UNIVERSITY OF CAPE COAST

PUBLIC EXPENDITURE AND UNEMPLOYMENT: EVIDENCE FROM GHANA.

BY

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DECLARATION

Candidate's Declaration

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

Candidate's Signature: ……. Date: …….

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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.

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ABSTRACT

The study examined the effect of public expenditure on unemployment in Ghana using annual data for the period 1980 to 2016 by employing Autoregressive Distributed Lag (ARDL) approach to cointegration. The study revealed that there is an inverse relationship between government consumption expenditure and unemployment rate. However, government capital expenditure and unemployment rate were found to be positively related. The study therefore established that the threshold of government gross fixed capital formation (capital) expenditure on the rate of unemployment is 6.9 percent of gross domestic product. Hence, government gross fixed capital formation (capital) expenditure that exceeds 6.9 percent of gross domestic product could help to reduce the unemployment rate in Ghana. Furthermore, the study revealed that inflation, external debt, domestic credit to private sector (as a proxy for private sector development) with the exception of growth rate of gross domestic product are significantly key determinants of unemployment in Ghana. The study recommends that government consumption spending should be increased to help control the rate of unemployment. The study also advocates that government capital spending should not be less than 6.9 percent of gross domestic product to be able to control unemployment. The study further recommends that fiscal authorities should ensure that revenue is generated internally by expanding the tax base to include the informal sector. This will aid the country to minimise external borrowing.

KEY WORDS

Autoregressive distributed lag model

Capital spending

Conditional least square estimation

Consumption spending

Threshold

Unemployment

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DEDICATION

To all my family members.

TABLE OF CONTENTS

LISTS OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

CUSUM	Cumulative Sum
CUSUMSQ	Cumulative Sum of Square
ESA	European System of Account
GEBSS	Graduate Entrepreneurial & Business Support Scheme
REP	Rural Enterprises Programme
SIC	Schwarz Information Criterion
STEPP	Skills Training and Employment Placement Programme
YEA	Youth Employment Agency
YEP	Young Entrepreneurs Programme

CHAPTER ONE

INTRODUCTION

Background to the Study

One of the major macroeconomic goals in any country world-wide is reduction in unemployment to its minimum desirable level. Other macroeconomic goals pursued by every country includes sustained economic growth, a healthy balance of payments position as well as price stability. To achieve these goals both in the short and long run, the government usually uses fiscal policy among other social and economic policies. Fiscal policy involves the use of government expenditure and taxation to influence the level and direction of economic activity in an economy (Loloh, 2011). In his work, Loloh further explained that fiscal policy is intended to control the variations in overall spending which are usually responsible for the fluctuations in economic activity amidst the numerous economic development problems such as unemployment, poverty and persistent fiscal deficit. Thus, the fundamental goal of fiscal policy should aim at reducing the level of unemployment.

The results of the sixth round of the Ghana Living Standards Survey (GLSS6) conducted by the Ghana Statistical Service in 2012/13 indicates that the unemployment rate was 5.2 percent for Ghanaians aged 15 years and older (GSS, 2014). However, the reports of the 2015 Labour Force Survey (LFS) conducted by the Ghana Statistical Service shows that the unemployment rate for Ghana in 2015 is 11.9 percent of the labour force (GSS, 2016). With the increasing level of unemployment in recent time, it is necessary for policy makers to look for the appropriate policy tool to address the increasing rate of unemployment since high rate of unemployment is a signal of unused economic

(human) resources and underdeveloped economy. Also, to note is that, unemployment is not a healthy sign for a country from social and economic point of view. As a result, the government of Ghana over the years has undertaken several policy interventions with the prime motive of controlling unemployment in the country. These include continuation and expansion of Skills Training and Employment Placement Programme (STEPP), the Graduate Entrepreneurial & Business Support Scheme (GEBSS), Microfinance and Small Loans Centre (MSLC), Rural Enterprises Programme (REP), Young Entrepreneurs Programme (YEP), and Youth Employment Agency (YEA) among many others (MELR, 2014).

Also, since 1960, the government of Ghana has used fiscal policy as a tool to influence the level of economic behaviour in an effort to achieve the economic objectives of high economic growth and full employment (Darko-Gyeke, Oduro, Turkson & Baffour, 2015). During the period from the 1970s and the early 1980s, Ghana witnessed years of expansionary fiscal policy in the form of growing government expenditure. This resulted in escalating budget deficits since the expenditure of the government exceeded the public generated revenue. However, the aftermath of the late 1970s and early 1980s economic crisis saw the public expenditure falling drastically below 10% of GDP in 1983 (Loloh, 2011) from the 1960s level of about 16% of GDP (World Bank, 2017). However, in 1992 government expenditure assumed its upward trend, increasing to 17% of GDP from the earlier year level of about 14% of GDP in 1991 (World Bank, 2017). In spite of all these policy interventions of various government at addressing the problem of unemployment in Ghana, unemployment still remains a major problem in Ghana. For instance, as at 2015,

the unemployment rate was about 11.9 percent (GSS, 2016) which is far higher than 5.8 percent of the labour force recorded in 2012/13 fiscal year (World Bank, 2017).

However, whether the government should actively partake in the running of the economy or not has been a debatable issue for years. Adam Smith, in his book published in 1776, *The Wealth of Nations*, argued strongly against active participation of the government in the administration of the economy. But in his work, *General Theory of Employment, Interest, and Money*, as noted by Adelman (2003), Keynes advocated that without the government taking a more active and participatory role to steer the economy, countries could move from unstable growth to prolonged recessions and massive rates of unemployment. Owing to this, there is a growing debate about the effects of government spending on unemployment (Bruckner & Pappa, 2012; Matsumae & Hasumi, 2016). Researchers such as Monacelli, Perotti and Trigari (2010), Murwirapachena (2011) and Ramey (2012) have come up with conflicting conclusions regarding the link and the interaction between these two macroeconomic variables. This study therefore seeks to contribute to the debate by examining the effect of public spending on the rate of unemployment in Ghana using annual data from Ghana.

A critical look at the data on government spending and rate of unemployment in Ghana revealed that the spending pattern of the government final consumption over the study period had been on the increase with some few years of slippages (World Bank, 2017). Over the study period the government final consumption spending recorded a minimum value of 5.86% of GDP in 1983 with the highest spending of 20.89% recorded in 2012 (World Bank,

2017). The nature and the trend of government final consumption (recurrent) expenditure from 1980 to 2016 is shown in Figure 1.

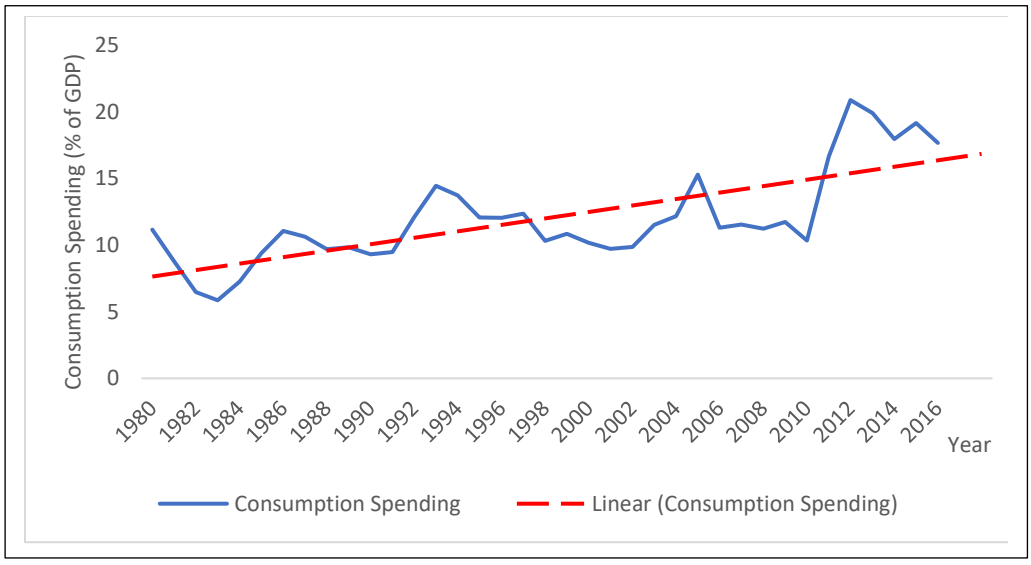

Figure 1: Trend of Government Final Consumption Spending
Source: Generated by the author with data from World Bank – World Development Indicators; September, 2017.

From figure 1, there was general volatile trend of government final consumption spending over the study period. There were periods of decline and upward trends. In 1983, the consumption spending recorded the lowest value as already stated. However, from 1983 the consumption spending assumed an increasing trend until 1994 after which it started experiencing a decreasing trend up to 2004. After this period, the consumption spending assumed the upward trend peaking at 20.89% of GDP in 2012 as already stated. The volatility in the government final consumption spending could be as a result of fluctuations in the economic growth over the study period. Also, it can be argued that smaller countries like Ghana are less able to moderate economic shocks and stabilize its government consumption leading to volatile nature of government consumption spending (Furceri & Ribeiro, 2008).

The economy of Ghana has consistently experienced increasing unemployment rate since 1988/89 from 0.8% to 10.1% in 2000 with 11.9% in 2015 (GSS, 2016). The level of unemployment as a percentage of labour force from 2000 to 2016 averaged 5.6% (World Bank, 2017). The unemployment trend in Ghana from 1980 to 2016 can properly be understood with the aid of Figure 2.

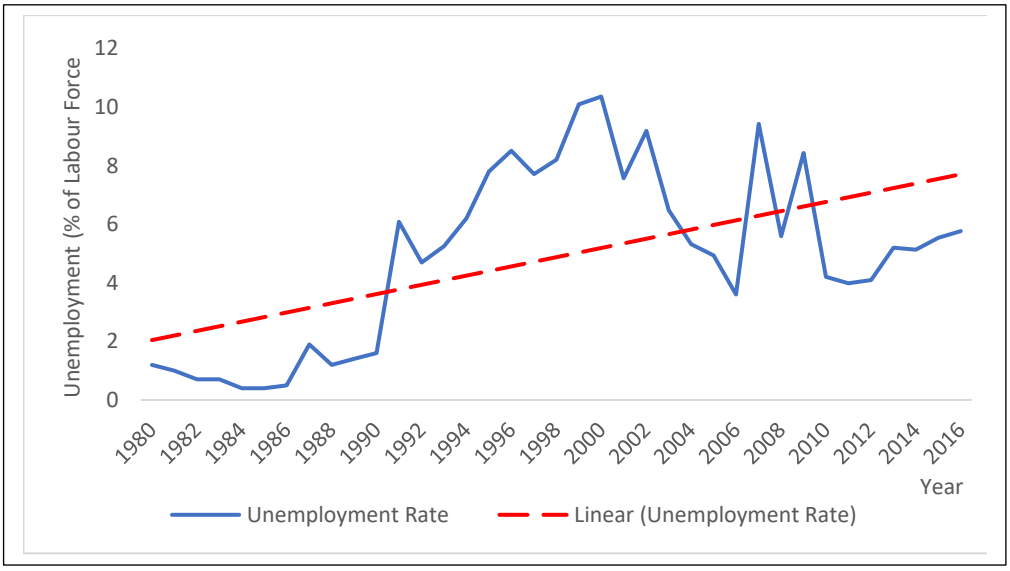

Figure 2: Unemployment Trend in Ghana

Source: Generated by the author with data from World Bank – World Development Indicators; September, 2017.

From Figure 2, it can be observed that the unemployment rate in the Ghanaian economy declined steadily in the 1980 through to 1986 where the average unemployment rate was 0.73 percent of the labour force. After these years, the rate of unemployment assumes an upward trend peaking at approximately 10.4 percent of the labour force in 2000. Over the study period the unemployment situation in the country has not been stable but volatile as depicted in Figure 2. The volatile nature of unemployment could be attributed to the various forces that causes an employed entity to join the unemployment pool; layoffs, a quit and a labour force entrance. The fluctuations in these factors

as a result of structural and policy changes are contributing factors of the volatility in the rate of unemployment in Ghana (Barnichon & Figura, 2010).

Capital spending of the government (government investment) has not been stable for the past two decades. In 1997 the government spending on capital formation was approximately 12.44 percent of the Gross Domestic Product (GDP). However, the level of capital formation spending decreased to 8.936 percent of GDP in 2003 from 10.41 percent of GDP in 2001. From the 2003 level, the figure went up further to 12.3775 percent of GDP but dropped to 6.6188 percent of GDP in 2014 (World Bank, 2017). The trend of government capital formation spending over the study period is depicted in Figure 3. The instability in the trend of government capital formation spending is mainly as a result of the volatile nature of real interest rate as well as that of Gross Domestic Product (GDP) in Ghana (Ochieng, 2018).

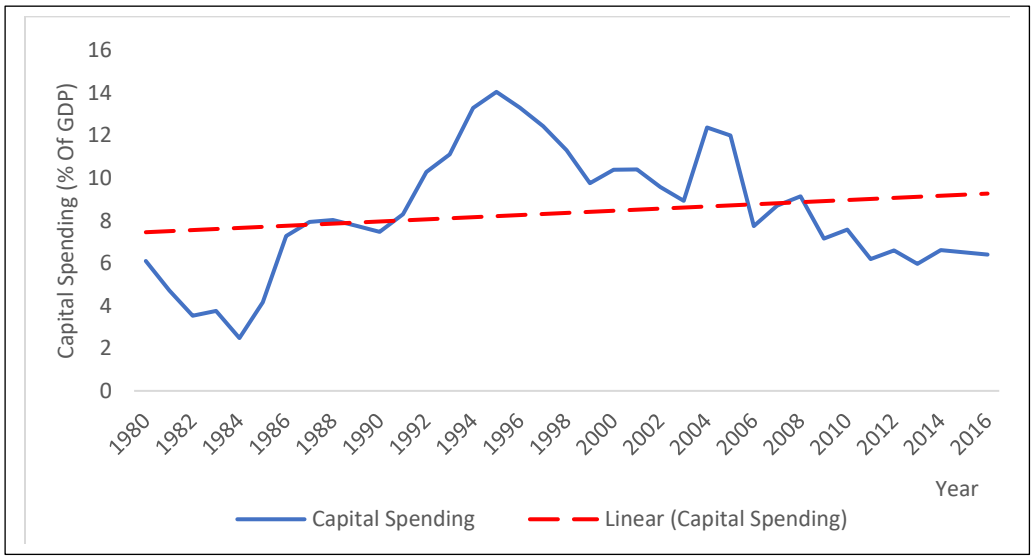

Figure 3: Trend of government capital formation spending

Source: Generated by the author with data from World Bank-World Development Indicators; September, 2017.

In 1991 the government capital formation expenditure as a percentage of GDP was approximately 8.29 percent. In the same period, the rate of

unemployment was approximately 6.08 percent of the labour force. However, in 1992 the spending of the government on capital formation increased from the 1991 level to approximately 10.29 percent of gross domestic product. In the same period, the level of unemployment as a percentage of the labour force decreased from 6.08 percent in 1991 to approximately 4.70 percent of the labour force in 1992. The same trend was exhibited from 2013 to 2014. The government capital formation expenditure increased from approximately 5.97 percent of GDP in 2013 to approximately 6.62 percent of GDP in 2014. Over this same period, the level of unemployment reduced from approximately 5.20 percent of the labour force to approximately 5.13 percent of the labour force. Amidst these periods analysed, there were situations of unstable level of government capital formation spending as well as unstable level of rate of unemployment (World Bank, 2017). The relationship between government capital formation spending (capital spending) and the level rate of unemployment can clearly be analysed and understood with the aid of Figure 4.

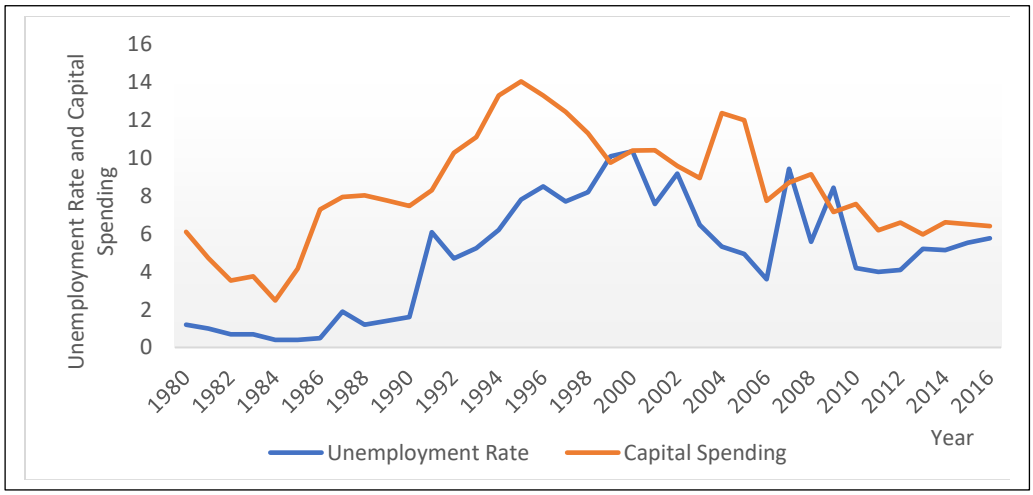

Figure 4: Relationship between rate of unemployment and capital formation expenditure.

Source: Generated by the author with data from World Bank – World Development Indicators; September, 2017.

With reference to Figure 4, it can be realised that the Ghanaian labour market is bedevilled with high level of unemployment with oscillating government capital spending. In the 1980's, the average rate of unemployment stood at 0.94 percent of the labour force. During this same period the government gross fixed capital spending (capital expenditure) averaged 8.36 percent of GDP. In this period, unemployment recorded the lowest rate of 0.7 percent of the labour force in 1983 whilst government capital spending recorded a minimum of 2.84 percent of GDP in 1984.

However, from the 1990's up to 2010, the average unemployment rate was 6.72 percent of labour force and government capital spending recorded an average of 10.25 percent of GDP. From 2011 to 2016, as unemployment rate averaged 4.95 percent of labour force, government capital spending recorded an average of 6.38 percent of GDP. Specifically, in 2015 the unemployment rate was 5.54 percent of the labour force which was far higher than 4.09 percent recorded in 2012 fiscal year. Also, government gross fixed capital spending recorded 6.5 percent in 2015 as against 6.6 percent in 2012 (World Bank, 2017).

The link between the rate of unemployment and government final consumption spending is well established with Figure 5.

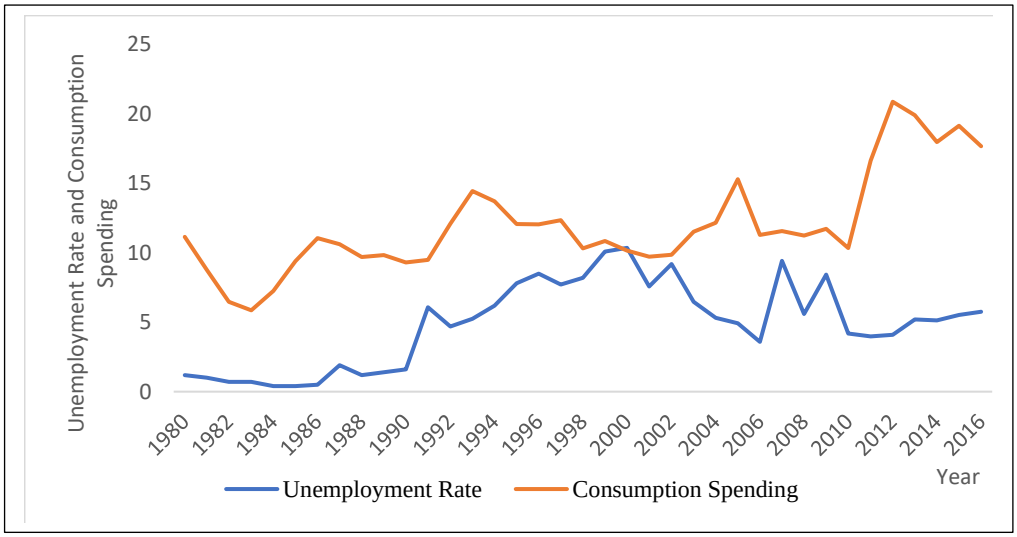

Figure 5: Relationship between government' consumption expenditure and rate of unemployment

Source: Generated by the author with data from World Bank-World Development Indicators; September, 2017.

From Figure 5, it can be realised that the Ghanaian labour market is bedevilled with high level of unemployment with oscillating government consumption spending. In the 1980's, the average rate of unemployment stood at 0.94 percent of the labour force. During this same period the government final consumption spending averaged 9.02 percent of GDP. In this period, government final consumption spending recorded the lowest rate of 5.86 percent of GDP in 1983 with unemployment rate of 0.7 percent of the labour force.

However, from the 1990's up to 2010, the average government final consumption expenditure increased to 11.5 percent of GDP with average unemployment rate of 6.72 percent of labour force. Government final consumption spending further averaged 18.71 percent of GDP from 2011 to 2016 as unemployment averaged 4.95 percent of labour over the same period.

Specifically, in 2015 the unemployment rate was 5.54 percent of the labour force which was far higher than 4.09 percent recorded in 2012 fiscal year. On the other hand, government final consumption spending recorded 19.16 percent in 2015 as against 20.89 percent recorded in 2012 (World Bank, 2017).

