debt remained negative once again to real GDP in the short-run. In addition, the current values for labour force participation was negative while its lag two value was positive in relation to real GDP while gross capital formation was also significant and positively related to real GDP in Ghana. For the other control variables, the lagged values for total revenue were significant and negatively related to real GDP while for gross domestic savings, its coefficient was negatively related to the growth of the economy. For broad money supply, its coefficient was positively related to economic growth in Ghana.

The ARDL model based on an SBC selection showed that the error correction term (ECM_{t-1}) recorded the expected negative significant sign, however its low value suggests a slow recovery into equilibrium from a shock in the previous quarter. The test also revealed that the independent variables used had

higher explanatory power and based on the Durbin-Watson statistic, the model was devoid of autocorrelation. The diagnostic tests for the entire model revealed that it passes the tests of serial correlation, functional form, normality test and heteroskedasticity test based on their probabilities of their F-statistics. In addition, the CUSUM and CUSUMSQ tests revealed that the model was stable as the tests passed through the 5% significance levels for both. Meanwhile, the Granger causality test results also revealed that both government non-interest recurrent expenditure and capital expenditure had a unidirectional causality with economic growth. Meaning the causality runs from non-interest recurrent expenditure and capital expenditure by government to economic growth of Ghana within the study period. However, for interest payment and real GDP, causality runs from real GDP to interest payment confirming the Wagner's Law.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This final chapter provides the summary, conclusions and recommendations of this study. To present a concise overview of the research problem, its purpose, methodology and empirical findings, a brief summary of the study is initially presented. This is followed by the conclusion part which deals with the entire outcome of the study with respect to their corresponding hypothesis stated previously in chapter one. Specific policy recommendations which are addressed to specific public institutions are also provided in the next section. It finally concludes by unveiling its limitations encountered and suggest some further directions for future research within the area of public expenditure and economic growth of Ghana.

Summary

In every developing country such as Ghana, one important aspect of the economy that drives economic growth is the government's investment in the form of public expenditure. Government expenditure by definition refers to all the spending on goods and services to satisfy the basic needs of all economic agents within the country. A glance at the World Bank's World Development Indicators (2016) and data from the Ministry of Finance shows that while government expenditure is increasing at an increasing rate, the level of economic growth has stagnated until 2011 where Ghana recorded a growth rate of 14.5% due to the

production of oil in commercial quantities (Adu & Ackah, 2015). As such many studies have delved into the relationship between government expenditure and economic growth. Other studies have also advanced further by disintegrating government expenditure into recurrent and capital expenditure and have concluded that recurrent expenditure though higher than capital expenditure is not effectively stimulating growth in the economy. However, it is important to note that a critical analysis by considering the sub-components under these major components of public expenditure will provide a definite insight about the actual performance of public expenditure to policy makers (Appiah, 2014).

Subject to this idea, this current study considered the major sub-components under recurrent expenditure namely; non-interest and interest payment recurrent expenditures and their relationship with economic growth. Most research studies have failed to consider the performance of these major sub-component of recurrent expenditure which together receives the highest share of government expenditure as compared to capital expenditure (from figure 1) and their performance with economic growth in Ghana. Though a further consideration of the sub-component in capital expenditure would also be useful for policy formulation, this study considered only the entire capital expenditure component due to the non-availability of data and estimated its relationship with economic growth in Ghana. In addition, it is important for policy makers to know empirically the direction of causality between capital expenditure and economic growth as well as that of these sub-components of recurrent expenditure and economic growth in order for them to reconsider their policies that tackle the source of economic growth in Ghana. The

government currently has set up a capital expenditure of 12.6 percent of total expenditures (Ministry of Finance, 2017), while the remaining total expenditure goes into recurrent expenditure as such this study addresses whether or not this capital expenditure and recurrent expenditure sub-components are effective in propelling the growth of the economy.

Extensive theoretical studies concerning the relationship between public expenditure and economic growth have concluded on diverse findings. Mention can be made of the Wagner's Law which concluded that public expenditure is a behavioural variable which response positively whenever there is an improvement in economic growth in a country. However, Peacock and Wiseman rejected the assertion by the Wagner's Law but stressed that the decision to spend on the economy by the government is influenced by the wishes of the people. The Solow growth model also stressed on the capacity to grow which depends on the ability to save through government and private expenditures as investment. Furthermore, while the viewpoint of the Keynesian theory is the intervention of government through public expenditure to improve the economy, the classical theory of growth stresses on a laissez-faire system (non-governmental intervention) within the economy.

Empirical studies concerning the relationship is quite extensive. Both country-specific studies and cross-country studies have concluded on diverse findings. As such there still remains little by way of knowledge concerning the allocation of public expenditure components which helps to shape the prospects of economic growth for this particular country. Country-specific time series, although

cannot be generalised to other countries are more informative in analysing macroeconomic variables within an economy. In this view, this research study was specific on the Ghanaian economy owing to the fact that empirical literature on the relationship have not been able to extend their analysis on the sub-components of public expenditure particularly the recurrent expenditure of Ghana.

The variables used in this study were initially described to know their basic features in a summary statistical form. This was followed by the unit root or stationarity test using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to ascertain whether the variables were stationary or not. The ADF and PP tests and preliminary graphical illustrations all indicate that most of the variables were integrated at order one while another variable was integrated at levels and this satisfied the pre-condition for using an ARDL approach to cointegration. The study proceeded to test for the presence of cointegration using the bounds testing approach as proposed by Pesaran and Pesaran (2001). After establishing the presence of a long-run relationship (cointegration), the coefficients for both the long-run and short-run relationship for the variables were then examined.

The results for the cointegration test suggests the presence of a long-run relationship among the variables of interest. Furthermore, the estimates for the long-run period indicates that capital expenditure and non-interest recurrent expenditure propel economic growth while interest payment recurrent expenditure retarded economic growth in Ghana. In addition, all the control variables were positively related to the growth of the economy with the exception of gross domestic savings which had a negative relationship with economic growth.

Furthermore, while the past values for capital expenditure retards economic growth in the short run, its current value rather contributes positively to economic growth in the short-run period. Also, non-interest recurrent expenditure in the short-run period also promotes economic growth while interest-payment recurrent expenditure has a negative relationship with economic growth in the short-run. For the control variables used in this study, the lags of total revenue were all negatively related with the growth of the economy in the short-run. Moreover, for the other control variables, while gross domestic savings was negatively related to real GDP, there was a positive relationship between broad money supply and economic growth in the short-run period. In addition, the error correction term from the estimation was negative and significant as expected. However, its low magnitude shows that the economy will be able to recover at a slow rate from the previous quarter period's shock. Specifically, the magnitude of the error correction term indicates that 19.4 percent of the deviations from the long-run economic growth caused by previous quarter's shock converges back to the long-run equilibrium in the current quarter period.

The model diagnostics and stability tests were further undertaken to ensure that the results from the estimation were robust and not biased. The test according to the F-statistics indicates that the model satisfied all the test statistics (thus Serial Correlation, Functional form, Normality and Heteroskedasticity) and its goodness of fit tests were satisfactory. Furthermore, the plots of the Cumulative Sum of Recursive Residuals and the Cumulative Sum of Squares of Recursive Stability

indicate that the model was stable and converges over the study period since the tests appeared within their five percent critical bounds level.

The direction of causality was also determined between capital expenditure and economic growth as well as the sub-components of recurrent expenditure and economic growth. This was done by employing the Granger Causality test on all the relationships. The results indicate that there exists a unidirectional causality between non-interest recurrent expenditure and economic growth as well as capital expenditure and economic growth. Meaning causality runs from the two forms of public expenditure to economic growth and this defies the viewpoint of the Wagner's Law which specifies that it is rather public expenditure which responds to the dictates of economic growth. Also, the estimate once again concluded on a unidirectional causality between interest-payment and economic growth in Ghana. This indicates that causality runs from real GDP to interest-payment. Meaning as the county experiences growth in the economy, it is able to service the interest on public debt that it owns. This could be inferred that the revenue for other developmental purposes may be rather used to service the interest accumulated on public debt.