On the basis of the above analyses, it is imperative to find out whether government spending is actually an appropriate tool to remedy the alarming rate of unemployment in the country, Ghana.

Statement of the Problem

Ensuring full employment level has been the main objective of fiscal authorities in many countries. As a result, several studies have been conducted in this regard to ascertain the effectiveness of fiscal policy in promoting employment. However, empirical studies conducted have yielded mix results (Nwosa, 2014; Resurreccion, 2014; Tagkalakis, 2013; Bruckner & Pappa, 2012). The inconclusive findings of the effect of fiscal policy (government spending) on unemployment (employment) are evidenced in the literature. For instance, Monacelli, Perotti and Trigari (2010), and Ramey (2012) concluded that an increase in government purchases leads to lower unemployment while Bruckner and Pappa found that increased government purchases lead to higher unemployment. Regardless of this contradictory finding, recent findings establish that there exists a high level of consensus among scholars that higher level of government expenditure is positively related to the level of employment and vice versa (Murwirapachena, 2011; Peter, 2015; Holden & Sparrman, 2012).

Nwosa (2014), carried out a study on the effect of aggregate government expenditure on unemployment and poverty in Nigeria using Ordinary Least Square (OLS) estimation technique. However, carrying out a study on the effect of aggregate government expenditure on unemployment does not give any information on the effect of the two key components of aggregate government expenditure (consumption and capital expenditure) on unemployment. To overcome this problem, studies have been ventured to highlight the disaggregated effect of government expenditure on unemployment (Murwirapachena, 2011; Obayori, 2016). Murwirapachena conducted a disaggregated study of the effect of fiscal policy on unemployment in South Africa. He used only government investment expenditure, government consumption expenditure and taxes as the explanatory variables. Also, Obayori examined the effect of recurrent expenditure and capital expenditure on unemployment rate in Nigeria. His study did not include any other explanatory (control) variable(s). These studies are therefore saddled with omitted variable bias and this may lead to erroneous causal inferences. As a contribution to the existing literature, this study undertakes a disaggregated study of the effect of public expenditure (consumption and capital spending) on unemployment rate in Ghana by incorporating other variables that equally influence the rate of unemployment but had been omitted in other studies.

Also, in Keynes' General Theory as stated by Smith and Zoega (Smith & Zoega, 2012), investment determines effective demand which further determines unemployment and the labour market plays a negligible role. In the work of Viorela (2012), the effects of capital investments on employment is a complex and sensitive matter, because the effect on the economy (and thus on

unemployment) depends largely among other factors on the volume of capital spending made. It therefore implies that the influence of capital investment on the macroeconomic variables of which unemployment is no exception depends on the amount of capital invested in the economy. Thus, the effect of investment on employment (unemployment) among other things depends mainly on the size of the investment. However, how high or low capital investment should be in order to have a plummeting effect on the unemployment is unknown from the literature. It is against this background that the study also seeks to fill the gap in the literature by finding the optimal size of government capital spending that will assist to control the unemployment rate in the Ghanaian economy.

Objectives of the Study

The general objective of the study is to establish how government expenditure and unemployment are related in Ghana using annual time series data from Ghana.

The specific objectives of the study seek to:

- Examine the effects of government final consumption expenditure on the rate of unemployment.
- Examine the effects of government gross fixed capital formation (capital) expenditure on the rate of unemployment.
- Estimate the threshold of government gross capital formation (capital) expenditure on the rate of unemployment.

Hypotheses of the Study

The null and the alternative hypotheses respectfully for the study are as follow:

- **H_0**: there is no statistically significant effect of government final consumption expenditure on rate of unemployment in Ghana.
- **H_1**: there is statistically significant effect of government final consumption expenditure on unemployment rate in Ghana.
- **H_0**: there is no statistically significant effect of government capital expenditure on rate of unemployment in Ghana.
- **H_1**: there is statistically significant effect of government capital expenditure on unemployment rate in Ghana.
- **H_0**: there is no statistically significant threshold effect of government gross capital formation (capital) expenditure on the rate of unemployment.
- **H_1**: there is statistically significant threshold effect of government gross capital formation (capital) expenditure on the rate of unemployment.

Scope of the Study

The study investigates the relationship between government spending and unemployment in Ghana using annual time series data for the period 1980 to 2016. The choice of the data coverage (sample period) was informed by the fact that it extremely challenging getting data below 1980 on unemployment which is a key variable in the study. Variables employed in the study are unemployment as a percentage of labour force, government final consumption expenditure as a percentage of GDP, government gross fixed capital formation as a percentage of GDP, inflation, external debt as a percentage of GDP, domestic credit to the private sector as a proxy for private sector development

and growth rate of GDP. Data on all the variables for the study is obtained from World Bank's World Development Indicators (World Bank, 2017).

Accordingly, two main econometric models are used in this study. To establish the relationship between government spending and unemployment, the study used recent and advanced approach to test whether long run relationship between the variables exists or not by applying Autoregressive Distributive Lag (ARDL) model or bounds testing approach to cointegration developed by Pesaran, Shin and Smith (2001). In addressing the third objective of the study, i.e., identifying the threshold effect of government capital spending, a technique known as the Conditional Least Square (CLS) estimation originated by Hansen (1999) and developed by Khan and Senhadji (2001) would be employed.

Significance of the Study

In Ghana, the effects of fiscal policy on unemployment have not received adequate attention in literature. Most studies did not exactly examine the relationship between the two economic phenomena but rather studied unemployment and fiscal policy separately. This motivates the desire to analyse the relationship between the two variables using Ghana as a case study. In addition, this study will be an important source of information for policy makers in the government as it will assist in formulating policies. Government policy makers need precise information on how the fiscal policy framework has affected unemployment; hence this study will help them to devise effective policies. Furthermore, the study will serve as a good source of information for researchers, as the results will inform the debates on this subject. It will also

contribute to the empirical literature on the impact of public spending on unemployment in Ghana.

At an international level, the study will contribute to the ongoing debate of whether large government spending is good for growth and fosters employment in developing countries. Information on the relationship between the variables that will be used in this study will also help economic agents in developing countries to make rationally informed decisions that maximise the overall wellbeing of the economy.

Organisation of the Study

The study is organized into five chapters. Chapter One, which is the introductory chapter, present a background to the study, problem statement, objectives of the study, hypotheses, scope of the study, significance of the study and the organisation of the study. Chapter Two presents the review of the literature on the effect of government expenditure on unemployment both theoretically and empirically.

Chapter Three discusses the methodological issues and the econometric modelling employed in the study. Chapter Four analyses the data using the methods explained in chapter three and discuss the results. Finally, Chapter Five presents the summary, conclusions and provides policy recommendations based on the findings of the study.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter presents theoretical and empirical literature on the effects of public spending on unemployment. This will be presented in three sections. The first section presents the theoretical literature on the relationship between unemployment and fiscal policy. The second section presents and discuss the empirical findings of previous researchers regarding government spending and unemployment. The section on empirical literature is divided into two sub-sections; empirical literature from developed countries and that from less developed countries. The third section summarises the chapter.

Theoretical Literature

This section discusses various theories regarding the effects of fiscal policy on unemployment. The theoretical works discussed are from the classical theory of unemployment, the unemployment theory in the Keynesian economy, the theory of natural rate of unemployment and the Monetarism and the Fiscal Policy Theory.

Classical Theory of Unemployment

The classical theory, as analysed by Pigou (1933) and McDonald and Solow (1981), argues that the labour market operates on the basis of demand and supply of labour. Demand for labour is a derived demand, obtained from the declining portion of the marginal product of labour. The demand curve is a negative function of real wage as such if wages increase the quantity demand

for labour will decline and vice versa. The supply of labour is derived from worker's choice whether to spend part of the time working or not working (leisure). Supply of hours worked is positively related to real wage, because if the real wage rises, workers supply more hours of work. Equilibrium is achieved when demand and supply of labour are intersected at a clearing point that determines the equilibrium real wage rate and full employment.

Sweezy (1934) in explaining Pigou's *Theory of Unemployment*, stated that unemployment apart from frictional obstruction, would not be in existence if it were not for the fact that wage-earners consistently speculate for a rate of wages higher than the 'equilibrium' level. Thus, as explained by Sweezy (1934), other forms of unemployment with the exception of frictional unemployment will not occur if workers do not insist on wages higher than the 'equilibrium' wage. Full employment does not mean that there is no unemployment. Still frictional unemployment does exist at the going real wage rate. Frictional unemployment arises because of the dynamic nature of the labour market, the unavailability of information, the search for better jobs, and random fluctuations in demand for labour such as closing of a plant and of opening of a new plant.

In the works of Wicksell, as stated by Jonung (1989), if wages are sufficiently flexible downward, then this decline can maintain full employment. However, as wages are sticky downward, it will be difficult to use wages to correct unemployment. Cheaper credit to businessmen is the most effective measure to fight unemployment as Wicksell advocated. He even thought that the government should support private investment in housing. Government can support the introduction of various inventions as well. Government support should be financed by taxation. Wicksell as well identified technical

unemployment as due to technological change in the economy. Though the introduction of machinery would cause unemployment, the unemployed will search for new jobs. The searching of jobs by these unemployed individuals will push wages downward. At this lower wage, the unemployed could be employed by employers hence full employment will be restored again. For the normal (frictional) unemployment, Wicksell thinks that advertisement of job opportunities and employment agencies can assist to reduce the normal unemployment rate (frictional unemployment).

The cyclical unemployment, as another type of unemployment, is due to the lack of effective demand. To him, it would be a good idea to raise wages in order for workers to buy more product at the market. However, this action may cause workers to lose their jobs since higher wages will mean higher cost of production. Essentially, for Wicksell the cyclical unemployment was due to the wrong investment of capital. Capital was invested in areas where rates of return were low. He concluded that public works is the best measure to fight cyclical unemployment. Otherwise, workers would have to accept lower wages for the unemployment situation to clear. He also thought that government should provide financial support to the unemployed who could not find jobs.

According to Hayek as stated by Nishhiyama and Leube (1984), unemployment is caused by "a deviation from the equilibrium prices and wages which would establish themselves with a free market and stable money". This is actually a mismatch between demand and supply of labour, which is usually caused by expansionary monetary and fiscal policies and powerful trade unions. These policies create economic dislocation and structural changes in an economy which misdirect labour and other economic resources to other

alternatives. Unions are also able to set higher wages compared to market wages, which generate unemployment, particularly in industries that become less profitable. In short, for Hayek the unemployment problem is caused by resources being in the wrong places at the wrong time and can be corrected if wages and prices are determined by the forces of demand and supply.

Following Hayek, Trehan (2001) provides an important explanation of the search theory of unemployment. Firms search for the productive workers and workers search for high paying jobs. So, both agents continue searching until matches are reached. At that point the unemployed worker will exit the unemployment pool. But if a worker later on get to know that her productivity is worth higher wages and firms are paying high wages on the average, then the worker's reservation wage will increase. Consequently, the unemployment rate will start rising gradually, indicating a mismatch has occurred again.

Keynesian Theory of Unemployment

Keynes contended that unemployment is a result of deficiency in aggregate demand. He assumed wages to be sticky downwards resulting in high levels of unemployment. Keynes criticized the Classical assumption that the cause of unemployment was disequilibrium in the labour market. In the view of Keynes, there is chronic instability in the economy and that the economy is subject to fluctuations, such that the economy could well balance out at an equilibrium that did not deliver full employment. In the view of Keynes, unemployment came about because aggregate demand was insufficient to create enough jobs in the economy so as to meet the needs of all those seeking jobs at any given wage rate. According to Keynes, the remedy to the unemployment

phenomenon was for the government to adopt an expansionary fiscal policy framework which would enhance aggregate demand, thereby leading to increased employment.

The Keynesian assumption that wages are sticky downwards meant that workers would not be happy about taking wage reductions and would oppose them. This means that wages would not necessarily drop enough to clear the market and hence unemployment would remain. Appendix A explains how wages behave in the Keynesian context. With reference to the illustration in Appendix A, when the demand for labour decreases from L_0^D *to* L_1^D (may be due to the onset of a recession), the wage rate should fall from W_0 to W_1, so that the market clears. However, Keynesians are of the view that because wages are sticky downwards, this would not happen. The wage rate would remain at W_0 and unemployment of AB magnitude would persist. The Keynesians define this unemployment as the demand deficient unemployment.

Keynesian economists are of the view that the economy can settle at any equilibrium. They therefore recommend that the government gets actively involved in the economy to influence the level of demand. The policies implemented by the government in this instance are known as demand management policies. Demand management means adjusting the level of aggregate demand to try to ensure that the economy arrives at full employment equilibrium. If there is a shortfall in demand, such as in a recession (a deflationary gap) then the government will need to undertake management policies that will boost the economy. On the contrary, if there is an excess of demand (such as in a boom), then the government will need to deflate the economy. Expansionary (reflationary) policies to boost the level of economic

activity might include: (a) increasing the level of government expenditure, (b) cutting taxation (either direct or indirect) to encourage spending, (c) cutting interest rates to encourage saving; and (d) allowing some money supply growth. The first two policies would be considered expansionary fiscal policies, while the second two are expansionary monetary policies. The implications of these policies would be to increase aggregate demand and therefore the level of output hence reducing unemployment as illustrated in Appendix B.

The expansionary policies upwardly adjust aggregate demand (shift from AD_1 to AD_2) leading to increase in the level of output from Q_1 to Q_2. The boost in aggregate demand will lead to increase in the demand for more labourers (since labour demand is derived from the demand of goods and services). It is also imperious to note from Appendix B that the reflationary (expansionary) policies relatively raised the price level from P_1 to P_2. However, the effect of the expansionary policy on the price level is very small, even though if demand increased further it may well cause price to increase further. Keynes identified this type of inflation as demand-pull inflation.

Keynesians have the view that at unchanged interest rates, higher levels of government spending and/or massive reductions in tax rates increase the level of aggregate demand. Therefore, to meet the increased demand of goods, output ought to increase. They cite that private sector aggregate demand is unstable primarily because of the volatility of investment demand. Their underlining assumption is that for a given money stock, changes in private sector aggregate demand may cause large and prolonged fluctuations in employment. Consequently, they advocate for expansionary fiscal policy to be used to promote aggregate demand and to stabilise employment.

The Keynesian economists assume that an autonomous decline in investment demand would reduce aggregate demand leading to a fall in output below the initial level in the short run. In the long run, workers will make a downward adjustment of their expected prices as they observe the lower actual prices. The aggregate supply curve will shift to the right as the expected price level decline. Workers now see a given money wage as representing a higher expected real wage. Labour supply and employment for a given price level will increase. This is presented in Appendix C.

Appendix C shows that an autonomous decline in investment will shift the aggregate demand curve from Y_0^D to Y_1^D. In the short run, output will fall below Y_0 to Y_1. In the long run, the aggregate supply curve will shift out to $Y^s(P_e = P)$ as labour suppliers come to expect a lower price level, corresponding to lower aggregate demand. Instead of allowing this invisible hand adjustment to operates, the Keynesians commend an expansionary fiscal policy, aggregate demand management policies, to restore the level of aggregate demand to Y_0^D.

Expansionary fiscal policy in this case entails either increasing government spending or reducing taxation or both as a measure to enhance aggregate demand. The Keynesians also make the assumption that the level of employment (in an individual firm, industry and in the aggregate) depend on the amount of the proceeds which the enterprise owners expect to receive from the corresponding output. The fundamental assumption is that entrepreneurs endeavour to fix the amount of employment at the level which they expect to maximise the excess of the proceeds over the factor cost.

Under this context, if we assume S to be the aggregate supply price of the output from employing N labourers, the relationship between S and N can be written as:

$$S = f(N) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (1)$$

Equation 1 is called the aggregate labour supply function. Similarly, assuming D to be the proceeds which entrepreneurs expect to receive from the employment of N labourers, the relationship between D and N can be written as:

$$D = f(N) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (2)$$

Equation 2 shows the aggregate labour demand function. In this regard, Keynesians conclusively emphasised that if for a given value of N the expected proceeds are greater than the aggregate supply price (if $D > S$) there will be an incentive for entrepreneurs to increase employment beyond N. If necessary, they even raise costs by competing with one another for the factors of production, up to the value of N for which S has become equal to D. Thus, the volume of employment is given by the point of intersection between the aggregate demand function and the aggregate supply function. At this point the entrepreneurs' expectation of profits will be maximised. The value of D at the point of the aggregate demand function, where it is intersected by the aggregate supply function, S, will be called the effective demand.

Friedman, in the 1940s, criticized the Keynesian theory of unemployment citing that government spending can crowd out spending by private businesses because less money is available in the market for private borrowing (Sylvie, 2012). The suggestion is that problems caused by the use of fiscal policy to control the economy may be alleviated through the use of

monetary policy. Monetarism focuses much on the role of money in the economy instead of the government using expenditure to control economic activity. According to monetarists, the best thing for the economy is to keep an eye on the money supply and let the market take care of itself. This implies that markets (without government interference through fiscal policy) are more efficient at dealing with unemployment.

The Keynesian theory of unemployment is also criticised because it advocates for a centrally planned economy. If the government is expected to spend funds to impede depressions, it is therefore implied that the government knows what is best for the economy as a whole. Keynesian economic policies therefore have a fundamentally collectivist approach. This encourages centralized planning, which leads to mal-investment of capital, resulting in business cycles. In reality some temporal government programs may suppress the private sector and civil society. Therefore, Keynes' ideology might work effectively in an authoritarian state.

Keynes' theory of unemployment has been criticised for its importance to Less-Developed Countries (LDCs). Keynes had the assumption that capital equipment, technology, organisation, labour and efficiency remain constant in both developed and developing economies. The argument is that problems relating to employment in Less Developed Countries (LDCs) arise only on account of the deficiency of demand which can be mitigated through increase in capital equipment, improvement in technology and improved labour efficiency. Solving this problem will take a long process and cannot be solved in the short-run. In most developing countries the basic cause of unemployment is low rate of savings and investment. The Keynesian approach is industry-

oriented while most of the LDCs are agriculturists. Due to this, increases in national income by deficit spending will lead to increases in demand for food. This will raise the prices of foodstuff. Therefore, relying too much on Keynesian approach could mislead economies, and can plunge the economy into an inflationary spiral. Also, to note is that, the principle of multiplier does not work much in LDCs because increased income levels will be absorbed by high prices.

Natural Rate of Unemployment Theory

The theory of the natural rate of unemployment and output developed by Friedman (1968) states that there exists an equilibrium level of output and a rate of unemployment determined by the supply of the factors of production, technology, and institutions of the economy (i.e. determined by real factors). Friedman believed that changes in aggregate demand (dominated by changes in the supply of money) cause temporary movements of the economy away from the natural rate of unemployment. Economists subscribing to Friedman's propositions (monetarists) do not agree with the classical position that output is completely supply determined even in the short run. They believe that equilibrating forces cause the levels of output and employment to return to their natural rate over a longer period. Friedman defined the natural rate of unemployment as the rate of unemployment which has the property that it is consistent with equilibrium in the structure's real wage rates. It is thus the level of unemployment where labour demand equals labour supply at an equilibrium real wage. This situation is depicted in illustration *a* of Appendix D.

The labour demand schedule in illustration *a* of Appendix D is the marginal product of labour (MPN) schedule. At the natural rate of employment

(N*), labour demand is equated with labour supply, where the labour supply schedule is $N^s[W / (P^e = P)]$. This speculate that the price level expected by labour suppliers is equal to the actual price level $(P^e = P)$. It is only at this level of employment that there is no tendency for the real wages to change. Here, labour suppliers have a correct expectation of the price level, and hence there will not be a tendency for labour supply to change.

The natural rate of unemployment can be found simply by subtracting those employed from the total labour force to find the number of unemployed and by expressing this as a percentage of the total labour force. The production function in illustration *b* of Appendix D shows Y^* as the level of output that will result from an employment level N^*. In this context, Y^* is the natural rate of output. Also, to note from Appendix D is that, the natural rate of output and employment depend on the supply of factors of production and technology of the economy (supply side factors). The natural rates of output and employment do not depend on the level of aggregate demand.

The monetarists do not assume that the economy is necessarily at these natural levels of employment and output in the short run. Just like the Keynesians, the monetarists assume that labour suppliers do not have perfect information about the real wages, so they cannot perfectly predict $P^e = P$. They base their labour supply decisions on the expected real wage (W/P^e). In the short run, labour supply may therefore not be given by the supply schedule in illustration *a* of Appendix D, hence P^e may not be equal to P. In this case employment and output will not be at their natural rates.

The monetarist view on the effectiveness of fiscal policy expressed by Friedman was that the state of the budget had no significant effect on the course

of nominal income, on deflation, or on cyclical fluctuations. Friedman rejected the Keynesian proposition that fiscal policy was effective. He argued that fiscal policy by itself is largely ineffective and what matters is what happens to the quantity of money supplied. The monetarists put forward that should the government need to increase spending (with tax rates not changed), the new spending must be financed by the printing of more money or by selling of bonds. Similarly, for a tax cut, if spending is unchanged, lost tax revenues must be replaced by sales of bonds to the public or printing of new money. If a tax cut or spending increase is financed by printing new money, we both have a monetary policy action (*M* increases) and fiscal policy action (*G* increases or *T* falls). In terms of the *IS-LM* framework, both the *IS* and *LM* curves shift. Monetarists do not argue that this type of policy change will be ineffective. They do argue that the policy effect will come mainly because the stock of money changes. Appendix E explains the reasons why monetarists reached the conclusion that fiscal policy will have little, if any, systematic effect on nominal income over short periods of time.