Conclusions

The main purpose of this study was to empirically estimate the relationship that capital expenditure and recurrent expenditure sub-components have with economic growth of Ghana for the period 1990 to 2015. Specifically, the study was based on four vital issues. These are the relationship between capital expenditure and economic growth, the relationship between non-interest recurrent expenditure

and economic growth, interest-payment and economic growth relationship and lastly the direction of causality between these forms of public expenditure and economic growth of Ghana. Based on the findings of this study, below are the brief conclusions that were reached:

1. An increase in capital expenditure will have a positive effect on economic growth in both the long-run and the short-run periods. This means that government spending on capital commodities has been a significant contributory factor to the growth of the economy. This could be due to the fact that most capital projects by government are public goods which have the characteristics of being non-rivalry and non-excludable in their consumption. As such their social benefits are higher than private benefit and this serves as a positive externality to economic activities in the country. However, its lag values in the short-run recorded negative values probably due to the gestation periods of some capital goods such as building of schools.
2. Non-interest recurrent expenditure has a positive relationship with economic growth of Ghana. Specifically, it means that an increase in non-interest recurrent expenditure will have a positive significant effect on the growth of the economy in both the long-run and short-run periods. This could be due to the fact that expenditures in the form of an increase in wages and salaries help to motivate public servants to offer more of their labour skills to the government. Also, operational cost in terms of administrative expenses sustains the smooth operation of government institutions which then contributes to the growth of the economy.

3. Interest-Payment Recurrent Expenditure from the model was also negatively related to economic growth in Ghana in both the long-run and the short-run period as expected and statistically significant in both periods. Interest-payment by government in Ghana is retarding economic growth due to the fact that government continues borrowing has caused interest payments to accumulate and this has caused other interest rates to increase hence a reduction in investment. This has caused production in the country to reduce leading to a reduction in economic growth in Ghana (IFS, 2016).
4. A unidirectional causality was also deduced between non-interest recurrent expenditure and economic growth as well as capital expenditure and economic growth in Ghana. This suggested that government's activities in terms of spending is a vital source of growth in the economy. As such proper care must be taken in managing the allocation of funds to such expenditures and the channels that they pass through before entering the economy. The results therefore defy the Wagner's Law which rather specifies that public expenditure responds to any increment in economic growth. On the contrary, the unidirectional causality deduced between interest-payment recurrent expenditure and economic growth suggest that causality rather runs from real GDP to interest payment of the country's debt. This shows that government increases its payment of interest on its debt when there is an increase in the growth of the economy.

Recommendations

Based on the empirical findings, the following are the policy recommendations for this research study:

1. Considering the current state of the Ghanaian economy, this study encourages the government, particular the ministry of finance to increase its spending on capital expenditure to further enhance the growth of the economy. However, on increasing capital expenditure, the decision by government to undertake any capital projects should be based on projects that have significant linkages (thus both backward and forward linkages) to other sectors of the economy that could enhance further growth of the economy.
2. In order to sustain the positive relationship between non-interest recurrent expenditure and economic growth, the ministry of finance needs to increase the funding for this subcomponent however it has to intensify its monitoring and evaluation of the usage of the non-interest recurrent expenditure and the channels through which funds for that expenditure passes through before entering the economy. On the side of Public Service workers who are the beneficiaries of this form of expenditure (through wages and salaries), government could consider the signing of performance contracts with all public service workers to serve as a check on their conducts and in order to maintain their maximum productivity levels in the economy.
3. It was also concluded from Table 7 and 8 that government's interest payment has a negative relationship with the growth of the economy. Thus, the compounding of interest on public debt as a result of government borrowing is retarding the growth of the economy from the short and long-run results. Based on this result the Ministry of Finance through its Debt Management Division is encouraged to adopt a debt management strategy that puts caps on the levels of gross concessional and

non-concessional borrowings within a year to reduce the rate at which interest-payment is increasing. In addition, strict measures and quantitative targets can be established to serve as a guide for efficient debt management in order to slow down the rate of debt accumulation which is increasing their interest-payment on them.