From illustration *a* in Appendix E, an increase in government spending shifts the *IS* curve from IS_0 to IS_1. The effect of the increase in government spending in the monetarist case is primarily to cause the interest rate to rise (from r_0 to r_1). Income level (and hence, aggregate demand) is changed slightly (from y_0 to y_1). Monetarists believe that this is due to the dependence of the relative effectiveness of monetary and fiscal policy on the slopes of the *IS* and *LM* curves; particularly on the assumed magnitude of the interest elasticity of money demand and of investment demand.

Monetarists assume that the interest elasticity of money demand is small (hence the *LM* curve is steep). An increase in government spending initially increases aggregate demand. As income begins to rise, the demand for transactions balances increase. With the money stock fixed, this increase in the demand for money exerts pressure on the interest rate, which rises until money supply and demand are again equal. If money demand is interest-inelastic, a large increase in the interest rate is required to re-equilibrate money demand with the fixed money supply.

In the monetarist view, the *IS* curve is relatively flat. Investment demand is highly sensitive to changes in the interest rate. This implies that a rise in the interest rate required to keep the money market in equilibrium will cause the private sector aggregate demand to decline substantially as government spending begins to stimulate income. This reduction in private sector aggregate demand is termed *crowding out*. In the monetarist view, such crowding out occurs almost all the time with an increase in government spending. The final result is that aggregate demand and, hence, income are increased very little by an increase in government spending.

On the other hand, from illustration *b* of Appendix E, an expansionary monetary policy will shift the LM curve from LM_0 to LM_1. The effect of the increase in money supply in the monetarist case is primarily to cause the interest rate to fall (from r_0 to r_1). The fall in interest rate triggers investment to enhance employment. Therefore, there is a relatively massive change in output (income) level (from y_0 to y_1). Thus, the monetarist conclude that the monetary policy is more effective that fiscal policy because the impact of an expansionary

monetary policy on income is much greater than the effect of expansionary fiscal policy on income.

The monetarists view has been criticised by the conservative economists who argued that, demand for money cannot be predicted as hypothesised by the monetarists. Stieglitz, Bruce and Greenwald (2003) also argued that the relationship between output growth and money supply growth is weak when economic growth is low. Other critics to the monetarist view cite the following:

a. Growth in the money supply is erratic due to structural change in the economy making controlling the money supply meaningless
b. Controlling money supply can lead to recession. For example, in the 1980s, the UK pursued strict money supply targets but this caused a deep recession. This was because monetary policy was too tight trying to meet artificial money supply targets
c. If you want to control unemployment, it makes more sense to target unemployment directly rather than through the intermediary of the money supply.
d. The demand for money is intrinsic to supply.

The Theory of Fiscal Policy

The theory of fiscal policy owes much to Musgrave (1959) who extensively took part in its development. According to this theory, policymakers are assumed to have no other goals besides the promotion of social welfare and public interest of the citizens. The social welfare depends on several indicators, some of which are economic in nature while others are social in nature. The way

in which policymakers attach importance to these indicators changes with time or with the government in power. In representative democracies, the importance attached to the policy indicators by policymakers is assumed to replicate the preferences of the citizens and changes in those preferences. Economic indicators include economic growth, employment growth, productivity growth, inflation rate, unemployment, and income distribution. Social indicators include life expectancy, incidence of crime, literacy rates, the quality of the physical environment, and the incidence of illnesses. The policymakers interested in economic policy will focus on economic indicators. They have some perception of the weight that each of these economic indicators *(Yi)* has on the welfare function *(W)*. Thus, we can write the equation as in equation (5);

$$W = f\ (Y_1, Y_2, \ldots, Y_n\ ) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Policymakers are aware that indicators *(Yi)* can be influenced by changes in particular policy instruments *(X_i)*. The policy instruments include, for example taxes, expenditure and so on. These instruments are available to the policy makers and are used to modify the social welfare and steer it toward optimum levels. This therefore means that each indicator is a function of the policy instruments *(X_i)*. Thus, we can write the equation as equation (6);

$$Y_i = f(X_i\ ); i = 1, 2, 3, \ldots, n\ ; \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

A particular instrument *(Xi)* is especially efficient in influencing a specific indicator *(Yi)*. In this context efficiency means that the change in an instrument *(ΔX)* is necessary to change an indicator by a given amount *(ΔY)*. If a small change in an instrument can cause a significant change in an indicator, then the instrument is considered efficient with respect to that indicator. When

efficient instruments are available to promote desirable objectives, economic policy becomes effective and successful.

Fiscal policies can also be seen as indirect instruments to pursue stabilization policies. They are influenced by changing taxes and spending. Non-fiscal economic instruments are the exchange rate, the interest rate, regulations and so on. The Theory of Fiscal Policy (Musgrave, 1959) states that if some technical conditions are satisfied then the implicit system of equation formed by the relationships mentioned above can be solved for the values of the instruments that would maximize the social welfare *(W)*. This mathematical solution may require too large changes in the instruments. However, if the instruments are efficient, the solution of the equation will require changes in their value that are technically or politically feasible. The theory of fiscal policy is built upon the following assumptions.

a. There is a *Nerve Centre* (office) where the "government" decides which policy instruments to use to influence the economic objectives that it considers important to promote and to maximize the social welfare. The existence of a Nerve Centre implies a unitary form of government to set the desired objectives and to change the policy instruments in the desired direction and by the needed magnitude.

b. Those in the government have only the public interest of the citizens in mind in making any policy decision. They are not influenced by their personal desires or that of any particular group(s) or geographical area(s). There are no effective lobbies operating outside the electoral process and there is no scope for corruption or rent seeking. Those in government avoid "populist" policies that go against the public interest,

even when these policies have short run appeal that could help those in power win the next election. This therefore means that the electoral cycle plays no role in budgetary decisions. When it makes the budgetary decisions, the government has available to it the best economic analyses that money can buy.

c. Policymakers are able to determine, with a reasonable degree of accuracy, that a given change in policy instrument is expected to cause a given change in a particular objective. This will rule out policy decisions based on "gut feelings", impressions, ideology, wrong data, biased forecasts, electoral promises, or antagonism toward previous governments.

d. The executive branch has much control over the policy instruments (that is, over the proposed laws) as it is feasible in a democratic society. This assumption has the outcome that the parliament has the prerogative to approve or turn down the proposals submitted to them by the executive. It also has the privilege to improve the proposals or amend them in some relevant ways. However, it should not have the prerogative to change them in fundamental ways; or to delay unduly action on proposals submitted by the executive. It is the executive branch of government that, within clear constitutional limits, must control the instruments of economic policy, not the parliament.

The theory of fiscal policy has been criticised because it is based on a theory of how the world should behave, not how it really is. The theory is based on a view of the world as seen by the citizens of particular countries. It is far from the reality in other countries, both industrial and especially developing countries.

Thus, while the theory is still useful in telling us what the world should be like, it is less useful in telling us how much of the world actually behaves. Also, the assumption that policymakers and bureaucrats can be separated from their personal interests and incentives in pursuit of the public interest is unrealistic. In reality bureaucrats usually prioritise their personal interests and incentives at the expense of social welfare. This therefore renders the theory of fiscal policy closer to infeasible.

Conclusively, the fiscal policy and unemployment related theories reviewed have the general conclusion that fiscal policy (in some instances together with monetary policy) is very important for stabilizing the economy. Through the use of various devices for fiscal policy (government spending, and taxation) as well as for monetary policy (such as interest rates and monetary targets), fiscal policy can swiftly alleviate the challenges facing an economy. This implies that fiscal policy is substantially necessary in fighting economic evils such as unemployment. However, theorists differ in their perception on how fiscal policy can be used to achieve the desired outcomes. The next section reviews some empirical literatures.

Empirical Literature

Many researchers have examined the relationship between fiscal policy and unemployment using different methods and countries. These researchers found out various results depending on the country of study, the method and time frame (sample size) of the study. This section throws light on some of the various studies conducted, the methodological approaches used, the countries of study and the findings thereof. This section is sub-divided into two sections

– literature from developed countries and literature from less developed countries.

Literature from Developed Countries

Several empirical studies from developed countries have contributed to the debate on the effect of fiscal policy on unemployment. Among these studies include Fatas and Mihov (1998), Kneller, Bleaney and Gemmell (1999), Young and Pedregal (1999), Feldmann (2006), Abrams (1999), Hercowitz and Strawczynski (2004) and others.

In their study to establish the effects of fiscal policy on consumption and employment, Fatas and Mihov (1998) studied the dynamic impact of fiscal policy on employment in the USA for the period from 1960 to 1996. The study was conducted using quarterly data and the vector autoregressive (VAR) methodology was applied to get the empirical results. From the study, it was found that positive improvements in government spending are followed by resilient and persistent increases in employment. The effects are particularly pronounced when government wage expenditure increase. The study tried to relate these findings to several changes of a standard real business cycle model and found that the positive conditional correlation in the responses of employment cannot be matched by the model under plausible assumptions for the values of the calibration parameters. The findings from their study were well-suited with the Keynesian theory of unemployment which advocates that an expansionary fiscal policy framework fuels aggregate demand leading to a rise in employment.

Kneller, Bleaney and Gemmel (1999) in studying the link of fiscal policy and growth used a panel data set covering 22 OECD countries for the period 1970 to 1995. Fiscal policy was classified into four types; distortionary or non-distortionary taxation and productive or non-productive expenditures. Distortionary taxes were those which influence the investment decisions of agents, creating tax wedges and hence impeding the steady-state rate of growth. Non-distortionary taxation did not affect saving/investment decisions because of the assumed nature of the preference function, and hence has no effect on unemployment. Productive government expenditures were those that are included as arguments in the private production function and hence have a direct effect on unemployment. If not then they were classified as unproductive expenditures and do not affect the steady-state rate of unemployment. The study aggregated the IMF's functional classifications of fiscal data into seven main categories, and tests for the sensitivity of the results to this classification of the data. Though the data was annual, the study followed the standard practice of taking 5-year averages to remove the effects of the business cycle, and then applied static panel econometric techniques.

Findings from the study showed that the sampled countries grew, on average, around 2.8 per cent (per capita) annually, with investment ratios in excess of 20 per cent and labour force growth around 1 per cent per annum. Among the fiscal variables, distortionary tax category yielded about twice as much revenue (18 per cent of GDP on average) than non-distortionary taxes, while the two main expenditure categories (productive and non-productive) each accounted for about 15 per cent of GDP. Results from the study agreed

with the Keynesian and the fiscal policy theories which assume that fiscal policy is a necessary tool to enhance growth and employment.

Young and Pedregal (1999) used a *Data-Based Mechanistic* (DBM) approach to time series modelling to explore how government spending and private capital investment may influence the unemployment rate in the USA between 1948 and 1988. The resulting model suggested strongly that the investigation of dynamic relationships between purely relative measures of the major macroeconomic variables could help in understanding changes in economic behaviour. It also allows for an initial investigation of the post-1988 period and an analysis of possible reasons for the differences in the investment-unemployment behaviour of the US economy before and after 1988. Their study established that government spending has positive effect on employment. The study therefore conforms to the Keynesian and fiscal policy argument that admonishes that there is a negative relationship between fiscal policy and unemployment, hence increase government spending will reduce unemployment.

Blanchard and Perotti (2002) adopted a structural VAR specification to analyse the dynamic effects of shocks in government expenditure and taxes on economic activity in USA, during the post second world war period. Their results consistently showed that positive innovations in public spending and taxes respectively had a positive and a negative impact upon output. They also found that both positive shocks in spending and taxes had a strong negative effect upon private investment spending. From the work of Blanchard and Perotti (2002) government spending does not react to other contemporaneous macroeconomic variables automatically and so government spending shocks

can be identified by a recursive ordering with government spending ordered first in a Vector Autoregression (VAR).

To study government size and unemployment, Feldmann (2006) used data from 19 industrial countries within the period from 1985 to 2002. The countries include all major industrial countries and countries with different cultural backgrounds that is, Anglo-Saxon countries, Scandinavian countries, countries from continental Western Europe, and Japan. The study examined how the size of the government sector upsets unemployment. Controlling for the influence of the business cycle as well as for the effect of all major labour market institutions and unobserved country effects, Feldmann (2006) established that a large government sector was likely to increase unemployment. The regression coefficients were estimated using the random effects Generalized Least Squares (GLS) procedure that includes time-invariant country effects (Swamy-Arora method). This compelled Feldmann (2006) to analyse both the cross-country and the time-series variation included in the sample while simultaneously controlling for unobserved country effects. Results from the study indicated that large governments appear to have a particularly harmful effect on women and the low skilled labour and to substantially increase long - term unemployment. In another statement, the study highlighted that dominant state-owned enterprises, a large share of public investment in total investment as well as high top marginal income tax rates and low-income threshold levels at which they apply are particularly detrimental.

Hercowitz and Strawczynski (2004) in a study on cyclical ratcheting in government spending studied the role of business cycles in the phenomenon of increasing government spending as a ratio of GDP in 22 OECD countries. The

study adopted an empirical framework that included both long-run and cyclical considerations in the determination of government spending using annual panel data covering 1975 to 1998. In their study, Hercowitz and Strawczynski (2004) used the Generalised Least Square (GLS) procedure to deal with cross-section heteroscedasticity, with weights computed from the residual variances for each country in a preliminary OLS regression. Results from the study suggested that the prolonged rise in the spending as a ratio of GDP was partially explained by cyclical upward ratcheting due to asymmetric fiscal behaviour. The ratio increased during recessions and was only partially reduced in expansions. The long-run ratcheting effect was estimated at approximately 2 per cent of GDP. Also analysed were the cyclical changes in the composition of government spending (government consumption, transfers and subsidies, and capital expenditure), as well as a possible link between cyclical ratcheting and government weakness. The study is compatible with various theoretical literatures that recommend fiscal policy as a tool to deal with business cycles. Such theories include the theory of fiscal policy and the Keynesian theory.

The work of Feldmann (2006) agreed with the work of Abrams (1999) who studied the effects of government size on the unemployment rate. The study presented the statistical proof for the link between the size of government and the unemployment rate in the U.S.A economy for the time period, 1945 - 2002 using the Generalised Least Squares (GLS) estimation technique. Results from the study suggested empirically that the optimal growth size of government (and tax level) as a share of GDP for the United States is approximately 23 percent. The study also established that increases in the U.S. government expenditure as a percentage of GDP since 1949 was responsible for increases in the

unemployment rate. This contributed to the slowing down of growth in the U.S. economy. Abrams (1999) concluded that reducing the U.S. government's average share of GDP from 36.7 per cent to 23 per cent lowered the reported unemployment rate by approximately 2.9 per cent. In line with Okun's Law, such a reduction raised U.S real GDP by approximately 5.8 per cent. Furthermore, the study concluded that a sizable amount of the slowdown in U.S. GDP growth was attributable to expansions in the size of government and its policies which have raised the U.S. natural rate of unemployment. Findings from the study is in conformity with the theoretical hypothesis that an expansion in government size, *ceteris paribus*, generally provided expenditure and tax effects that increases reported unemployment rate.

Monacelli, Perotti, and Trigari (2010) explore the effect of government consumption in a neoclassical model augmented with search and matching frictions. They show that while higher government consumption increases the hiring rate due to the negative wealth effect inducing higher labour supply, this effect is dampened by the rise in the real interest rate. Overall, the effect of an increase in government spending equal to one percent of GDP leads to a reduction in the rate of unemployment of 0.6 percentage points. Thus, Monacelli et al (2010) studies on the effect of government spending on factors closely related to the functioning of the US labour market using a structural VAR concluded that a rise in spending equal to one percent of GDP not only increases output by about 1.6 percent, but also raises labour market tightness by around 20 percent and employment by 1.6 percent, thereby lowering the unemployment rate by 0.6 percentage points. Their empirical study, which is a structural VAR analysis on US data, shows a larger effect of 0.6 percentage points.

Tagkalakis (2013), investigated the unemployment effects of fiscal policy in Greece using the Structural Vector Autoregressive (SVAR) methodology. In his study, it was evidenced that unemployment and growth effects can be quite sizeable in case of reduction in government purchases, particularly government consumption and to a lesser extent government investment. Also, tax hikes reduce output and increase unemployment, in particular those leading to higher implicit direct and indirect tax rates. The effects of fiscal policy on output and unemployment are more sizeable when considering current year developments. Both output and unemployment respond in a more persistent manner, compared to pre-crisis years.

In conclusion, the reviewed studies in the developed countries enclose a general acumen that fiscal policy contraction has a negative effect on unemployment. In other words, employment is lowered by contractionary fiscal shocks. However, it is imperatively noble to note that fiscal policies react differently to macroeconomic shocks in different countries. Some react in a systematic way but some exercise discretion. This has made it very difficult to have a common fiscal policy in many developed nations.

Literature from Less Developed Countries (LDCs)

Government expenditure in recent time is increasingly becoming a recognisable macroeconomic tool for the control of unemployment and other macroeconomic variables including economic growth. Its relevance as a policy tool, particularly in less developed countries has informed numerous studies in such and related scope as to investigate the effect of fiscal policy or government expenditure on this significant relationship. These include studies by Giavazzi,

Jappelli, and Pagano (2000), Aizenman and Marion (1993), Pepinsky (2007), Agénor, Nabli, Yousef, and Jensen (2007), Zenou (2008), Schclarek (2007), among others.

In the study on policy uncertainty and growth, Aizenman and Marion (1993) investigated the relationship between policy uncertainty, economic growth and unemployment in 46 developing countries over the period 1970 to 1985. They used annual data in an endogenous growth model where domestic investment was characterised by irreversibility and policy fluctuations between a high and a low tax regime. In the study, Aizenman and Marion (1993) made use of the VAR model and it was evidenced from the study that the magnitude of policy fluctuation and the persistence of policy together determine the pattern of investment, economic growth and unemployment. In their study, it was proved that for 46 developing countries over the period 1970-1985, policy uncertainty was negatively correlated with investment, economic growth and unemployment. These results were consistent with economic theory.

Giavazzi, Jappelli, and Pagano (2000) searched for non-linear effects of fiscal policy using panel data of 101 developing countries over the period 1970 to 1994 in a panel study. The study tested if there was evidence of non-linearities in the effects of fiscal policy on national saving and unemployment in developing countries. Giavazzi *et al.* (2000) looked for asymmetries between fiscal expansions and fiscal contractions, and for the possibility that the growth rate of the public debt affects the way in which national saving and unemployment respond to a fiscal impulse. In doing this, the study kept the 70 per cent threshold for the debt/income ratio and a threshold of 4 per cent for the change in the debt/income ratio in two consecutive years. The study used an

OLS fixed effect estimator and found some evidence of a non-linear effect for both taxes and government spending. The offsetting effect of the interaction terms was slightly weaker for fiscal contractions than for expansions. All the relevant coefficients were statistically significant at the 1 per cent level, and the effect of taxes was positive in normal times, smaller during large fiscal contractions, and even smaller during large fiscal expansions.

In the literature, Pepinsky (2007) explored autocracy, elections and fiscal policy in Malaysia using a time-series analysis of Malaysian fiscal expenditures over the period 1967 to 1997. The study showed that the ruling government systematically increased federal government spending before elections. With the use of Vector Autoregressive (VAR) model, the findings from the study showed that authoritarian regimes often used fiscal policy to reward political supporters and to punish political opponents. The study stated that many authoritarian regimes with political institutions like parties, legislatures, and elections, take elections as a focal point for budget expenditures. In addition to rationalizing private resources to distribute patronage, the study noticed that the government officials' roles are manipulated by the Malaysian government authority. Findings from the study have important implications for the growing literature on political institutions under autocratic regimes and the politics of patronage and redistribution in the developing world. The results were consistent with economic theory, prominently the public choice theory which assumes politicians to use fiscal policy to buy votes and maximise personal gains, as opposed to social welfare.

In the literature on labour market policies on growth, employment, urban inequality, and rural welfare in labour-exporting countries in the Middle East

and North Africa, Agénor *et al.* (2007) investigated the impact of labour market policies on labour exporting countries. Several experiments such as a reduction in payroll taxation, cuts in public sector wages and employment, and a reduction in trade unions‟ bargaining power were conducted in the study. Findings of the study suggested that overseas employment may be substituted for domestic informal sector employment as the main buffer in labour market adjustment. Also, the study recommended that to ensure broad-based welfare-enhancing job creation in the region, labour market reforms must take account of general equilibrium effects, including crowding-in effects on private investment and variations in income remittances and international migration patterns. The study further argued that labour market reforms should be seen as a part of a more comprehensive program of structural reforms aimed at spurring growth and employment.

In line with the work of Agenor et al. (2007), Zenou (2008) in the study on job search and mobility in developing countries developed a labour market model in which the formal sector was characterised by search frictions whereas the informal sector was competitive. The study showed that unique steady-state equilibrium existed in South American countries. Subsequently, the study then considered different policies financed by tax on firms' profits. The results suggested that reducing the unemployment benefit or the firms' entry cost in the formal sector induces higher job creation and formal employment. Furthermore, the study revealed that the reduction in unemployment benefits reduces the size of the informal sector but has an ambiguous effect on wages. The study also found that an employment/wage subsidy policy and a hiring subsidy policy had different implications. In particular, an employment/wage subsidy increased the

size of the informal sector while a hiring subsidy decreased the size of the informal sector. Results from the study are also applicable to the economies which strives to promote informal sector employment.

In a study of fiscal policy and private consumption, Schclarek (2007) used panel data from 1970 to 2000 for 40 countries from all over the world to examine the impact of fiscal policy on private consumption and employment. Out of the surveyed countries, 19 were industrialized and 21 were developing. Empirically, the study studied the effects of fiscal policy shocks on private consumption and employment by employing the vector autoregressive (VAR) model. He also investigated whether the initial financing needs of the government or previous fiscal deficits affected the relationship under study. The study used panel data econometric estimations and discovered that government consumption and employment shocks have Keynesian effects for both industrial and developing countries. In the case of tax shocks, there were mixed findings. Furthermore, there was no evidence that favoured the hypothesis of expansionary fiscal consolidations. Results from the study were compatible with economic theory.

In trying to establish the relationship between the government expenditure and poverty rate in Pakistan for the period 1976 to 2010, Mehmood and Sadiq (2010) used an error correction modelling technique to empirically establish that a negative relationship exists between government expenditure and poverty rate in Pakistan.

Loto (2011) investigated the effect of government expenditure on economic growth in Nigeria over the period of 1980 to 2008, with a particular focus on sectorial expenditures. Five key sectors were chosen (security, health,

education, transportation and communication and agriculture). The variables were tested for stationarity and cointegration analysis was also carried out using the Johansen co-integration technique. Error correction test was also performed. These techniques were used to identify the interactions between government spending on these sectors (education, health, national security, transportation and communication and agriculture) and economic growth in Nigeria. The result showed that in the short-run, expenditure on agriculture was found to be negatively related to economic growth. The impact of education, though also negative was not significant. The impact of expenditure on health was found to be positively related to economic growth. Though expenditures on national security and transportation and communication were positively related to economic growth, the impacts were not statistically significant.

In the study of the impact of fiscal policy on unemployment in South Africa, Murwirapechena (2011) found that government consumption expenditure has negative impact on unemployment while government investment (capital) expenditure positively impact unemployment in South Africa. Specifically, the study indicated that 1% increase in government investment expenditure will reduce unemployment by approximately 0.8% while 1% increase in government consumption spending will increase unemployment by approximately 3% in South Africa.

In examining the relationship between government spending and poverty rate in Sistan and Baluchestan Province of Iran for the period 1978 to 2008, Nazar and Tabar (2013) employed an Autoregressive Distributed Lag (ARDL) technique and observed that constructive expenditures have positive

effect on poverty reduction while current expenditure of government influences poverty reduction negatively.

To examine the impact of government expenditure on unemployment and poverty rates in Nigeria for the period 1981 to 2011, Nwosa (2014) adopted an Ordinary Least Square (OLS) estimation technique. Nwosa (2014), in his study found out that government expenditure has positive and significant impact on unemployment rate. However, the same variable was found to have a negative but insignificant impact on poverty rate. Out of the findings from the studies, Nwosa (2014) recommended that a critical attention should be accorded to rising unemployment as well as high poverty rates so that Nigeria's objective of being among the top 20 economies of the world by 2020 can be achieved accordingly.

Resurreccion (2014), studied the link between unemployment and inflation and economic growth for Philippines. The study found out that unemployment is negatively related to inflation and economic growth. The study revealed that, though the unemployment – inflation relationship is not statistically significant, for a 1% percent increase in inflation rate, unemployment decreases by approximately 4.93%, consequently supporting the premise on the trade-off between inflation and unemployment as espoused by the Phillips Curve. However, the first order lag of inflation was found to be significantly negatively related with unemployment. This implies that the effects of the prior year's inflation rate could be felt on unemployment rate in Philippines, such that for every 1% increase in the inflation rate immediately a year prior to the current year, unemployment will decrease by about 9.1%.

Ogbeide, Kanwanye and Kadiri (2015) conducted a study on the determinants of unemployment and the question of inclusive growth in Nigeria. The result from their study revealed that government capital expenditure worsens the unemployment situation in Nigeria. Their study indicated that 1% increase in government capital expenditure increases unemployment rate in Nigeria by 0.103%. However, this assertion was not significant.

Also, Far and Saeedi (2016) conducted a study on the effect of government civil expenditures on unemployment rate for Iran. The results from their study showed that there is negative and significant relationship between the two variables (social and economic spending) and unemployment rate in Iran. They observed that 1% increase in the social spending of government of Iran reduces unemployment rate in Iran by approximately 3.3% while 1% increase in the economic spending of the government of Iran reduces unemployment rate of Iran by approximately 4.4%. They recommended that government spending in Iran should be directed toward economic affairs than social affairs since the former has greater positive impact on unemployment rate in Iran than the latter.

Obayori (2016), investigated fiscal policy and unemployment in Nigeria. The main objective of his study was to examine the impact of government capital and recurrent expenditure on unemployment rate in Nigeria. In the study, he found that both recurrent and capital expenditure reduce unemployment rate in Nigeria. However, the impact was fairly greater for with capital expenditure than that of recurrent expenditure.

In the study, Igberi, Odo, Anoke and Nwachukwu (2016), investigated the implications of rising public debt on unemployment in Nigeria using

Autoregressive Distributed Lag (ARDL) method to cointegration. Their findings from the study indicated a long run relationship between unemployment rate and public debt. It is estimated that 1% increase in public debt on the average, will bring about 1.6% increase in unemployment rate in Nigeria. Also, their results revealed that 1% increase in GDP growth rate on the average will bring about 0.12% decrease in unemployment rate whilst 1% increase in inflation rate will bring about 0.2% decrease in unemployment rate.

Chapter Summary

This chapter reviewed some theoretical and empirical literatures regarding the effects of public expenditure on unemployment. From the reviewed literature, growing bodies of empirical studies have demonstrated a strong link between fiscal policy (government spending) and unemployment. However, as indicated by the literature reviewed, the findings on the effect of government spending on unemployment is mixed as a result of institutional, structural and policy differences of the countries involved, variety of variables used and the data span chosen as well as methodological differences. It is important to note that, in Ghana, a large gap exists in literature regarding the effects of public expenditure on unemployment. To the best of my knowledge, studies in this area in Ghana to provide policy guide to policymakers do not exist. There is therefore the need empirically to investigate the effect of government spending on unemployment.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter is underpinned by the literature in the previous chapters. The chapter provides an analytical framework for the study. It is divided into five sections. The first section develops an analytical model while the second section defines the variables used in the model and the third section discusses the data sources. A review of estimation techniques for the study of the impact of public expenditure on unemployment is presented in the fourth section, while the fifth section concludes the chapter.

Theoretical Framework

The theoretical framework of the study is drawn from the Musgrave (1959) fiscal policy theory. The theory cites that economic indicators (employment, economic growth, inflation, among others) can be influenced by changes in particular policy instruments (taxes, expenditures, exchange rates, among others). This means that each economic indicator is a function of the policy instruments. Thus, the equation can be written as equation (7);

$$Y_i = f(X_i); i = 1, \ldots, j \quad (7)$$

Where: Yi = economic indicator and X_i = policy instrument.

According to Musgrave (1959), a particular instrument is efficient in influencing a specific indicator. This means that the change in an instrument (ΔX) is necessary to change an indicator by a given amount (ΔY). If a small change in an instrument can produce a significant change in an indicator, then the instrument is considered efficient with respect to that indicator. When

efficient instruments are available to promote desirable objectives, economic policy becomes easier.

Model Specification and Definition of Variables

Model Specification

The study adopted the Musgrave (1959) theoretical model in equation (7) as outlined in Baxter and King (1993), which was further discussed by Fatas and Mihov (2001). They regressed employment against fiscal and non-fiscal variables such as government spending, private consumption, investment, economic growth, taxation and treasury bills. The model is modified further in this study to test for the effects of public spending on unemployment in Ghana. Thus, in this study, unemployment is modelled as a function of government expenditure variables (government final consumption spending, government gross fixed capital formation spending) and other macroeconomic variables such inflation, external debt of government, banks credit to the private sector used as a proxy for private sector development and the growth rate of gross domestic product. By substituting the economic indicator (unemployment) and the policy instruments (government expenditure variables, inflation, private sector development, external debt to GDP and growth rate of GDP) into equation (7), equation (8) is formulated as

$$\mathrm{UNEM} = \mathrm{f}(\mathrm{GEX}, \mathrm{INF}, \mathrm{PSD}, \mathrm{XDBG}, \mathrm{GDPG}) \quad (8)$$

With government expenditure (GEX) disaggregated into government final consumption spending (CONS) and gross fixed capital formation spending (CAP), equation (8) is formally written as an econometric model as in equation (9);

$$\mathrm{UNEM}_t = \beta_0 + \beta_1 \mathrm{CONS}_t + \beta_2 \mathrm{CAP}_t + \beta_3 \mathrm{INF}_t + \beta_4 \mathrm{PSD}_t + \beta_5 \mathrm{XDBG}_t + \beta_6 \mathrm{GDPG} + \varepsilon_t \quad (9)$$

For the purpose of linearity and to reduce if not to eradicate the problem of heteroscedasticity, natural logarithm is applied to equation (9) with the exception of growth rate of gross domestic product variable (GDPG) and the resultant function is expressed as in equation (10).

$$\ln UNEM_t = \beta_0 + \beta_1 \ln CONS_t + \beta_2 \ln CAP_t + \beta_3 \ln INF_t + \beta_4 \ln PSD_t + \beta_5 \ln XDBG_t + \beta_6 GDPG_t + \varepsilon_t \quad (10)$$

The growth rate of gross domestic product (GDPG) is not applied with the natural logarithm because doing so will lead to loss of data points since some of the observations are negative. In order to avoid any form of misconception of empirical results, description of all variables that appear in the estimated equation are provided.

Variables and Expected Sign

Government Final Consumption Expenditure (CONS)

The impact of the aggregate government final consumption expenditure (CONS) on unemployment is expected to be negative. An increase in government spending increases the aggregate demand (AD) which leads to more employment being created (decrease in unemployment). This follows the Keynesian hypothesis that assumes employment demand to be derived from aggregate demand. Therefore, a negative sign is expected for the coefficient of aggregate government final consumption expenditure.

Government Capital Formation Expenditure (CAP)

Government gross fixed capital formation (investment) expenditure (CAP) has an unknown expectation on unemployment. The more the

government spends on investment, the higher will be the level of employment in the country (with unemployment decreasing). Thus, at a high level of government investment, the private sector will be attracted to undertake investment which in turn will create jobs for the economy. However, at a low level of capital spending, there will be no motivation for private investors to create jobs thereby creating unemployment in the economy. Hence the sign of government capital spending is indeterminate.

Inflation (INF)

The sign of inflation in this study is indeterminate. This is because a high level of inflation can serve as a motivation for producers to take advantage of the increase in prices to increase productivity. In this case producers will have to employ more labour to increase productivity. On the other hand, high level of inflation can cause prices of goods (raw materials) to increase. This will prompt producers to cut down production just to cut down or maintain the cost of production leading to reduction in employment.

Private Sector Development (PSD)

Private sector development proxied by domestic credit to the private sector by banks is expected to reduce unemployment in the country. More credit to the private sector by banks implies that more investment can be undertaken by the private sector. This will create employment avenues to reduce the level of unemployment. Hence, the coefficient of private sector development (PSD) is expected to be negative.

External Debt as a percentage of GDP (XDBG)

Accessing external short and long-term loans give the government revenue to undertake developmental projects that have the tendency to increase the employment level in the country. However, in the long term, when the loans mature for repayment with interest, the government loses a sizeable amount of money through the payment of both the principal loan and the interest on it. This will result in the cutting down of developmental project leading to a fall in aggregate demand and reduction in investment. This will result in the cutting down of employment with the resulting increase in unemployment. It is therefore expected that in the long-term external debt will be positively related with unemployment.

Gross Domestic Product Growth Rate (GDPG)

It is expected that the growth rate of GDP will be related with unemployment negatively. Theoretically, a high rate of economic growth may reduce unemployment since business men as well as the government become more capable during this period of high economic boom.

Measurement and Justification of Variables

Dependant variable

Unemployment rate (UNEM)

There are many definitions of unemployment. According to IMF as stated by Aqil, Qureshi,, Ahmed, and Qadeer (2014), unemployment is measured annually as percentage of labour force that cannot find a job. Thus, unemployment is a phenomenon of job-seeking resulting out of joblessness. The International Conference of Labour Statisticians (ICLS) of the International

Labour Organisation (ILO) considers a person of working age (e.g. 15+ years in Ghana) to be unemployed if during a specified reference period (either a day or a week), that person had been: 'without work', not even for one hour in paid employment or self-employment of the type covered by the international definition of employment; 'currently available for work', whether for paid employment or self-employment; and 'seeking work', by taking active steps in a specified recent period to seek paid employment or self-employment (Baah-Boateng, 2013). People who voluntarily do not want to work, full time (regular) students, retired people, pregnant women who leave their job to go and give birth and children are not included in the unemployment category.

The strict definition states that unemployment refers to the share of the labour force that is without work but available for and seeking employment. This is in line with that of Ghana Statistical Service (GSS) which says that a person is considered as unemployed if he/she was not engaged in any work, had no attachment to a job or business, reported that he/she was available for work and had taken some specific steps to look for work (GSS, 2013). In short, unemployment means the state where people who are willing and able to do a job fail to get the desired job.

Unemployment is one of the significant variables that depicts the health of an economy. A higher unemployment rate reflects that people are not earning according to their desire and ability. It causes poverty, crime, political and social unrest. Therefore, it is necessary to address this issue in detail to understand the factors which are responsible for causing or remedying unemployment. It must be noted that due to non-availability and difficulty of accessing unemployment data at the national database, the study used the modelled International Labour

Organisation (ILO) estimate of the unemployment rate as well as the national estimate over the study period under review which is available and obtained from the World Development Indicators Online Database (World Bank, 2017).

Independent Variables

The main independent (policy) variables in this study are government final consumption expenditure (CONS) and government gross fixed capital formation expenditure (CAP). Other (control) variables included are; inflation (INF), private sector development (PSD) proxied by the domestic credit to the private sector by financial institutions as a percentage of gross domestic product, external debt stock as a percentage of gross domestic product (XDBG) and the growth rate of gross domestic product (GDPG).

Government Consumption Expenditure (CONS)

General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defence and security but excludes government military expenditures (World Bank, 2017). Government final consumption expenditure was defined in national accounts of the European System of Account (ESA, 1995) as "expenditure incurred by the general government sector on goods or services that are used for the direct satisfaction of individual needs or wants (individual consumption goods and services) or expenditure on the collective needs of members of the community (collective consumption services)" and this general definition was similar to that included

in the 1993 System of National Account (SNA) of World Bank. Government final consumption expenditure is then incurred by all subsectors of the general government sector as well as by the social security funds.

The government final consumption expenditure is among the most significant instruments of fiscal policies. For this reason, the effect of government consumption expenditure variable on other macroeconomic variables has been the subject of long debates. From the Classical economists, government expenditure has no effect on economic growth due to complete crowding out of private investment. This argument is vehemently rejected by radical Keynesians who assert that an expansionary fiscal policy affects economic growth in full. Generally, they expect an increase in government consumption expenditure (government spending) to increase aggregate demand. So, when demand is more than supply in the economy, prices will increase. To meet the increase in aggregate demand, producers will have to increase their productivity thereby enhancing economic growth and employment. In a different context, if government final consumption expenditure acts as a complementary effect for private investment, we can expect that an increase in government final consumption expenditure will lead to a growth in production and employment.

In an empirical study carried out by Obayori (2016), he established that there is a negative and significant relationship between unemployment and recurrent (consumption) expenditure. This means that, if the government recurrent expenditure increases, unemployment will reduce and when government recurrent expenditure decreases, unemployment will increase. Hence, government final consumption expenditure should be included in

estimating unemployment – public spending model. Consequently, we expect the coefficient of government final consumption expenditure (CONS) to be negative.

Government Gross Fixed Capital Expenditure (CAP)

Government gross fixed capital formation as a percentage of gross domestic product (GDP) is used to account for government capital expenditure. Gross fixed capital formation refers to the net increase in physical assets (investment minus disposals) within the measurement period. It is called "gross" because it does not take into account capital consumption allowance (depreciation) of fixed capital. It also excludes expenditure on acquisition of new lands. Capital formation is a form of investment because it is the part of current income which is saved and reinvested in return for future incomes (Bakare, 2011). Gross fixed capital formation (formerly gross domestic fixed investment) includes land improvements (fences, drains, and so on); plant, machinery, and equipment purchase; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation (World Bank, 2017). Thus, there are two sub-classes of gross fixed capital formation; gross private fixed capital formation and gross public fixed capital formation. Hence, adjusting the gross fixed capital formation for gross private fixed capital formation gives the public gross fixed capital formation (Ncanywa & Makhenyane, 2016).

High level of capital spending (investment) will create the necessary environment needed for production to create employment. For example, construction of roads in a farming area will motivate farmers to increase their productivity since their produce can easily be conveyed to the market for sale to generate the expected income. This will generate employment for the farming folks since labourers will be employed to enhance productivity.

Mainstream economics has been denying the influence of capital formation on unemployment of economies (Nickell, Nunziata & Ochel, 2005). However, the significant role of capital accumulation in the evolution of unemployment rates across economies has gradually regained the interest of macro-labour economists and the resulting literature is fast growing. This is evidenced in the works of Stockhammer, Guschanski, and Kohler, (2014) and Karanassou, Sala and Salvador (2008) among others. Despite the abundant resources in Africa, infrastructure appears to be a dismal factor that led millions of its citizens into unemployment. It has been shown that the most effective way to reduce unemployment is to raise investment as a share of GDP. That is higher shares of investment are associated with lower unemployment (Taylor, 2011).

In the literature, there are mixed findings on the effect of government capital expenditure on unemployment. In Keynes' General Theory, as stated by Smith and Zoega (Smith & Zoega, 2012), investment determines effective demand, which influences employment. However, the impact of investment on employment depends on the volume it is invested (Violera, 2012). In their study, Ogbeide, Kanwanye and Kadari (2016) found out that government capital expenditure aggravates unemployment in Nigeria. However, in the work of Onodugo, Obi, Anowor, Nwonye and Ofoegbu (2017), they revealed that

government capital expenditure has a negative relationship with unemployment in Nigeria. On the premise of these studies, the sign of government gross capital formation expenditure (simply, capital expenditure) in this study is not known a priori.

Gross Domestic Product Growth Rate (GDPG)

Gross domestic product (GDP) growth rate is the rate at which a country's GDP grows or changes over time, usually a year. An increase in the growth rate of GDP is an indication of economic growth. Theoretically, a high rate of economic growth may reduce unemployment since businesses as well as the government become more capable during this period. Economist, Arthur Okun's, research on the subject which has since become known as the Okun's law. Basically, Okun's law investigated the statistical relationship between unemployment rate and the growth rate of its economy. Okun's law is intended to find out how much of a country's gross domestic product (GDP) may be lost when the unemployment rate is above its natural rate. Okun's law focuses on a relationship between unemployment and GDP, whereby 1% increase in unemployment causes a 2% fall in GDP (Okun, 1963).

Many empirical studies have been conducted to prove the law in different regions or countries. Xuen, Bee, Hsien, Yen and Yee (2017) in their study, revealed a highly significant negative relationship between unemployment and GDP growth rate in China. In their study, Ogueze and Odim (2015), showed that unemployment has a negative relationship with the real gross domestic product in Nigeria. Also, Al-hosban and Edienat (2017) revealed a negative relationship between unemployment and GDP in the period 1982-

2016 in the Jordanian economy, which is consistent with Okun's law. This implies that growth in the GDP will help reduce unemployment. On the basis of these empirical evidence the study expects a negative relationship between these two variables.

Inflation (INF)

Inflation is the increase in the overall level of prices (Mankiw, 2001). Thus, inflation is a sustained increase in the aggregate or general prices level in an economy. Inflation is another important macroeconomic factor which affects unemployment. The relationship between these two variables has been of great significant since 1958 when A.W. Phillips showed a negative relationship between the variables. Although the Philip Curve shows a negative relationship, the traditional literature advocates a positive correlation between the variables. For example, Rogerson (1988) proved empirically that a rise in inflation decrease the labour supply through a consumption-leisure substitution mechanism. Similarly, Beyer and Farmer (2007) found an insignificant and positive relationship between the two variables. Hence the correlation between inflation and unemployment may be positive, negative or insignificant.

However, recent studies have established that there is a negative relationship between inflation and unemployment. Sumera and Amjad (2016) established both short and long run insignificant trade-off between inflation and unemployment in Pakistan. However, Mahmoud (2013) established a significant long run positive relationship between changes in unemployment rate and inflation gap in Egypt. Also, Ejembi, Adesina and Maja (2015) found a long run positive relation between inflation and unemployment for the

Ghanaian economy at 10 percent significant level. Consequently, the effect of inflation on unemployment in this study is not known a priori.