Limitations of the Study

The study's main limitation encountered had to do with the limited availability of data for the key variables. As such it could only consider the sub-components for recurrent expenditure leaving that of capital expenditure. This is due to the fact that a cointegration analysis requires a time series data which has a long span period for all the variables used in a study. This posed challenges in making important recommendations to affect the various components under capital expenditure.

Directions for Future Study

Future studies on the issue of public expenditure should consider the sub-components of both capital expenditure and their relationship with economic growth or on other pertinent issues such as poverty and unemployment in the country.

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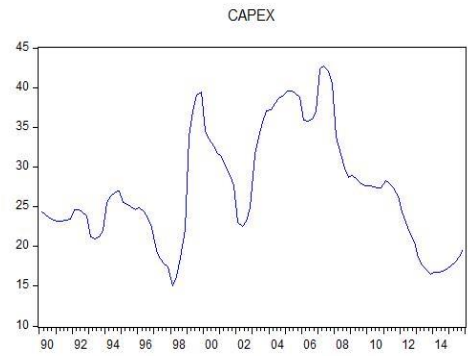
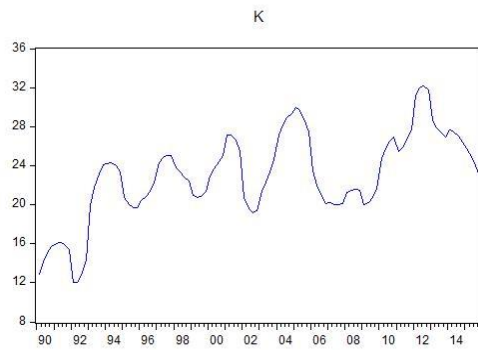
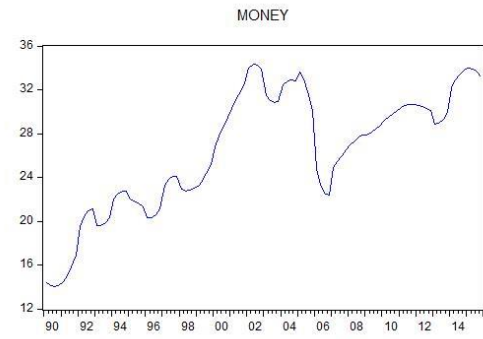
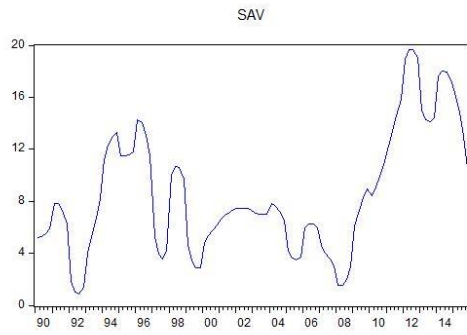
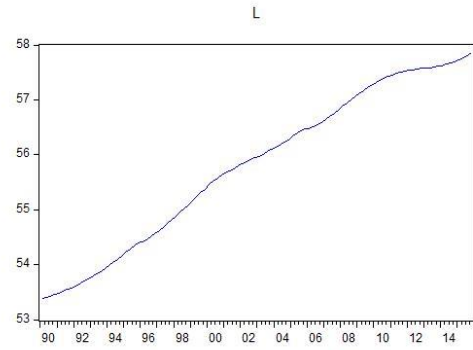
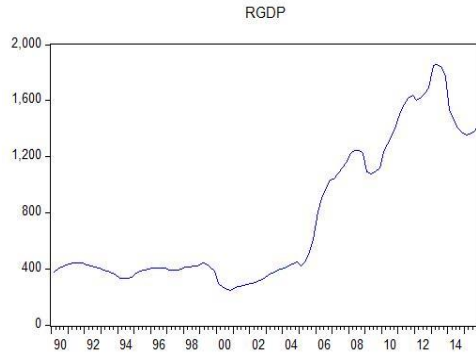
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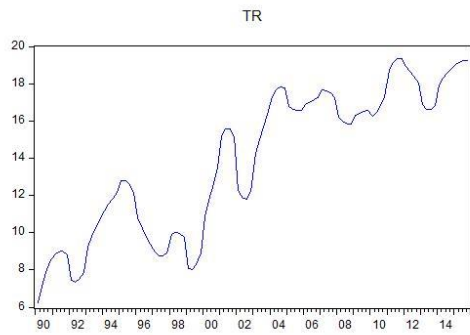
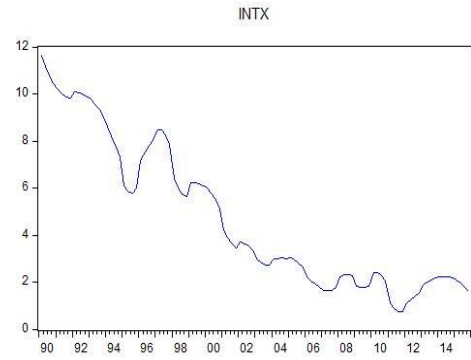
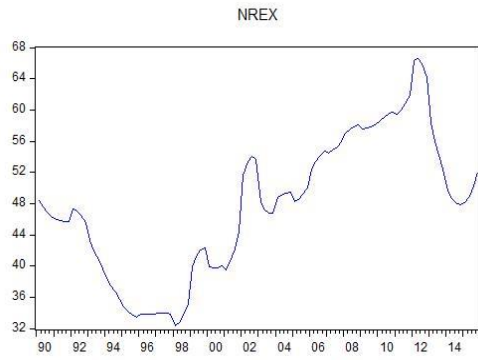
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APPENDICES A