Private Sector Development (PSD)

There is a growing recognition of the role played by the private sector in creating employment opportunities for the poor, improving investment climate for entry of new firms into the market thus fostering competition, increasing efficiency and productivity, and promoting economic growth. According to World Development Report (World Bank, 2005), private sector entities invest in new markets and new facilities that help strengthen the infrastructural foundation of the economy which, in turn, lays a good ground for attracting investors from abroad and facilitating achievement of economic growth. The private sector development also helps in reducing unemployment and corruption which have far-reaching implications for both economic and social lives of the country's population. Jobs and incomes created by private sector enterprises lead to economic diffusion of growth by having a direct impact on poverty alleviation. The private sector is known to create better employment opportunities.

Andabai (2014) in his study on the "private sector development and economic growth" revealed that there is a positive significant relationship between private sector development and economic growth in Nigeria. It therefore suggests that an increase in the development of the private sector will enhance economic growth in Nigeria thereby reducing unemployment. The study therefore proposed that there is a negative relationship between private sector developments and unemployment.

External Debt as a percentage of GDP (XDBG)

Total external debt is debt owed to non-residents repayable in currency, goods, or services. Total external debt is the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt. Short-term debt includes all debt having an original maturity of one year or less and interest in arrears on long-term debt.

In the study of Ohwofasa, Nana and Kumapayi (2012) on "External Debt Management and Macroeconomic Performance of the Nigerian Economy" it was established that external debt has a positive determining influence on unemployment. Igberi, Odo, Anoke and Nwachukwu (2016) confirmed this assertion and established that a 1% increase in public debt on the average, will bring about 1.6% increase in unemployment rate of Nigeria. As a result, the relationship between external debt and unemployment in this study is expected to be positive.

Data Type and Source

The study relies on secondary data. The data on all the variables were obtained from the World Development Indicators (WDI) yearly online database of the World Bank. The study considers a sample size of 37 annual observations for the period from 1980 to 2016 for each variable. The choice of the data coverage (sample period) was informed by the fact that it extremely challenging getting data below 1980 on unemployment which is a key variable in the study.

Estimation Procedures

To test the relationship between unemployment and government expenditure, the study applied cointegration and error-correction models. The testing procedure involved;

i. First, testing the time series properties of the data by using the Augmented Dickey-Fuller and Philip-Peron (PP) test. This was done to determine the order of integration of the variables.
ii. Second, the study proceeded to test for short run and long run relationships among the variables using the Autoregressive Distributed Lag (ARDL) approach otherwise known as the bounds testing approach to cointegration.
iii. Thirdly, the stability and diagnostic test statistics of the ARDL model was examined to ensure the reliability and the goodness of fit of the model.

To establish whether there is a threshold effect of government capital expenditure on rate of unemployment, the study employed the Conditional Least Square estimation technique that was originated by Hansen (1999) and developed by Khan and Senhadji (2001). The testing procedure involve;

i. First, ensuring that the variables are in their growth rate.
ii. Secondly, testing the time series properties of the variables by using the Augmented Dickey-Fuller and the Philip-Perron tests for unit root in the presence of a single structural break point.
iii. Thirdly, assigning a dummy for the threshold variable in unemployment regression model.

iv. Fourthly, the regression model is estimated using Ordinary Least Square estimation technique by assigning threshold value in each regression. The threshold value whose regression generates a maximum R-squared is chosen as the threshold point.

v. Finally, different diagnostic tests are implemented on the estimation where the R- square is maximized in order to check for the reliability of the estimation.

Unit Roots Test

Brooks (2008) identified a stationary series as one with a constant mean, constant variance and constant auto covariance for each given lag. The stationarity of a series can strongly influences its behaviour and properties. If a series is non-stationary and it must be differenced *d* times before it becomes stationary, then it is said to be integrated of order *d*. This would be written as I (*d*). An I (0) series is a stationary series, while an I (1) series contains one unit root. An I (2) series contains two unit roots and so would require differencing twice to induce stationarity. I (1) and I (2) series can wander a long way from their mean value and cross this mean value rarely, while I (0) series would cross the mean frequently. A series that is not stationary is referred to as non-stationary.

The use of non-stationary data can lead to meaningless or spurious regression. If non-stationary variables are employed in a regression, then the standard assumptions for asymptotic analysis will not be valid. Thus, the usual t-ratios will not follow a t-distribution and the F-statistic will not follow an F-distribution. As a result of spurious and or nonsense regression, unit root or

stationarity tests should be done on all the variables before estimating the parameters and testing for co-integration. Various tests of stationarity exist.

In this study the Augmented Dickey-Fuller (ADF) and Philip-Perron (PP) unit root tests are employed. This was done to ensure reliable result of the test for stationarity due to inherent individual weaknesses of the techniques. The ADF and PP test are similar except that they differ with respect to the way they correct for autocorrelation in the residuals and also the ADF test has a low power in small samples (Cheung and Lai, 1993), so the study used the PP unit roots tests to check the robustness of the ADF estimation results. The Phillips-Perron non-parametric test generalises the ADF procedure, allowing for less restrictive assumptions for the time series in question.

The basic formulation of the Augmented Dickey-Fuller (ADF) is specified as in equation (11);

$$\Delta Y_t = \alpha + \delta t + \rho Y_{t-1} + \sum_{i=1}^{P} \propto_i \Delta Y_{t-1} + \varepsilon_t \qquad (11)$$

Where Y_t denotes the series at time t, Δ is the first difference operator, $\alpha, \delta, \rho, \propto$ are parameters to be estimated, ε is the stochastic random disturbance term and p is the lag length included in the estimation process.

The null hypothesis to be tested is that the variable under investigation has a unit root against the stationary alternative. Thus,

$$H_0 : \rho = 0$$
$$H_1 : \rho \neq 0$$

The null hypothesis is that the series contains unit roots which implies that the series is non-stationary against the alternative hypothesis that it does not contain unit roots, implying that the series is stationary. The decision rule is that, if the test statistics of the ADF is higher (in absolute terms) than the critical value of the test at the significance level under consideration, we fail to accept the null

hypothesis and conclude that there is no unit root implying that the series is stationary. In a different domain, if the p-value for Z_t of the ADF test is greater than the significance level of the test statistic, we fail to reject the null hypothesis of the presence of unit root and conclude that there is unit root, hence the series is non-stationary. However, if the p-value for the Z_t of the ADF test is less than the significance level at which the test was conducted, then we fail to accept the null hypothesis and conclude that the series has no unit root, hence the series is stationary.

The lag length is chosen using the Akaike Information Criterion (AIC) or the Schwarz Information Criterion (SIC). Both the AIC and SIC have the objective of selecting a model that produces the error that approaches a white noise process as much as possible, subject to the constraint that smallest possible number of lag terms or estimated parameters is included to ensure parsimony as well (Bashiru, 2011). The ADF unit roots test assumes that the error term is independent with a constant variance. It is known that the ADF tests do not consider cases of heteroscedasticity and non-normality that are regularly disclosed in a raw data of most economic time series variables, and also unable to discriminate between stationary and non-stationary series that have high degree of autocorrelation. To escape these problems of the ADF tests in this study, the study further employed a test, the Phillips-Perron unit roots test which is superior to the ADF unit roots test to correct for the possible weakness of the ADF test (Stock, 1994).

The Phillips-Perron unit roots test assumes that the errors are weakly dependent and heterogeneously distributed. This assumption of the PP unit roots test over the constant and independent error terms of the ADF test makes the PP

test to be superior to the ADF test. The PP unit roots test is specified as in equation (12);

$$\Delta Y_t = \alpha + \beta_i Y_{t-1} + \theta(t - T/2) + \sum_{i=1}^{m} \theta_i \Delta_{t-i} \quad (12)$$

The test hypothesis, the estimation process and the decision criteria of the PP unit roots test are the same as that of the ADF unit roots test.

Autoregressive Distributed Lag (Bounds Test) Approach to Cointegration

The two commonly used techniques to test for Cointegration between variables are the Engle and Granger method and the Johansen technique. The Engle and Granger method is a single-equation technique and as such it can lead to biasness, especially when there are more than two cointegrated variables under consideration (Asteriou & Hall, 2011; Ang, 2010). Another shortcoming of this method is in its implementation: in order to obtain the long-run equilibrium relationship, we need to estimate the Ordinary Least Squares (OLS) regression as a first step. The first step, as pointed out by Banerjee, Dolado, Hendry and Smith (1986), may generate a substantial bias owing to the omission of dynamics and this can undermine the performance of the estimator. Also, the second step uses the generated residual series in the first step to estimate a new regression model in the second stage, in order to test whether the residual series is stationary or not. Hence, the error introduced in the first step is carried forward into the second step (Enders, 2004; Asteriou & Hall, 2011).

The Johansen method, which is known as a system-based approach to cointegration, is considered to be a superior method over the Engle and Granger method and offers a solution in the case of having more than two variables and multiple cointegration vectors that might exist between the variables.

Furthermore, the Johansen approach mitigates the omitted lagged variable bias that affects the Engle and Granger approach by the inclusion of lags in the estimation.

Even so, the Johansen method can be subject to criticism. The first drawback is the sensitivity of the results to the optimal number of lags included in the test (Gonzalo, 1994). The second is that if there are more than one cointegrating vectors, it is often hard to interpret each implied economic relationship and to find the most appropriate vector for the subsequent test (Ang & McKibbin, 2007). Both the Engle-Granger and Johansen techniques are criticized on the grounds that the validity of these methods requires that all the variables be integrated of the same order such as of order one, I (1) or of order two, I(2). They cannot be employed, therefore, if we have a mixture of I (0) and I (1) variables.

The study, uses the autoregressive distributed lag or Bounds testing approach to cointegration (ARDL) technique (Pesaran, Shin & Smith, 2001). This method has been used as an alternative cointegration test since it addresses the above issues raised against Engle-Granger and Johansen tests. First, the co-integrating relationship can be estimated easily using OLS after selecting the lag order of the model. Second, it tests simultaneously for the long and short-run relationships between the variables in a time series model. Third, in contrast to the Engle-Granger and Johansen methods, this test procedure allows a mix of integration such as I (0) or I (1) or mutually co-integrated, which means that no unit root test is required. That is the ARDL model avoids pre-testing problem associated with standard cointegration, which requires that the variables should be integrated of the same order. It therefore implies that the ARDL model is

more appropriate when we are not sure of the unit roots properties of the series in the study. However, the ARDL test procedure will not be applicable if an I (2) series exists in the model.

Fourth, in spite of the possible presence of endogeneity of all kinds, ARDL model provides unbiased coefficients of explanatory variables along with valid t-statistics. In addition, ARDL model corrects the omitted lagged variable bias (Inder, 1993). Furthermore, Jalil and Ma (2008) and Ang and McKibbin (2007) argue that the ARDL framework includes sufficient number of lags to capture the data generating process from general model to specific model. Finally, this test is very efficient and consistent in small and finite sample sizes unlike the Johansen co-integration technique which require large data sample for validity.

The Steps of the ARDL Cointegration Approach

Step 1: Determination of the Existence of the Long Run Relationship of the Variables

In the first step, the existence of the long-run relation between the variables under investigation is tested by computing the Bound F-statistic (bounds test for cointegration). This bound F-statistic is carried out on each of the variables as they stand as endogenous variable while others are assumed as exogenous variables. In practice, testing the cointegration between the variables in the ARDL model leads to hypothesis testing of the long-run relationship among the underlying variables. In doing this, current values of the underlying variables are excluded from the ARDL model approach to cointegration.

This approach is illustrated by using an ARDL (p, q) regression with I(d) regressors as expressed in equation (13);

$$Y_t = \emptyset_1 Y_{t-1} + \cdots + \emptyset_p Y_{t-p} + \phi_0 X_t + \phi_1 X_{t-1} + \cdots + \phi_p X_{t-p} + \mu_t \quad (13)$$

Where $t = 1, 2, \ldots, T$; $\mu_t \sim iid\ (0, \delta^2)$; ϕ,and $\emptyset$ are unknown parameters, and $Y_t\ (or\ X_t)$ is an I(d) process generated by equation 14;

$$Y_t = Y_{t-1} + \varepsilon_t \quad or \qquad X_t = X_{t-1} + \varepsilon_t \quad (14)$$

Where μ_t and ε_t are uncorrelated for all lags such that Y_t is strictly exogenous with respect to μ_t. The cointegration or the dynamic stability condition is that /$\emptyset$/ <1. This assumption is similar to the stationarity condition for an AR (1) process and implies that there exists a stable long-run relationship between Y_t and X_t. If $\emptyset$=1, then there would be no long-run relationship. In practice, this can also be denoted as follows:

The ARDL $(p, q_1, q_2 \ldots q_k)$ model approach to Cointegration testing is expressed as in equation 15;

$$\Delta Y_t = \propto_0 + \sum_{i=1}^{k} \alpha_1 \Delta Y_{t-i} + \sum_{i=1}^{k} \alpha_2 \Delta X_{t-i} + \delta_1 Y_{t-1} + \delta_2 X_{t-1} + v_t \quad (15)$$

Where k is the maximum lag order and is chosen by the researcher using the appropriate criteria. The F-test is carried out on the joint null hypothesis that the coefficients $(\delta_1\ and\ \delta_2)$ are zero. $\delta_1\ and\ \delta_2$ correspond to the long run relationship while $\alpha_1\ and\ \alpha_2$ represent the short run dynamics of the model. The null hypothesis of non-existence of the long-run relationship is defined by;

$H_0: \delta_1 = \delta_2 = 0$ (That is the long run relationship does not exist)

$H_1: \delta_1 \neq \delta_2 \neq 0$ (That is the long run relationship exists)

This is tested in each of the models as specified by the number of variables. This can also be denoted as in equation (16);

$$F_Y(Y_1 | X_1 \ldots X_K) \quad (16)$$

The hypothesis is tested by means of the F- statistic (Wald test) in equation (16). The distribution of this F-statistics is non-standard, irrespective of whether the variables in the system are I (0) or I (1). The critical values of the F-statistics for different number of variables (K), and whether the ARDL model contains an intercept and or trend are available in Pesaran and Pesaran (1997), and Pesaran et al. (2001). They give two sets of critical values. One set assuming that all the variables are I (0) (i.e. lower critical bound), meaning that there is no cointegration among the underlying variables). Another set of critical values assuming that all the variables in the ARDL model are I (1) (i.e. upper critical bound), meaning that there is cointegration among the underlying variables. For each application, there is a band covering all the possible classifications of the variables into I (0) and I (1). However, according to Narayan (2005), the existing critical values in Pesaran et al. (2001) cannot be applied for small sample sizes as they are based on large sample sizes. Hence, Narayan (2005) provides a set of critical values for small sample sizes, ranging from 30 to 80 observations. The critical values are 2.496 - 3.346, 2.962 – 3.910, and 4.068 – 5.250 at 90%, 95%, and 99%, respectively.

If the relevant computed F-statistic for the joint significance of the level variables in equations (12), δ_1 and δ_2 falls outside this band, a conclusive decision can be made, without the need to know whether the underlying variables are I (0) or I (1), or fractionally integrated. That is, when the computed F-statistic is greater than the upper bound critical value, then the H_0 is rejected (the variables are cointegrated). If the F-statistic is below the lower bound critical value, then the H_0 cannot be rejected (there is no cointegration among the variables). If no long run relationships exist in equation (16), the ARDL

approach cannot be applied, hence, Johansen and Juselius (1990) approach becomes the alternative. If the computed statistic falls within the critical value band (i.e. between the lower and upper bound), the inference is inconclusive. It is at this stage that unit root tests become important (Pesaran and Pesaran, 1996). Also, if the variables are I (2), the computed F-statistics of the bounds test are invalid because they are based on the assumption that the variables are 1(0) or 1(1) or mutually cointegrated (Chigusiwa, Bindu, Mudavanhu, Muchabaiwa & Muzambani, 2011). However, to avoid invalid test results, it may be advisable to first perform unit roots, though not as a necessary condition, in order to ensure that none of the variables is I (2) or beyond, before carrying out the bound F-test.

Step II: **Estimation of the Long Run Estimates of the Selected ARDL Model**

The issue of finding the appropriate lag length for each of the underlying variables in the ARDL model is very important because we want to have Gaussian error terms (i.e. standard normal error terms that do not suffer from non-normality, autocorrelation, heteroscedasticity, etc.). In order to select the appropriate model of the underlying long run equation, it is necessary to determine the optimum lag length (k) by using proper model of order selection criteria such as; the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC) or Hannan-Quinn Criterion (HQC). By applying the Error Correction Model (ECM) version of the ARDL, the speed of adjustment to long run equilibrium from short run shocks will be estimated.

Following Pesaran et al. (2001), Frimpong and Oteng-Abayie (2006), Ang and McKibbin (2007), the ARDL version of the vector error correction

model (VECM) which is an Unrestricted Error Correction Model (UECM) is adopted and specified as in equation (17);

$$\Delta \ln UNEM_t = \beta_0 + \sum_{i=1}^{p} \pi_{1i} \Delta \ln UNEM_{t-1} + \sum_{i=1}^{q} \pi_{2i} \Delta \ln CONS_{t-i} + \sum_{i=1}^{q} \pi_{3i} \Delta \ln CAP_{t-i} + \sum_{i=1}^{q} \pi_{4i} \Delta \ln INF_{t-i} + \sum_{i=1}^{q} \pi_{5i} \Delta \ln PSD_{t-i} + \sum_{i=1}^{q} \pi_{6i} \Delta \ln XDBG_{t-i} + \sum_{i=1}^{q} \pi_{7i} \Delta GDPG_{t-i} + \beta_1 \ln UNEM_{t-1} + \beta_2 \ln CONS_{t-1} + \beta_3 \ln CAP_{t-1} + \beta_4 \ln INF_{t-1} + \beta_5 \ln PSD_{t-1} + \beta_6 \ln XDBG_{t-1} + \beta_7 GDPG_{t-1} + \omega_t \quad (17)$$

Where

Δ denotes the first difference operator, β_0 is a drift parameter, π's are the short run parameters, β's are the long run multipliers, q is the maximum lag length of ARDL (p, q) model selected by using Akaike Information Criterion (AIC) and or Schwarz Bayesian Criterion (SBC), ω_t is white noise error term which is normally distributed with zero mean and constant variance (i.e. $\omega_t \sim N(0, \delta^2)$).

The study begins by estimating equation (17) with the bounds test by applying the OLS method which is normally the first procedure in the ARDL model. The F-test (Wald test) is used to test for the presence of long-run relationship among the variables in equation (17) given as follows: the null hypothesis of no long-run relationship among the variables in equation (17) is tested against the alternative hypothesis of a long-run relationship as follows:

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$$

$$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq 0$$

The existence of cointegration between the variables under consideration is tested based on the F-statistics (Wald statistics). Given that the asymptotic distribution of F-statistics is non-standard without considering the independent variable being I (0) or I (1), Pesaran and Pesaran have provided two set of critical values for the different regressors (k), and whether the ARDL contains an intercept and or trend. Therefore, the computed F-statistic is compared with these sets of critical values developed on the basis that the independent variables are I(d) with $(0 \leq d \leq 1)$.

In order to obtain the optimal lag length for each variable, the ARDL methodology estimates $(p+1)^{k+1}$ number of regressions, where p is the maximum number of lags to be used and k is the number of variables in the equation. The lag of the ARDL is based on the Schwarz-Bayesian Information Criterion (SBIC) or the Akaike Information Criterion (AIC) or the Hannan and Quinn (HQ) criterion. The criterion that gives the least lag length is selected for the ARDL model.

If the bounds test reveals that long-run relation exist among the variables in the ARDL model, the long-run coefficient of the ARDL model is estimated as equation 18;

$$\begin{aligned} \ln\mathrm{UNEM}_t = {} & \beta_0 + \sum_{i=1}^{p} \beta_1 \ln\mathrm{UNEM}_{t-i} + \sum_{i=0}^{q_1} \beta_2 \ln\mathrm{CONS}_{t-i} + \sum_{i=0}^{q_2} \beta_3 \ln\mathrm{CAP}_{t-i} \\ & + \sum_{i=0}^{q_3} \beta_4 \ln\mathrm{INF}_{t-i} + \sum_{i=0}^{q_4} \beta_5 \ln\mathrm{PSD}_{t-i} + \sum_{i=0}^{q_5} \beta_6 \ln\mathrm{XDBG}_{t-i} \\ & + \sum_{i=0}^{q_6} \beta_7 \mathrm{GDPG}_{t-i} + \mu_t \end{aligned} \tag{18}$$

Finally, the Error Correction Model (ECM) is used to estimate the short run dynamics. The ECM generally provides the means of reconciling the short-run behaviour of an economic variable with its long-run behaviour. The ECM is specified as equation 19;

$$\Delta lnUNEM_t = \alpha_0 + \sum_{i=1}^{p} \gamma_{1i} \Delta lnUNEM_{t-i} + \sum_{i=1}^{q} \gamma_{2i} \Delta lnCON_{t-i} + \sum_{i=1}^{q} \gamma_{3i} \Delta lnCAP_{t-i} + \sum_{i=1}^{q} \gamma_{4i} \Delta lnINF_{t-i} + \sum_{i=1}^{q} \gamma_{5i} \Delta lnPSD_{t-i} + \sum_{i=1}^{q} \gamma_{6i} \Delta lnXDBG_{t-i} + \sum_{i=1}^{q} \gamma_{7i} \Delta GDPG_{t-i} + \rho ECT_{t-1} + \mu_t \quad (19)$$

Where

$\gamma_{i's}$ represent the short-run dynamic coefficients of the model's convergence to equilibrium. ECT_{t-1} is the Error Correction Term of one period lag. The coefficient of the ECT_{t-1}, ρ measures the speed of adjustment to equilibrium in the event of shocks to the system. The coefficient of the error correction term, ρ is expected to be negative to confirm the existence of the co-integrating relationship among the variables in the model. The absolute value of ρ is expected to be greater than zero but less than or equal to one (i.e. $0 < |\rho| \leq 1$). If the estimated $\rho = 1$, then 100% of the adjustment takes place within the period, or the adjustment is instantaneous and full. If the estimated $\rho = 0.5$, then 50% of the adjustment takes place each period (year). If $\rho = 0$, it indicates that there is no adjustment, and to claim that there is a long-run relationship is not valid anymore.

Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSUMSQ) of Recursive Residuals Test (Stability Tests)

Two tests of stability of the long-run coefficients are conducted, following Pesaran and Pesaran (1997), after estimating the error correction model. These tests are performed by plotting the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ). The CUSUM test for stability is carried out based on equation 20;

$$CUSUM_{\tau} = \sum_{t=K+1}^{\tau} \hat{v}_t^{(r)} \Big/ \hat{\sigma}_v \qquad (20)$$

Where $\hat{\sigma}_v$ is the variance of the residual, $\hat{v}_t^{(r)}$ is the recursive residuals and $\tau = K+1, \ldots, T$

Threshold Model

The third objective of this study is to estimate the threshold level of government capital expenditure on unemployment in the economy. In estimating the unemployment model given in equation (9), Non-Linear Least Squares (NLLS) could have been used if the threshold level (k) was known a priori. However, in this study the threshold point (k) enters into the model in a non-differentiable and non- linear way that makes the method of NLLS inappropriate to use. Therefore, the best way of identifying the threshold point is the technique of Conditional Least Square (CLS) that is originated by Hansen (1999) and developed by Khan and Senhadji (2001).

Therefore, in studying the threshold of government capital expenditure on unemployment the study will adopt CLS model by Khan and Senhadji (2001). Though the model was designed to undertake a panel study of developed

and developing countries, it has been modified by other researchers such as Phiri (2010), Frimpong and Oteng-Abayie (2010), Bawa and Abdullahi (2012) and other scholars to study the threshold of inflation on economic growth for a particular country. In this study, the model will be modified further by using new set of variables such as rate of unemployment, government capital expenditure and other control variables to analyse the threshold of government capital expenditure on unemployment in Ghana.

Estimating the Threshold

The threshold estimation begins by ensuring that all the variable in the threshold model are in their growth rate. Also, the two main variables are tested for the causality among them. The growth rate variables are tested to see whether they are stationary using the Philip-Perron unit root tests. This is to ensure that all the variables are integrated of order zero. After establishing that the growth rate variables are stationary at levels, the Conditional Least Square (CLS) technique is carried out for formal estimation of the threshold level of government capital (investment) expenditure on unemployment. In the CLS technique, the basic idea is to find the level of capital expenditure that minimizes the Residual Sum of Squares (RSS) or the one that maximizes the R^2 for different values of the threshold points assigned. In other words, the value of the threshold (k) is obtained by finding the maximum point among the assigned values of Ks in the estimation process where the R^2 has the highest value (or the RSS has the smallest value) from the respective regressions. As explained in the study of Khan and Senhadji (2001) the identification of the threshold point is given as equation (21);

$$k^* = Arg_k Max R^2(\underline{k}, \ldots, \overline{k}) \quad or \quad k^* = Arg_k MinRSS \tag{21}$$

where, k* is the threshold level of capital expenditure, $\underline{k}$ and $\overline{k}$ are the range at which the ascending numbers are given. Thus, according to equation (21), among the values between the range, the one that maximizes the R^2 or minimises the residual sum of square is the threshold level of capital expenditure.

In the method of Conditional Least Squares (CLS), before undertaking the regression, it is necessary to assign dummy values for the threshold variable. For the threshold level of capital expenditure say, 2 percent of GDP, dummy variable should be assigned 0 for all values of capital expenditure that are less than or equal to 2 percent of GDP and 1 for all values of capital expenditure that are higher than 2 percent of GDP. In this method, a regression for each value assigned from $\underline{k}$ to $\overline{k}$ is estimated. The unemployment model in equation (9) is modified to capture the threshold effect as in equation (22):

$$UNEM_t = \alpha_0 + \alpha_1 CAP_t + \alpha_2 D_t(CAP_t - k^*) + \alpha_3 PSD_t + \alpha_4 XDBG_t + \alpha_5 INF_t + \varepsilon_t \tag{22}$$

Where $k^*$is the threshold level of government capital expenditure, D_t is a dummy variable that takes the value of one when the growth rate of government capital expenditure becomes greater than the threshold level and zero otherwise. That is

$$D_t = \begin{cases} 1, \ldots\ldots\ldots \text{ if } CAP_t > k \\ 0, \ldots\ldots\ldots \text{ if } CAP_t \leq k \end{cases} \tag{23}$$

In order to check for the reliability of the estimation, different diagnostic tests are implemented on the estimation where the R^2 is maximized and or the RSS is minimized. The LM test is used to check for autocorrelation. The problem of Heteroscedasticity is detected using the Autoregressive Conditional

Heteroscedasticity (ARCH) test. Also, to verify the stability of the model the Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSUMQ) of recursive residuals test are employed. Finally, the sensitivity of the estimated threshold value to additional explanatory variable is tested.

Data Analysis

The study employed both descriptive and quantitative analysis. Graphs and tables were used in the descriptive analysis. Unit root tests were conducted on all the variables to verify their order of integration. Also, the study adopted the ARDL econometric methodology for co-integration to obtain both the short run and long run estimates of the main variables involved in the study and the Conditional Least Square (CLS) method was employed to estimate the threshold of capital spending on unemployment. All estimations were conducted using Econometric views (E-views).

Chapter Summary

This chapter formulated the econometric model to be estimated for the study and specified the technique to be used for estimation. The methodology of the study was developed from Musgrave (1959) theory of fiscal policy in which unemployment was modelled as a function of government spending, inflation, external debt to gross domestic product, private sector development and growth rate of gross domestic product.

Furthermore, the study described the sources, data and variables used in the study. The ARDL approach to cointegration and error correction models is used to find out the adjustment to equilibrium in case there is disequilibrium in

the model. Finally, the Conditional Least Square method developed by Khan and Senhadji (2001) is employed to determine the optimal level of government capital spending on unemployment rate.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents the results of the study. The results of the descriptive statistics of the relevant variables, the ADF and the PP unit root tests, the bounds test approach to cointegration with the long run estimates and the short run dynamics as well as the result of the threshold of gross government capital formation spending (capital expenditure) are presented and discussed.

Descriptive Statistics

In this section, an analysis of the descriptive statistics is carried out. The descriptive statistics is presented in Table 1.

Table 1: Summary Statistics

	UNEM	CONS	CAP	INF	PSD	XDBG	GDPG
Mean	4.87484	12.0043	6.36183	27.9423	9.530006	64.4131	4.49329
Median	5.20000	11.2424	7.94236	19.2507	9.358847	61.7981	4.70039
Maximum	10.3600	20.8880	14.0485	122.875	20.44463	139.439	14.0460
Minimum	0.40000	5.86129	2.48151	8.72684	1.542268	18.2312	-6.9237
Std. Dev.	3.05879	3.56896	2.90576	25.4640	6.015191	32.9482	3.65851
Skewness	0.01627	0.90115	0.09285	2.62095	0.198800	0.54957	-0.9096
Kurtosis	1.89043	3.33321	2.38050	9.85973	1.639880	2.42850	6.04292
Jarque-Bera	1.89965	5.17893	0.64483	114.906	3.095684	2.36606	19.3767
Probability	0.38681	0.07506	0.72440	0.00000	0.212706	0.30635	0.00006
Sum	180.369	444.160	309.388	1033.86	352.6102	2383.29	166.252
Sum Sq. Dev.	336.822	458.550	303.965	23342.9	1302.571	39080.9	481.848
Observations	37	37	37	37	37	37	37

Note: Std. Dev. represents Standard Deviation while Sum Sq. Dev. Represents Sum of Squared Deviation.

Source: Computed by the author.

The first two rows in Table 1 show the average value of the series as a mean and the middle values of the series as the median. Over the period under study, unemployment as percentage of labour force averaged 4.9 percent while government final consumption and gross fixed capital formation spending averaged approximately 12 and 6 percent of gross domestic product respectively. However, the median values of these variables (UNEM, CONS and CAP) were reported as approximately 5.2 percent, 11.2 percent and 7.9 percent respectively. Comparison of the mean and median of each of these series indicates that for all these series, the value of means and medians are close to each other indicating minor symmetry of these variables.

The maximum and minimum values of the series are also given for each series under the row labelled maximum and minimum, respectively. The results presented in Table 1 indicate that over the study period the maximum unemployment as a percentage of the labour force is approximately 10.4 with minimum unemployment value of 0.4 percent of the labour force. The maximum level of government final consumption spending is approximately 21 percent of gross domestic product and the lowest consumption spending recorded in the study period is approximately 6 percent of GDP while capital spending recorded a maximum value of approximately 14 percent of GDP with minimum value of approximately 2.5 percent of GDP.

The measure of dispersion around the mean in the series is calculated as the standard deviation. Standard deviation is difficult to interpret in absolute terms. However, it can be interpreted in relative terms by comparing the standard deviation for two different distributions, i.e., the distribution with smaller standard deviation exhibits less dispersion and larger standard deviation

shows higher dispersion. Accordingly, in Table 1, government gross fixed capital spending (CAP) is a relatively less dispersed series with a standard deviation of 2.90576, while government final consumption expenditure as a percentage of GDP (CONS) is the relatively highly dispersed series with a standard deviation value of 3.56896. The larger the dispersion between the values, the higher the standard deviation that shows greater volatility in the variable. This implies that relatively, government final consumption spending as a percentage of GDP is more volatile variable.

Skewness measures the symmetry of the distribution of the series around the mean. Symmetric distribution has zero skewness value. Thus, among the values of skewness in Table 1, few of the variables is close to symmetric distribution. The descriptive statistics shows that unemployment as a percentage of labour force (UNEM) and government gross fixed capital formation expenditure (CAP) are close to symmetric distribution with skewness values of approximately 0.016 and 0.093 respectively. However, series such as government final consumption spending (CONS) is positively skewed implying that the series has a distribution with long right tail. This then implies that most of the observations are greater than its mean value. The slight skewness of the variables indicates that extreme values of the variables used for the study were not recorded or observed during the period under study. Also, the positive skewness of the variables implies that negative values were not recorded for these variables over the study period.

However, by simple observation of the values of skewness and kurtosis it is difficult to tell whether a given series is normally distributed or not. In Table 1, the result for Jarque-Bera (JB) test for normality is given for each variable

under the null hypothesis of normal distribution. According to the results of Table 1, the null hypothesis of normal distribution cannot be rejected for all the key variables since they have probability values greater than 5%. From Table 1, the total number of observations used to undertake the study is 37.

Stationarity Plots of Variables

The hallmark of the ARDL approach to cointegration is to ensure that the series in the model are integrated of order d, where $0 \leq d \leq 1$. This gives information about the stationarity of the series used in the study. To test for the stationarity of variables, different methods are employed. Usually a visual plot of the series is plotted first before pursuing any formal test. Therefore, an informal graphical analysis is conducted before the formal tests of Augmented Dickey-Fuller and Philips-Perron tests are conducted. This provides for a preliminary examination which gives an idea of trends and stationarity of the data set. The graphical results from the test for stationarity are presented in Appendix F and G that show data in levels and first difference respectively.

Appendix F shows that the natural log of unemployment rate (lnUNEM) has a growth trend after 1985 before exhibiting downward trend. The natural log of government's gross fixed capital formation (lnCAP) shows a downward trend from the beginning until 1983 after which it assumed an upward trend up to 1993 after which it exhibits a continuous downward trend. The log of government final consumption expenditure (lnCONS) shows a downward trend until 1983 after which it exhibits a growth trend with some few and slight down trend. The natural log of inflation shows a downward trend throughout the study period with some spikes. The natural log of private sector development (lnPSD)

shows a downward trend up to 1983 after which it shows an increasing trend. The log of external debt (lnXDBG) shows an upward trend up to 2000 after which there is a decreasing trend until 2006 after which it assumes an upward trend. The growth rate of GDP shows a sharp upward trend in the early years of the study period up till 1983 after which it exhibits a stable trend around zero. It is clear from the visual plot that most (if not all) of the variable or the series are non-stationary in their levels.

Appendix G shows that all the differenced variables fluctuate around the zero mean hence the variables are likely to be integrated of order one I (1). This implies that the data is stationary and integrated of order one. The first order integrated series ensure that the economic data is stationary for the purpose of avoiding spurious results. To identify if time series data are stationary, one needs to check if the plots on a graph are fluctuating around the zero mean. However, one cannot precisely base conclusions on the graphical analysis because it is an informal test for stationarity. Therefore, other formal tests such as Augmented Dickey Fuller and Philips-Perron tests were conducted to reinforce findings from the graphical illustrations.

The results of the Augmented Dickey-Fuller and the Philips-Perron tests in the levels of the variables are shown in appendix H - 1 and I - 1 respectively and that of the variables in their first difference are presented in appendix H - 2 and I - 2 respectively.

Unit Roots Test Results

The results of ADF and PP tests for unit root with intercept and trend in the model for all the variables used in the study are presented in Table 2. The

Augmented Dickey-Fuller test has the null hypothesis of unit root. The null hypothesis is rejected if the test statistic has a greater absolute value compared to the critical values at all levels of significance or the probability value (p-value) of the test statistics is less than the significance level of interest. If the null hypothesis is rejected, it means that we fail to reject the alternative hypothesis of stationarity, thus indicating that there is no unit root, that is, the series is stationary.

From the unit roots test in Table 2, the null hypothesis of the presence of unit root for most of the variables in their levels cannot be rejected at any of the three conventional level of significance since the p-value of the ADF statistics are greater than any of the three conventional level of significance (1%, 5% and 10%) with the exception of log of inflation (lnINF) and consumption spending (lnCONS) which have no unit root at 1% and 5% significance levels respectively. However, at first difference, all the variables became stationary. This is because the null hypothesis of the presence of unit root (non-stationary) is rejected at 1% significance levels for all the variables.

Also, from Table 2, the results of the PP test indicate that the null hypothesis for the presence of unit root for all the variables in their levels with the exception of log of inflation (lnINF) cannot be rejected at any of the conventional level of significance. This is because the p-value of the PP test statistics of the variables with the exception of log of inflation (lnINF) are greater than any of the conventional significance levels. However, at first difference, the variables became stationary. This is because the null hypothesis of the presence of unit root (non-stationary) is rejected at 1% significance levels for all the variables. The ADF test results is in line with the PP test results

suggesting that most of the variables are integrated of order one, I (1), when trend and intercept are accounted for in the model.

Table 2: Results of Augmented Dickey-Fuller and Philips-Perron Unit Root Tests with Intercept and Trend at Levels and First Difference.

	ADF				PP			
Var.	Statistics	Lag	Prob.	I(d)	Statistics	BW	Prob.	I(d)
lnUNEM	-1.7290	0	0.7174		-1.6376	3	0.7577	
DlnUNEM	-7.504	0	0.0000	I(1)	-7.5671	6	0.0000	I(1)
lnCON	-3.6999	1	0.0356		-3.3132	2	0.0803	
DlnCON	-4.856	0	0.0021	I(0)	-8.0593	31	0.0000	I(1)
lnCAP	-1.4440	0	0.8301		-1.5359	1	0.7980	
DlnCAP	-5.587	0	0.0003	I(1)	-6.2436	8	0.0000	I(1)
lnPSD	-2.5628	0	0.2984		-2.6185	1	0.2749	
DlnPSD	-6.073	1	0.0001	I(1)	-11.9523	19	0.0000	I(1)
lnINF	-5.2063	0	0.0008		-5.2534	6	0.0007	
DlnINF	-6.305	1	0.0000	I(0)	-24.4820	31	0.0000	I(0)
lnXDBG	-1.8125	0	0.6777		-1.8707	1	0.6487	
DlnXDBG	-5.281	1	0.0007	I(1)	-5.2810	0	0.0007	I(1)
GDPG	-3.3498	0	0.0745		-3.08167	5	0.1258	
DGDPG	-6.135	0	0.0001	I(1)	-9.1895	10	0.0000	I(1)

Note: D denotes the first difference, I(d) is the order of integration and BW is the band width.

Source: Computed by the author.

It is therefore clear from the unit root results discussed above that all the variables are integrated of either order zero, I(0) or order one, I(1). Since the test results have confirmed the absence of I(2) variable(s), the Autoregressive Distributed Lag (ARDL) methodology becomes appropriate for estimation.

Tests for Cointegration

Since it is established that some of the variables are integrated of order one whiles others are integrated of order zero, this section performs cointegration to determine the existence of a long-run equilibrium relationship amongst the variables. The Pesaran et al. (2001) bound's testing approach requires an inclusion of the optimal lag length in the ARDL model. Given the small sample size and the use of annual data of 37 observations, a lag length of one (1), as confirmed by the all the lag selection criteria in Appendix J, is used in the cointegration analysis, since Pesaran and Shin (1996) suggested a maximum lag of one or two for annual data in the bounds test for cointegration. Cointegration of variables means that the linear combination of the variables is stationary.

Testing for cointegration using a model with many variables has always been a daunting task for econometricians. An example of the problems emanating from such a model is that of too many cointegrating equations which are difficult to interpret. The best option when faced with such a scenario is to estimate a simplified model (parsimonious) with few variables but with the risk of an omitted variable bias (misspecification). One other way is to apply the pair-wise correlation matrix to guide the variable selection exercise. Appendix K shows results for the pair-wise correlation matrix used to determine the exact

relationship between the six explanatory variables including the dependant variable used in this study.

From the pair-wise correlation results shown in Appendix K, it can be observed that lnCAP and lnPSD are somewhat highly correlated with lnUNEM. Also, lnCONS is fairly correlated with the lnUNEM since its correlation coefficient is approximately 51%. Both variables (lnCONS and lnCAP) are positively correlated with lnUNEM. The growth rate of gross domestic product has a positive correlation with unemployment. Also, inflation will induce productivity to reduce unemployment as indicated by the negative correlation between inflation and unemployment.

Bounds Test

The initial step in the ARDL approach is to test for the presence of long run relationship among the variables. This is done by conducting the F-test for the joint significance of the coefficients of the lagged variables in the model. Thus, in this case, the log of unemployment which is the dependent variable is regressed on the other variables.

According to Pesaran et al. (1997), it is the F-statistics value of the OLS regression which is of importance in the bounds test. This F-statistics tests the joint null hypothesis that the coefficients of the lagged levels are zero thus indicating whether there is existence of cointegration among the variables in the long run or otherwise.

Table 3 reports the results of the cointegration test when log of unemployment is normalised in the ARDL – OLS regression.

Table 3: Bound Test for the Existence of Cointegration

F-Bounds Test		Null Hypothesis: No Levels Relationship		
Test Statistic	Value	Significance	I (0)	I (1)
			Asymptotic: n=1000	
F-statistic	6.119897	10%	2.33	3.25
k	6	5%	2.63	3.62
		2.5%	2.9	3.94
		1%	3.27	4.39
Actual Sample Size	36		Finite Sample: n=40	
		10%	2.634	3.719
		5%	3.07	4.309
		1%	4.154	5.699
			Finite Sample: n=35	
		10%	2.685	3.785
		5%	3.174	4.383
		1%	4.629	5.698

Note: k is the number of regressors used in the model.

Source: Computed by the author.

From Table 3, the calculated F-statistics reported shows that, there exist a long run relationship between unemployment and its explanatory variables because the F-statistics value of 6.119897 is higher than the upper critical value of 5.699 at 1% significance level when the variables are integrated of order one [I (1)] and also greater than the lower bound critical value of 4.154 at 1% significance level when the variables are integrated of order zero [I (0)]. Given that some of the variables used in the study are I (0) while others are I (1), it implies that the null hypothesis of no cointegration among the variables in equation (17) is rejected indicating that there exists a long run relationship between unemployment and its determinants in equation (17). Given that there is existence of cointegration among the variables in the unemployment model, the study proceeds with the unemployment equation to estimate their long run coefficients and short-run dynamic relationship using the ARDL cointegration framework.

Results of the Long-Run Relationship

Given the results of the cointegration analysis, the long run relationships among the variables were estimated using the ARDL framework and the results are presented in Table 4. The Akaike Information Criteria (AIC) and a lag length of one (1) as selected by the AIC was used in the estimation of the ARDL model.

As shown in Table 4, the result of the long run estimates shows theoretically correct a priori signs for all the regressors (explanatory variables). All the variables exert significant effect on the level of unemployment in the long run with the exception of GDP growth rate.

Table 4: Long Run Estimate Based on ARDL Approach

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnCONS	-1.006501	0.385686	-2.609642	0.0154**
lnCAP	1.987681	0.238858	8.321586	0.0000***
lnINF	-0.534246	0.231183	-2.310921	0.0297**
lnPSD	-0.930340	0.401120	-2.319355	0.0292**
lnXDBG	0.327384	0.170070	1.924996	0.0662*
GDPG	-0.029426	0.020288	-1.450430	0.1599
TREND	0.117919	0.029009	4.064921	0.0004***

Note: ***, ** and * denote significance level at 1%, 5% and 10% respectively
Source: Computed by the author.

From Table 4, the long run relationship results confirm the a priori expectation that government final consumption expenditure reduces the level of unemployment in Ghana since the coefficient of the government final consumption expenditure in the long run is negative and statistically significant at 5% significance level. The coefficient (-1.006501) indicates that a one percent change in the level of government final consumption expenditure will result in approximately 1.007 percent change in the rate of unemployment. The

coefficient indicates that in the long run a one percent increase in the final consumption expenditure of the government will reduce the rate of unemployment rate in Ghana by approximately 1 percent of the labour force. The ability of government final consumption spending to cause a reduction in unemployment is as a result of how government consumption spending enhances aggregate demand. The increase in aggregate demand prompts producers to employ more workers to aid increase productivity to meet the increase in aggregate demand. Thus, government final consumption spending reduces unemployment through increase in aggregate demand. This finding confirms that of Obayori (2016) and Far and Saeedi (2015) who found a significant and negative relationship between unemployment and government recurrent expenditure for the Nigerian and Iranian economies respectively. However, this result is in contrast with what Murwirapachena (2011) asserted for South Africa that increase in government consumption spending will increase unemployment.

Also, the long run coefficient of government gross fixed capital formation spending (capital expenditure) showed a positive sign which is significant at 1% significant level. This implies that government gross fixed capital formation spending causes an increase in unemployment in Ghana. The coefficient of government gross fixed capital formation (capital) spending is 1.987681 which indicates that a percentage increase in gross fixed capital spending of government increases the unemployment rate by approximately 2 percent. This pre-supposes that the Ghanaian economy may be characterised by low level of capital spending (capital investment) which has the tendency to cause unemployment. Also, the increase in rate of unemployment resulting from

increase in government capital spending reflects how capital projects (contracts on infrastructures) in Ghana are inflated and at most times not completed to create the required employment avenue. This finding is in conformity with the findings of Ogbeide et al (2015) for Nigeria who established that government capital expenditure aggravates unemployment in Nigeria.

Consistent with expectations, the coefficient of private sector development is negative and significant at 5 percent significance level. The result specifically shows that, in the long run, if the private sector developed by 1 percent, there will be a 0.930340 percent decrease in the unemployment rate. That is when the credit given to the private sector by financial institutions increase by one percent of GDP, the unemployment rate is expected to reduce by 0.930340 percent of the labour force holding all other factors constant. The significant negative relationship between unemployment and private sector development may be attributed to the sound monetary environment (such as solidarity group lending) that has been created by the banking sector over the years. This motivates private entities (businessmen) to access credit from the domestic banks without collateral to expand production thereby recruiting workers. This reduces the unemployment situation in the country.

The result in Table 4 also confirms the a priori expectation that inflation negatively relates to unemployment rate in the long run. This is because the coefficient of inflation in the unemployment model is negative and statistically significant at 5 percent. The coefficient of -0.534246 indicates that a 1 percent increase in inflation has the tendency to reduce unemployment by 0.534246 percent in the long run. This result is consistent with conclusions of Igberi, Odo, Anoke and Nwachukwu (2016) who obtained a negative

relationship between inflation and unemployment for the Nigerian economy. The study of Igberi et al (2016) indicates that 1 percent increase in inflation rate will bring about 0.2 percent decrease in unemployment. The finding of the study also conforms to that of Resurreccion (2014) for Philippines which established that unemployment is negatively related to inflation and unemployment. Her study found out that, though not significant, for a 1 percent increase in inflation rate, unemployment decreases by approximately 4.93 percent, consequently supporting the premise on the trade-off between inflation and unemployment. The significant negative relationship between unemployment and inflation is justified on the grounds that as prices increase, producer manage to produce more to take advantage of the inflationary situation in order to earn relatively higher profit. In so doing, they employ more workers in order to increase production thereby reducing unemployment.

As anticipated, the external debt as a percentage of GDP is appropriately signed. That is, the coefficient of external debt to GDP is significantly positive at 10 percent significance level. Thus, the results indicate that if the external debt as a percentage of GDP increases by 1 percent, unemployment as a percentage of the labour force will increase by 0.327384 percent in the long run. The positive and statistically significant relationship of external debt with unemployment is consistent with the result obtain by Igberi et al. (2016) for Nigeria that 1 percent increase in public debt on the average, will bring about 1.6 percent increase in unemployment rate (UNEM) using ARDL model. The established positive relationship between unemployment and external debt suggests that loans taken from external economies and institutions are not spent on projects that will create the needed employment avenues in order for people

to be employed. Thus, external credits taken are not used efficiently. For example, the use of external loans to pay "judgement debt". It can also be implied that in the long run high cost of loan servicing in terms of high interest payment on loans as well as the payment of the principal loans erodes the employment effect of external loans.

The result in Table 4 shows that there is insignificant effect of growth rate of gross domestic product on unemployment rate in the Ghanaian economy.

The intercept term is negative but insignificant at 5 percent significant level. However, the trend term is positive and statistically significant. The result in Table 4 indicates that the trend in time influences the rate of unemployment in Ghana in the long run. The positive and statistically significant coefficient of time trend shows the increasing impact that time has on unemployment in the Ghanaian economy. The coefficient of the time trend implies the rate at which the unemployment rate changes in each subsequent period (year). The coefficient of trend is 0.117919 which implies that over the years of the study period, the unemployment rate grows by approximately 11.8 percent on the average. In other words, the result in Table 4 indicates that, holding all other factors constant, as time passes by, unemployment as a percentage of labour force in Ghana will grow by approximately 11.8% each year. This means that time has a positive impact on rate of unemployment. This is justified by the fact that as time passes by technology advances, institutions and human behaviour change and such changes will naturally grow the unemployment in the economy.

The error correction model (ECM) that calculates the speed of adjustment to long run equilibrium when there is any disequilibrium in the system in the short run as a result of shocks is given as:

$$\begin{aligned} ECM = lnUNEM - (&-1.0065 * lnCONS + 1.9877 * lnCAP - 0.5342 \\ &* lnINF - 0.9303 * lnPSD + 0.3274 * lnXDBG - 0.0294 \\ &* GDPG + 0.1179 * TREND) \end{aligned}$$

Results of the Short Run Dynamic Model

Table 5 shows the estimated short-run error correction model using the ARDL model.

Table 5: Estimated Short run ECM using the ARDL (1, 0, 1, 1, 0, 1, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.079583	0.044764	-1.777837	0.0881*
D(lnUNEM(-1))	-0.869523	0.137303	-6.332865	0.0000***
D(lnCONS)	-0.875176	0.366118	-2.390424	0.0250**
D(lnCAP)	0.373042	0.213792	1.744879	0.0938*
D(lnCAP(-1))	1.728335	0.281812	6.132932	0.0000***
D(lnINF)	-0.297643	0.076884	-3.871327	0.0007***
D(lnINF(-1))	-0.464539	0.195845	-2.371979	0.0261**
D(lnPSD)	-0.808952	0.345381	-2.342199	0.0278**
D(lnXDBG)	1.116616	0.186968	5.972221	0.0000***
D(lnXDBG(-1))	0.284668	0.156584	1.817982	0.0816*
(GDPG)	-0.025586	0.017837	-1.434432	0.1644
ECT (-1)	-0.869523	0.109343	-7.952291	0.0000***

Note. ***, ** and * indicate significance level at 1%, 5% and 10% respectively.
Source: Author's computation.

Once the long run relationship among the variables have been established within the ARDL framework, the study further estimates their short run relationships. According to Engle and Granger (1987), when the variables are cointegrated, their dynamic relationship can be specified by an error correction representation in which an Error Correction Term (ECT) computed from the long run equation must be incorporated in order to capture both the short run and long run relationships.

The error correction term indicates the speed of adjustment to restore equilibrium in the dynamic model. The ECT coefficient shows how quick the variables converge to equilibrium following a shock and it should have a statistically significance negative coefficient. According to Bannerjee, Dolado and Mestre (1998), when the error correction term is highly significant, it further confirms the existence of a long run relationship among the variables

From the results, the coefficient of the error correction term lagged one period (ECT_{t-1}) is negative and highly significant at 1 percent significance level. This confirms the existence of the cointegration relationship among the variables. The ECT stands for the rate of adjustment to restore equilibrium in the dynamic model following a disturbance. The coefficient of the error correction term in absolute term is 0.869523. This means that about 87 percent of the deviation of the long-term unemployment rate is corrected annually due to adjustment from the short run toward the long run. In other words, the highly significant error correction term suggests that approximately, 87 percent of disequilibrium in the previous year is corrected in the current year. The rule of thumb is that, the larger the error correction coefficient (in absolute term), the faster the variable equilibrates in the long-run when shocked (Acheampong,

2007). Therefore, the result shows that the speed of adjustment is relatively high in the model.

The results from the Table 5 shows that government final consumption expenditure negatively relates with the rate of unemployment in the short run just as in the long run. Specifically, unemployment will fall by 0.875176 percent in the short run should the government increase her final consumption expenditure by 1 percent. This is significant at 5 percent level of significance. This result pre-supposes the need for the government to widen her final consumption expenditure to reduce the alarming rate of unemployment in the country.

Also, as shown in Table 5, the coefficient of government gross fixed capital formation (capital) expenditure in the dynamic short run unemployment equation is positive and statistically significant at 10 percent significance level. This relationship is consistent with the long-run unemployment equation. From the results, a percentage increase in the government gross fixed capital formation expenditure will induce unemployment by approximately 0.373 percent in the short run. However, the impact of capital expenditure on the rate of unemployment is relatively weaker in the short run as compared to that of long run because generally, capital investment usually takes longer period to have productive effect on the economy (i.e. capital investments have long gestation period). Therefore, capital spending is expected have weak or insignificant effect on the economy in the short run. Moreover, the results revealed that the previous year's level of capital spending significantly caused unemployment in the current year. This relation is significant at 1 percent level of significance. This result indicates that a percentage increase in last year's

government gross capital formation expenditure will generate an unemployment rate of approximately 1.73 percent this year.

Also, the coefficient of inflation maintained the negative sign consistent with the long run results. Specifically, the results confirm the theoretical conclusion that inflation contributes to a fall in unemployment rate since the coefficient of inflation in the short run unemployment equation is negative and significant at 1 percent. From the result, the coefficient of inflation is -0.297643 which indicates that a 1 percent increase in the general prices of goods and services in the country will reduce unemployment by approximately 0.3 percent of the labour force in the short run ceteris paribus. Moreover, the previous year's level of inflation has a relatively more significant influence on the current year's level of unemployment in the short run. In other words, the result in Table 5 indicates that last year's inflation controls this year's level of unemployment. Specifically, the coefficient of inflation lag one period is -0.464539 and this is significant at 5 percent level of significance. The result indicates that a 1 percent increase in this year's level of inflation will reduce next year's unemployment level by approximately 0.5 percent of the labour force.

Similarly, consistent with the long-run estimate, the coefficient of private sector development proxied by the credit to the private sector by banks maintained its negative sign and is statistically significant at 5 percent level of significance. The results indicate that a 1 percent increase in the private sector development will reduce unemployment as a percent of labour force by 0.808952 percent in the short run. The negative relationship of rate of unemployment with the private sector development informs the need of the

government to promote conducive environment for the operations of the commercial banks to be able to give out more credits to the private sector at moderate prices (interest rate).

The coefficient of external debt to GDP in the short run is also positive, consistent with the long run findings. The results thus suggest that if external debt to GDP increase by 1 percent, unemployment will increase by 1.116616 percent in the short run. This relationship between the two variables is relevant at 1 percent significance level. This suggests how external debt resulting from extensive borrowing and the like can worsen the unemployment situation in Ghana in the short run. In the same vein, at 10 percent significance level, the results show that this year's unemployment is influenced by last year's level of external debt to GDP. On the other hand, the result in Table 5 indicates that the level of last year's external debt to GDP will affect this year's level of unemployment. The results show that the coefficient of external debt to GDP lagged one-year period is 0.284686 which is significant at 10 percent. This coefficient means that a percent increase in the external debt to GDP last year will cause this year's rate of unemployment to rise by approximately 0.3 percent of the labour force.

Finally, consistent with the long run estimate, the gross domestic product growth rate shows a negative relationship with unemployment in the short run. However, this relationship is not significant at any of the conventional significance level.

Model Diagnostics and Stability Tests

Hansen (1992) warned that estimated parameters of a time series data may vary over time. As a result, it is essential to conduct parameter test for

model misspecification to avoid biased results. In order to check for the estimated variable in the ARDL model, diagnostic and structural stability tests of the model are considered.

Goodness of Fit of the Model

Table 6 shows the results for the goodness of fit of the model.

Table 6: Goodness of Fit.

R-squared	0.710428	Mean dependent var	0.043602
Adjusted R-squared	0.673064	S.D. dependent var	0.441516
S.E. of regression	0.252451	Akaike info criterion	0.213049
Sum squared resid	1.975680	Schwarz criterion	0.432982
Log likelihood	1.165127	Hannan-Quinn criter.	0.289811
F-statistic	19.01364	Durbin-Watson stat	1.955152
Prob(F-statistic)	0.000000		

Source: Computed by author.

The overall regression is significant at 1 percent as can be seen from the probability value of the F-statistics in Table 6. Table 6 also shows that the data used in the study is robust. This is indicated by an adjusted R^2 above 50 per cent (approximately 67.3 percent) in the study. The adjusted R^2 which measures the closeness of fit in the regression model suggests that the statistical fitness of the model to the data is satisfactory. Also, an F-statistic value of 19.01364 suggests the joints significance of the independent variables in the model. The Durbin-Watson (DW) result of 1.955152 (approximately 2.0) shows that the model does not suffer from serial correlation, that is, there is no auto correlation.

Also, the fitness of the model was tested in four main ways. Firstly, Ramsey RESET test is conducted to check whether the model is correctly specified. The null hypothesis of the Ramsey RESET test states that the model

is correctly specified against the alternative that it is not. According to the test results, the model is correctly specified because the F-statistics probability value of 0.4595 is greater than 5 percent level of significance. Therefore, there is insufficient evidence to reject the null hypothesis (H_0). Hence, the model is correctly specified. Serial correlation is tested using the Breusch-Godfrey serial correlation Lagrange Multiplier (LM) test, followed by the Breusch-Pagan-Godfrey test for heteroscedasticity and finally the Jarque-Bera (JB) for normality test. Diagnostic checks results are shown in Appendix L. Results from Appendix L show that there is no serial correlation. This is shown by the test statistics and the probability value of 0.9777.

The test for heteroscedasticity using Breusch-Pagan-Godfrey test produced an F-statistics probability value of 0.4944. The null hypothesis of no heteroscedasticity will thus not be rejected given the probability value. Therefore, the model does not suffer from the problem of heteroscedasticity hence can be relied on.

The null hypothesis for the Jarque-Bera (JB) test for normality states that there is a normal distribution. The results obtained for the JB test show a probability value of 0.201838. The null hypothesis is rejected if the probability was less than 5% significance level. In this study, the probability is greater than the 5% significance level, hence we fail to reject the null hypothesis of a normal distribution. The diagnostic checks have all revealed the suitability of the model. There is no serial correlation, no misspecification and the errors are normally distributed. Therefore, the results can be relied on.

To observe the fitness of the model, the actual versus fitted residuals can be presented in the form of a graph. This is depicted in Appendix M. Although

there is still a considerable margin of error, Appendix M shows that the model fits the data in a fairly reasonable way. This is shown by the closeness of the values of the actual dependent variable and that of the estimated dependent variable. This is depicted by the closeness (and most times sameness) of the actual and the fitted lines of the dependent variable as shown in Appendix M. Also, the scaled residuals show that there is white noise.

Model Stability Tests.

Finally, Pesaran and Pesaran (1997) advocate that we employ the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMQ) tests when analysing the stability of the long run coefficients together with the short run dynamics. The constancy of the regression coefficients is evaluated by this stability tests and they can show whether or not the regression equation is constant over time.

The null hypothesis is that the coefficient vector is the same in every period and the alternative is simply that it is not (Bahmani-Oskooee, 2004). CUSUM and CUSUMQ statistics are plotted against the critical bound of 5% significance. According to Bahmani-Oskooee (2004), if the plot of these statistics remains within the critical bound of 5% significance level, the null hypothesis that all coefficient in the model are stable cannot be rejected. The plots of the cumulative sum of residuals (CUSUM) and the cumulative sum of squares of residuals (CUSUMQ) stability test as shown in Appendix N depict that all the coefficients of the estimated model are stable over the study period since they are all within the 5 percent critical bounds.

Estimation of the Threshold Level of Government Capital Expenditure

As mentioned in chapter three, Conditional Least Square (CLS) is the technique that will be used to determine the threshold level of government gross fixed capital formation expenditure. The intention of the CLS technique is to identify the level of capital spending at which the R^2 attains a maximum value from the set of different capital spending values chosen in ascending order as assumed threshold values or the one that gives the lowest residual sum of squares (RSS) among the different ascending values of capital spending assumed as the threshold.

The variables employed in the threshold estimation are the growth rate of unemployment, growth rate of government gross capital formation expenditure (capital expenditure), growth rate of external debt to GDP, growth rate of private sector development and inflation. Equation 24 is estimated with different value of k and the maximum value of R^2 is assessed to identify the optimal level of government gross capital formation expenditure.

$$UNEM_{gt} = \beta_0 + \beta_1 CAP_{gt} + \beta_2 D_t(CAP_{gt} - k^*) + \beta_{2+i} X_{gt} + v_t \qquad (24)$$

The variable X_{gt} is a vector of other control variables in their growth rate (external debt as percentage of GDP, private sector development and inflation) which theoretically and empirically explain the growth rate of unemployment.

To check the unit root properties of the growth rate variables the study employed the PP test for unit root since the variables are non-parametric. The unit root test is conducted to ensure that all the variables that will be employed in the CLS technique are stationary at levels to avoid spurious result. The result of the unit root test is presented in Appendix O. The result indicates that all the growth rates variables are stationary at levels.

Preceding the estimation of the threshold model is the Granger Causality results presented in the Table 7. The reported test statistics show that there is no enough evidence to reject the null hypothesis that growth rate of unemployment does not Granger cause government's capital expenditure. However, the reverse is rejected at the 5% level of significance indicating that it is growth in government gross capital formation expenditure which causes unemployment and not the other way. There is therefore a uni-directional causality running from capital expenditure to unemployment. The implication of the result is that previous growth of government capital expenditure has valuable information which can aid in forecasting the future levels of unemployment.

Table 7: Pairwise Granger Causality Test

Null Hypothesis:	Obs.	F-Statistic	Prob.
UNEM does not Granger Cause CAP	37	0.49067	0.4884
CAP does not Granger Cause UNEM		4.81811	0.0351**

** indicates significance level at 5%.
Source: Computed by the author.

The values of the threshold points (k) range from 3% - 14% and Appendix P shows how the outcomes of R^2 vary as the capital expenditure threshold value (k) assigned arbitrarily increases. As it can clearly be seen from Appendix P, the value of R^2 is maximized at the point where k is 6.9 (i.e. 6.9% of GDP), hence this level (6.9%) is the threshold level of government gross fixed capital formation expenditure (capital expenditure) on the rate of unemployment.

From the results of Appendix P, it is shown that all the explanatory variables in the unemployment model are significant when capital expenditure is at its threshold level. At the optimal point of 6.9% of GDP, the p-value of the coefficient for the gross fixed capital expenditure is significant at 5% level of

significance. For the level of gross fixed capital expenditure that is more than 6.9 percent of GDP there is a significant negative relationship between gross fixed capital expenditure and rate of unemployment. If capital expenditure increases above the threshold level, unemployment rate is expected to change approximately by the sum of the coefficients of CAP_g and D $(CAP_g - k^*)$ which is $[0.428962 + (-1.029357) = -0.600395]$ in each year. The resultant coefficient, which is approximately (-0.6004) implies that when the gross fixed capital expenditure increases by 1 percent above 6.9% of GDP, the unemployment rate will decline by approximately 0.6 percent of the labour force. Among the given values of k, at 6.9 the value of R^2 is maximized at a value of 0.413402. The relation between the threshold (k) values assigned and their corresponding R-squared is illustrated in Appendix Q. Thus, the study concludes that gross fixed capital formation should be kept above 6.9% of GDP in order for it to have a positive impact on unemployment situation in Ghana.

Diagnostic and Sensitivity Tests

Diagnostic Test

For the model where the threshold level of government gross fixed capital formation expenditure is 6.9%, a diagnostic test is carried out to check whether the model has Gaussian error terms. The diagnostic tests include serial correlation test, heteroscedasticity test and Cumulative sum of recursive residuals (CUSUM) and Cumulative Sum of Squares of recursive residuals (CUSUMQ) tests. The results of these tests are summarized in Appendix R.

The Breusch-Godfrey serial correlation test result reveals that the error terms in the model are serially independent. The test statistic (F-statistics) has a

value of 2.079949 with a probability value of 0.1596 showing that there is no problem of serial correlation.

Moreover, the result from the ARCH LM test shows that the error terms have constant variance. This is due to the lower test statistic (F-statistics) of the ARCH LM test that is 0.904562 and its relative higher p-value of 0.3483. From the result, the null hypothesis of non-constant variance of the error terms is rejected.