Results of plots of variables at levels

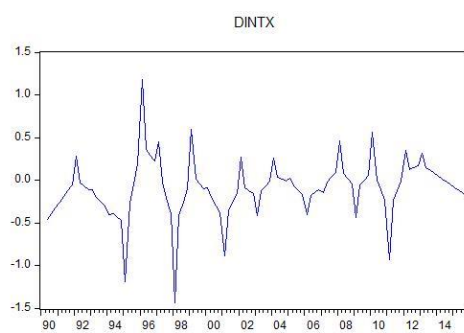
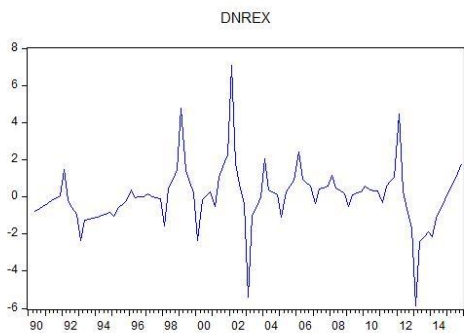
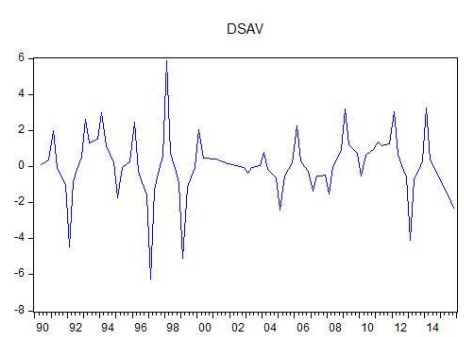
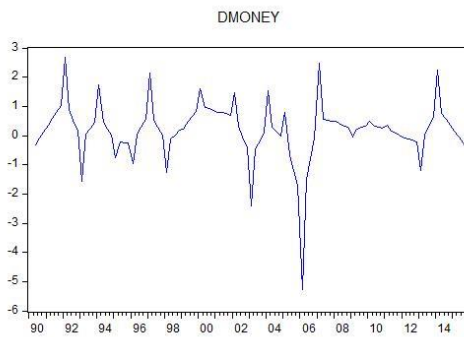
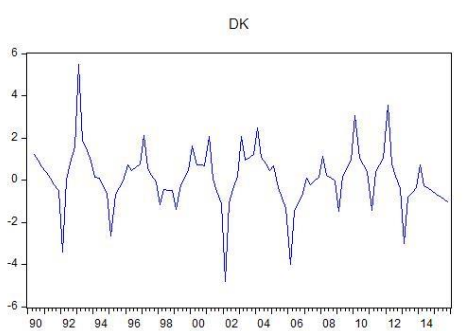
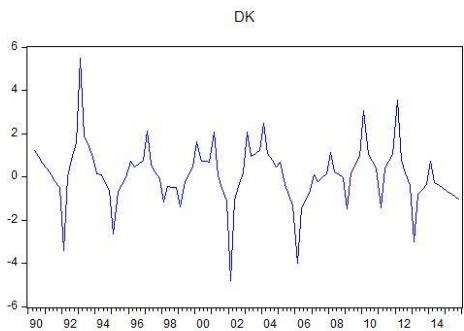
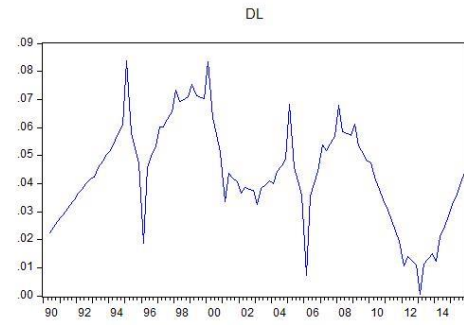
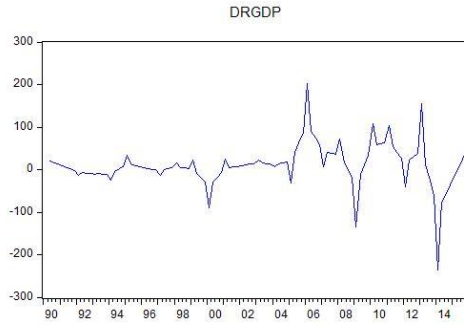


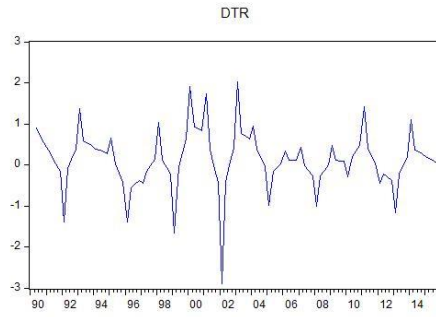


Source: Graphed from World Development Indicators, ISSER and IMF database (1990-2015)

APPENDICES B

Results of plots of variables at First Difference





Source: Graphed from World Development Indicators, ISSER and IMF database (1990-2015)

APPENDIX C

Unit Root Tests at Levels and First Difference with Intercept Only

Table 14: Unit Root Test at Levels (Intercept Only)

Var	ADF Stats	(LL)	(C.V)	(P.V)	PP Stats	(B.W)	(C.V)	(P.V)
LRGDP	-0.541	5	-2.891	0.877	0.406	4	-2.890	0.903
L	-0.439	1	-2.890	0.439	-1.617	8	-2.890	0.470
K	-2.064	12	-2.893	0.257	-2.612	1	-2.890	0.094*
CAPEX	-2.139	5	-2.891	0.230	-1.274	0	-2.890	0.639
NREX	-1.199	3	-2.896	0.672	-1.179	2	-2.890	0.682
INTX	-2.215	9	2.893	0.202	-2.206	1	-2.890	0.205
SAV	-3.008	9	-2.893	0.038**	-1.990	9	-2.890	0.291
TR	-0.663	9	-2.893	0.663	-1.518	1	-2.890	0.521
MONEY	-1.718	9	-2.893	0.419	-1.822	0	-2.890	0.368

Note: ***, ** and * denotes 1%, 5% and 10% significant levels respectively. Also, (LL), (CV), (BW) and (P.V) are the Lag Length, Critical Value, Bandwidth and Probability Value respectively

Source: Estimated by Author using Eviews 9.0 Package.

Table 15: Unit Root Test at First Difference (Intercept Only)

Var	ADF Stats	(LL)	(C.V)	(P.V)	PP Stats	(B.W)	(C.V)	(P.V)
DLRGDP	-3.321	4	-2.891	0.017**	-4.794	13	-2.890	0.000***
DL	-2.706	0	-2.890	0.077*	-2.687	5	-2.890	0.080*
DK	-2.355	12	-2.894	0.157	-4.752	14	-2.890	0.000***
DCAPEX	-2.751	12	-2.894	0.070*	-4.858	21	-2.890	0.000***
DNREX	-2.766	8	-2.893	0.067*	-4.933	18	-2.890	0.000***
DINTX	-3.392	8	-2.893	0.014**	-4.904	15	-2.890	0.000***
DSAV	-2.207	8	-2.893	0.205	-6.979	101	-2.890	0.000***
DTR	-3.087	8	-2.893	0.031**	-5.079	16	-2.890	0.000***
DMONEY	-2.618	8	-2.893	0.093*	-5.091	16	-2.890	0.000***

Note: D represents First difference, ***, ** and * denotes 1%, 5% and 10% significant levels respectively. Also, (LL), (CV), (BW) and (P.V) are the Lag Length, Critical Value, Bandwidth and Probability Value respectively

Source: Estimated by Author using Eviews 9.0 Package.

APPENDIX D

Table 16: Unrestricted Vector Autoregression (VAR)

Variable	Coefficient	Standard Errors	T-Statistics
LRGDP(-1)	1.351	0.098	13.679
LRGDP(-2)	-0.461	0.087	-5.279
L	0.035	0.020	1.770
K	-0.001	0.002	0.539
CAPEX	-0.003	0.001	-2.420
L(NREX)	0.078	0.048	1.624
L(INTX)	-0.022	0.029	-0.750
MONEY	-0.010	0.003	-3.062
SAV	-0.002	0.002	-0.997
TR	0.008	0.004	2.127
C	-1.343	1.017	-1.320

Source: Estimated by Author using Eviews 9.0 Package.

Table 17: Full Short-Run Estimation

ARDL (1,3,0,4,1,0,4,1) selection on SBC				
Variable	Coefficient	Std. Error	T-Statistics	Probability
D(K)	0.005	0.003	2.109	0.038**
D(L)	-1.199	0.350	-3.426	0.001***
D(L(-1))	0.636	0.387	1.639	0.105
D(L(-2))	0.839	0.326	2.568	0.012**
D(LINTX)	-0.179	0.037	-4.783	0.000***
D(CAPEX)	0.006	0.002	3.863	0.000***
D(CAPEX(-1))	-0.005	0.002	-2.949	0.004***
D(CAPEX(-2))	-0.006	0.002	-3.220	0.002***
D(CAPEX(-3))	-0.006	0.002	-3.432	0.001***
D(LNREX)	0.233	0.123	1.891	0.062*
D(SAV)	-0.013	0.002	-5.274	0.000***
D(TR)	0.005	0.009	0.549	0.584
D(TR(-1))	-0.016	0.005	-3.043	0.003***
D(TR(-2))	-0.016	0.005	-3.014	0.004***
D(TR(-3))	-0.013	0.005	-2.453	0.016**
D(MONEY)	0.035	0.003	10.766	0.000***
ECM(-1)	-0.194	0.022	-9.010	0.000***

Note: ***, **, and * denotes statistical significance levels at 1%, 5%, 10% respectively. For the Variables:

Source: Estimated from WDI (2016), IMF and ISSER (1990-2015) data using Eviews 9.0 package