Finally, the result from the cumulative sum (CUSUM) of recursive residuals and the cumulative sum of squares (CUSUMQ) of recursive residuals show that the structural stability of the model falls between the bound lines at 5% level of significance. Thus, CUSUM and CUSUMQ do not wander away from the bound lines but stay within the bands at 5% level of significance implying the stability of the model. Hence the model is stable.

Sensitivity to Additional Explanatory Variable Test

Government consumption expenditure is another important variable that influences unemployment as emphasised by Tagkalakis (2013). As such, to check whether the inclusion of other variable(s) would change the estimated threshold of capital spending and its effect on unemployment, the government final consumption spending variable is added to the model in equation (22) to develop a new equation as equation (25);

$$UNEM_{gt} = \alpha_0 + \alpha_1 CAP_{gt} + \alpha_2 D_t(CAP_{gt} - k^*) + \alpha_3 PSD_{gt} + \alpha_4 XDBG_{gt} + \alpha_5 INF_t + \alpha_6 CONS_{gt} + \varepsilon_t \quad (25)$$

Equation (25) was estimated using the Conditional Least Square (CLS) method and the results is presented in Appendix S.

The results in Appendix S shows that the inclusion of other variable (consumption spending) to the threshold model did not change the estimated threshold at all and the new variable included however is insignificant. It therefore implies that the estimated threshold is robust to additional variable and that the inclusion of the other variable(s) does not change the optimal capital spending value estimated.

Also, the result in Appendix S indicates that though the additional explanatory variable (consumption spending) did not change the threshold point, the effect is slightly different from the effect estimated earlier. With the inclusion of another explanatory variable (consumption expenditure), the estimated threshold effect of capital expenditure on unemployment is $[0.4117 + (-1.0371) = -0.6254]$. Thus, with additional variable, 1% increase in capital spending above 6.9 percent of GDP is expected to decrease unemployment rate by 0.6254 percent of labour force which is slightly higher than the 0.6004 percent of labour force earlier reported. By comparing the magnitude of the threshold effects in the two situations, it can be inferred that the new variable has increased the threshold effect by $[-0.6004 - (-0.6254) = 0.025]$. However, since the additional variable is insignificant in the model, it can be inferred that its impact on the magnitude of the threshold effect is equally insignificant. It therefore implies that the estimated threshold effect is insensitive to additional explanatory variable(s).

Chapter Summary

The chapter looked at the empirical results of the effect of public spending on unemployment in Ghana. The chapter began examining the time

series properties of the data used for the estimation. The unit root test employing the ADF technique basically showed that all the series have to be differenced once to achieve stationarity with the exception of natural log of inflation and government final consumption spending which were stationary at their respective levels. In the similar vein, employing the PP test for stationarity indicated that all the variables are stationary at first difference except log of inflation which is stationary at their level. The study further conducted the test for cointegration using the bounds testing approach. Also, the Conditional Least Square estimation approach was employed to identify the turning point of government gross fixed capital formation expenditure (capital expenditure) on unemployment rate.

Both the short run and the long run estimates reveal a significant negative effect of government final consumption expenditure on unemployment since its coefficient is negative both in the short run and long run and statistically significant at 1% significance level. However, both the short run and long run estimates indicate positive impact of government gross fixed capital formation expenditure on the rate of unemployment.

The coefficient of the error correction term is indicative of the fact that approximately 87 percent of all disequilibria from the preceding year's shock converges back to the long-run equilibrium in the existing year. In other words, the speed of adjustment is about 87 percent within a year. The diagnostic and the parameter stability tests reveal that the model passed the test of serial correlation, functional misspecification, normal distribution of data and heteroscedasticity. The overall regression is also significant at both 1% and 10%

as can be seen from the short run and long run estimate and the graph of the CUSUM and CUSUMQ plots indicate the stability of the coefficients estimated

Finally, employing the Conditional Least Square estimation, the result reveals that gross fixed capital formation expenditure of the government should exceed 6.9% of GDP for it to be able to reduce unemployment.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter summarises the entire study. Its presents summary, conclusion and recommendations derived from the analysis of the data collected. This chapter also presents the limitation and suggests direction for further research.

Summary of the Study

The study set itself to achieve three key objectives. First, to examine the effects of government final consumption on unemployment as a percentage of the labour force in Ghana. Second, to examine the effect of capital expenditure on unemployment as percentage of labour force in Ghana. Third, to estimate the threshold of capital expenditure on the rate of unemployment in Ghana. The literature reviewed in this study revealed that public spending may have comprehensive effects on employment (unemployment). Theories considered in this study are: the classical theory of unemployment, the Keynesian theory of unemployment, the natural rate of unemployment theory and the theory of fiscal policy. Most of the theories agreed on the belief that fiscal policy (especially, government spending) can be used as a tool to manage aggregate demand, thereby affecting employment in the economy. Most of the empirical literature reviewed in this study disclosed that government expenditure significantly affects unemployment in both developed and less developed countries.

The annual data series used in the study were tested for stationarity using the ADF and the PP tests in order to ascertain their order of integration. The

ADF and PP tests portrayed that with the exception of inflation which is integrated of order zero, all the variables (series) were integrated of order one. Also, employing the PP test, it was revealed that growth rate of all the series used in the threshold estimation were stationary at levels hence all were integrated of order zero. To examine the long-run relationship and short-run dynamic parameters of the model, the Autoregressive Distributed Lag (ARDL) model (also known as bounds testing approach to cointegration) was employed. Also, to estimate the threshold level of capital spending on the level of unemployment in Ghana, the study employed the Conditional Least Square (CLS) method. The study examined the long run and short run relationships between public spending and unemployment rate. The key findings from the study are:

The cointegration analysis revealed that there is negative and significant relationship between unemployment rate and government final consumption spending. The long run equation revealed that 1 percent increase in government final consumption expenditure leads to approximately 1.01 percent decrease in the unemployment as a percentage of labour force. Also, the long run estimations revealed that there is a positive and significant long run relationship between unemployment as a percentage of labour force and government gross fixed capital formation expenditure (capital expenditure). It was revealed that in the long run, 1 percent increase in government's capital spending increases unemployment rate by approximately 1.99 percent. Consistence with the long run estimate the two policy variables maintained their relationship with unemployment level in the short run.

The study also found a negative and statistically significant relationship between private sector development and the level of unemployment both in the long run and short run. This re-emphasised the crucial role that the private sector plays in unemployment situation in Ghana and that the development of the private sector reduces the unemployment level.

Furthermore, the result of the study revealed that there is a positive and highly significant relationship between public external debt and unemployment. This indicates how external debt worsens the rate of unemployment situation in Ghana in the long run.

In addition, the bound test revealed that in both the long run and short run, inflation exerts positive and significant effect on rate of unemployment. The negative and statistically significant relationship between inflation and unemployment is in the with the traditional Philip Curve theory as posited by Phillips (1958). This is an indication that inflation contributes to reduce the level of unemployment in the Ghanaian economy.

The coefficient of the lagged error correction is negative as expected and is statistically significant at 1 percent significant level. This suggests that it would not take a long time for the system to return to its equilibrium whenever there is disequilibrium in the system. The magnitude of the coefficient of the error correction term indicates that about 87 percent of the disequilibrium in the system caused by the previous years' shock converges back to the long-run equilibrium in the current year.

The diagnostic tests results show that the model passes the test of serial correlation, functional form misspecification, normally distributed errors and heteroscedasticity. The graphs of the cumulative sum of recursive residuals

(CUSUM) and the cumulative sum of square recursive residuals (CUSUMQ) exhibit that there exists a stable relationship between unemployment and public spending over the study period.

The study also revealed that government gross fixed capital spending has a positive long run relationship with unemployment unlike government final consumption spending. However, the result from the threshold indicates that for the government capital spending to help reduce unemployment in the country, it must be at least 6.9% of GDP for this effect can be realised.

Conclusions

Based on the findings of the study, the following conclusions were drawn. From the result, the objective of finding the effect of government consumption and capital spending on rate of unemployment were executed. When considering the short run and the long run effects, government final consumption spending was found to be a catalyst for reducing unemployment rate in Ghana in both the short run and long run. On the other hand, the study revealed that government spending on gross fixed capital formation (capital spending) is stimulus for unemployment rate in the country. However, the study established that the optimal government spending on gross fixed capital formation is 6.9 percent of gross domestic product and above it, government capital spending will have a reducing effect on the unemployment rate in Ghana.

Secondly, in line with empirical evidence, the study revealed that inflation, external debt and credit to the private sector (as a proxy for private sector development) are key determinants of the level of unemployment in Ghana. This revelation implies that these variables are very critical in

controlling the unemployment situation in Ghana. However, the influence of growth rate of gross domestic product on unemployment situation in Ghana was found to be insignificant.

Policy Recommendations

The study brought to light the importance of government final consumption expenditure, government gross fixed capital formation (capital) expenditure, inflation, development of the private sector, external debt to gross domestic product and growth rate of gross domestic product in influencing the level of unemployment rate in Ghana.

The study found a strong evidence to support the fact that government final consumption spending acts as a catalyst in controlling the unemployment rate in Ghana. It is recommended that fiscal authorities (government) should increase final consumption spending to help reduce the unemployment situation in Ghana. For example, government consumption spending components such as payment of salaries and the like should be increased to enhance aggregate demand in order to reduce unemployment in the country. Also, activities such as fighting corruption, improving efficiency and effective training of human resources should be allocated more funds from the budget because these will ensure improvement in the productivity of the public sector to enhance employment.

However, the study found out that the level of government capital spending aggravates the unemployment situation in Ghana as a result of low level of capital investment. This implies that the government should spend more on investment in order to improve employment levels in the country. The study

recommends that for capital spending to reduce the unemployment situation in the country, its volume should not be less than 6.9 percent of the gross domestic product (GDP). Government gross fixed capital formation (investment) includes the construction of roads, railways, and the like, including schools, offices, hospitals, etc. (World Bank, 2017). Therefore, the fiscal authorities should spend more (specifically, minimum of 6.9% of GDP) on these infrastructures to help reduce the unemployment situation in Ghana. Also, the study recommends that fiscal authorities must ensure that all uncompleted capital (infrastructural) projects will be completed to provide the necessary employment opportunity desirable.

The study also revealed a negative effect between private sector development and unemployment rate which is an indication that development of the private sector plays an important role in controlling unemployment rate. To ensure the development of the private sector, the Bank of Ghana in conjunction with other financial institutions could revise the conventional financial institution lending policy to make it more conducive for micro-borrowing. The study recommends that, solidarity group lending should also be encouraged to allow the private entrepreneurs to access credit at low cost and in due time without requiring collateral. This will facilitate the development of the private sector to help control unemployment rate.

Finally, the study also showed an increasing effect of external debt to gross domestic product on unemployment both in the short run and long run. This implies that borrowing from external sources have bad implications on the Ghanaian economy as far as unemployment is concern. This is as a result of cost on loan servicing that robs the country of high income that could have been used

to undertake ventures that will enhance employment. It is recommended that the government of Ghana should ensure that revenue is generated internally so as to desist from or minimise external borrowing. For example, expanding the tax base to include the informal sectors. Also, tax evaders should be sanction accordingly. Also, public (external) borrowing should strictly be for only capital projects that have the capacity to create jobs.

Limitations of the Study

The study is not free of drawbacks. The main limitation of the study had to do with the limited availability of annual data on some key variables used in the study. For example, an attempt to extend the data backward to include more annual observations was constrained by unavailability of data.

The data used in this study were basically generated from secondary source and no attempt was made to assess the reliability and authenticity of their data generating processes since they are the source from which data on most economic variables are obtained from.

Direction for Future Research

The main focus of this study has been to examine the effect of disaggregated government spending on total unemployment rate in Ghana. The picture will be clearer if unemployment could also be disaggregated into at least two components – rural unemployment and urban unemployment so as to assess the effect of each of the components of government spending on each components of unemployment. By so doing, more attention can be given to the area where there is much concern.

Secondly, the study has revealed a negative relationship of inflation with unemployment at an unknown rate. However, since high inflationary rate is detrimental to economic growth, it will be more appealing if the optimal level of inflation on unemployment could be ascertained so that the reducing effect of inflation on unemployment rate will not turn into increasing effect at a very high level of inflation.

Finally, since unemployment is a key macro issue and a major indicator of economic growth and development, a further research could be undertaken to find out the effect of unemployment on economic growth in Ghana.

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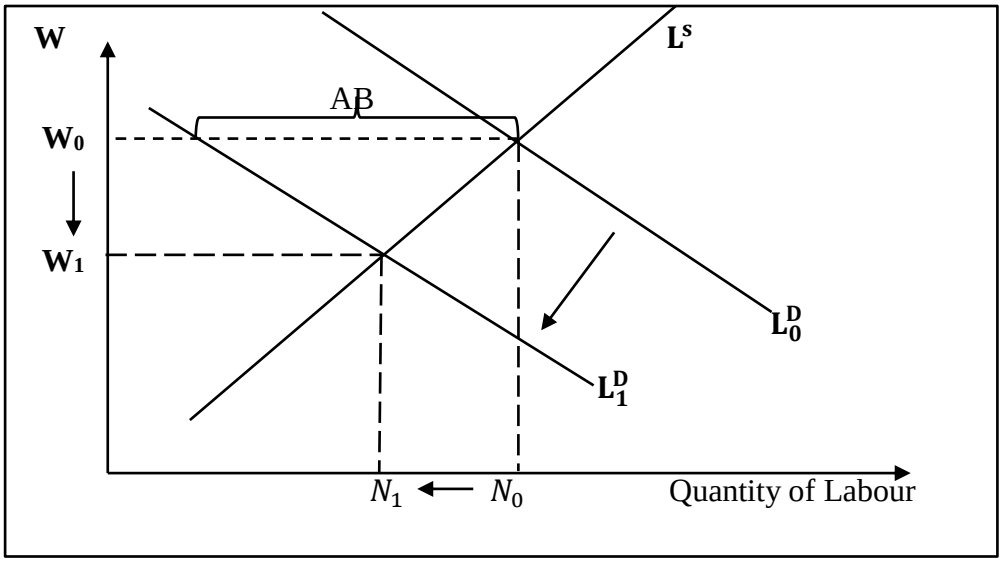
APPENDICES

Appendix A

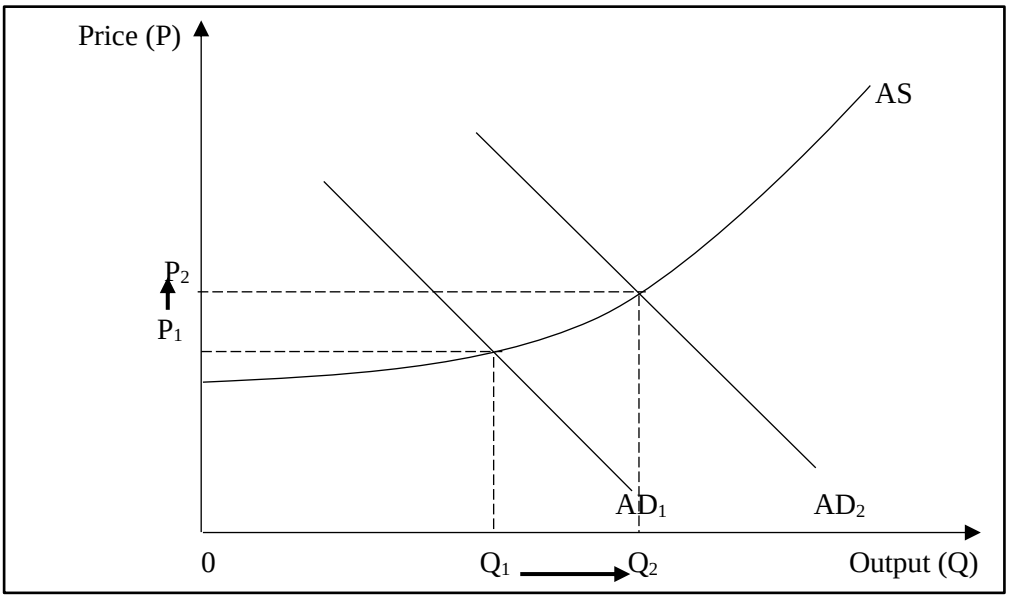
The Labour Market



Source: Froyen (1999)

Appendix B

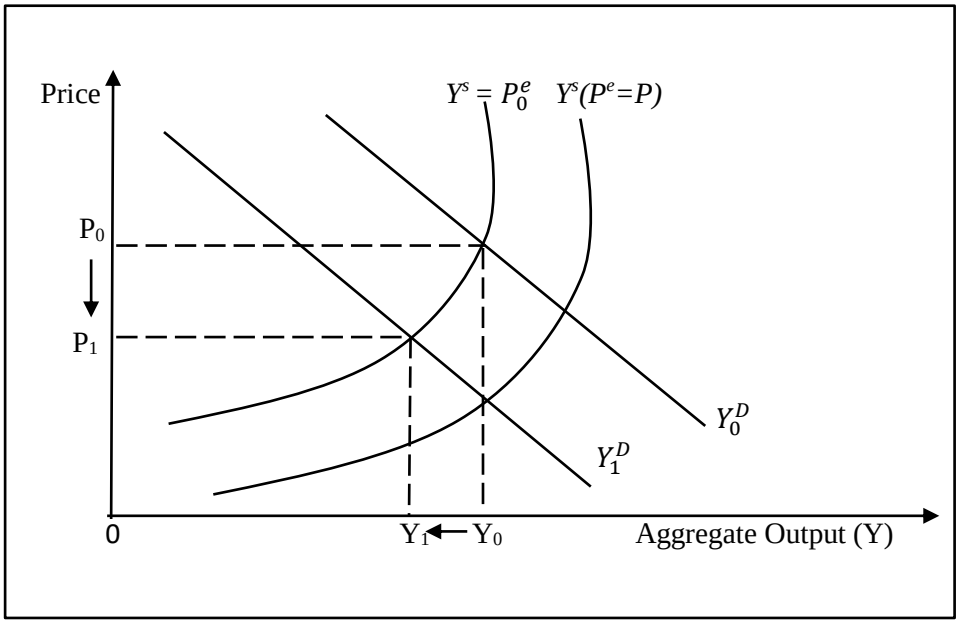
Reflationary Policies



Source: Froyen (1999)

Appendix C

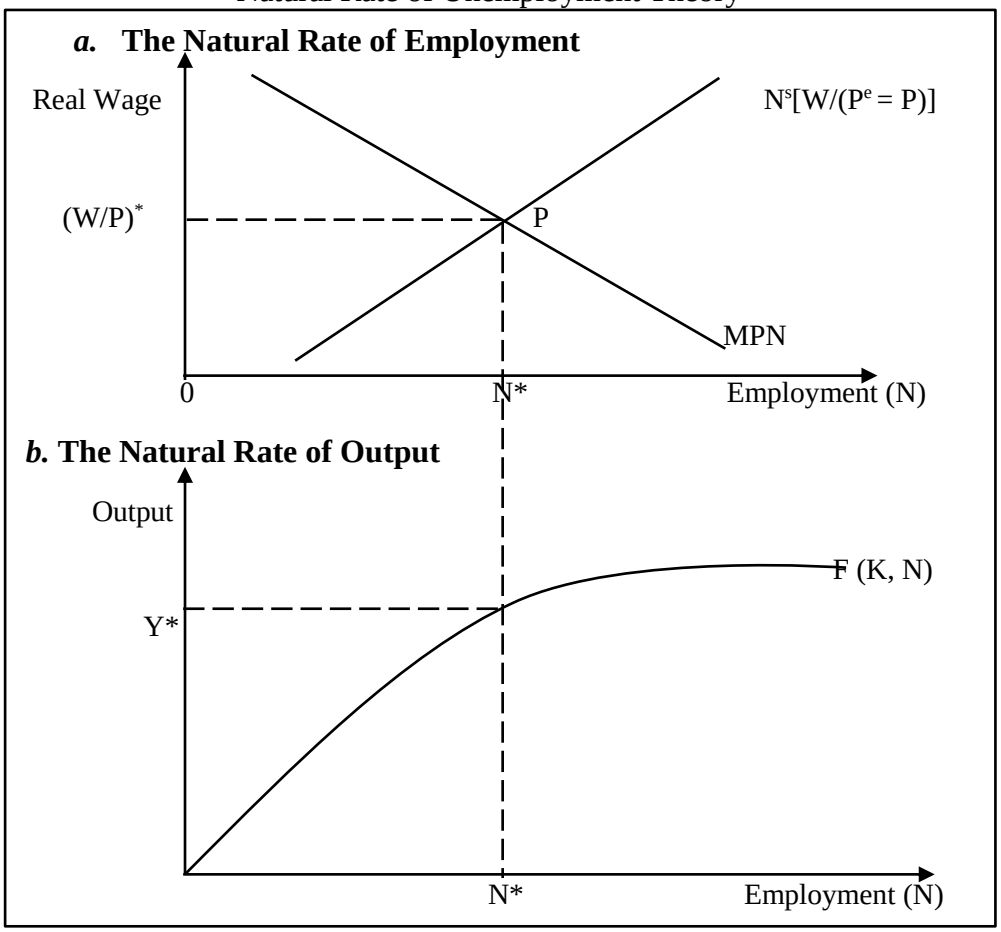
Effects of an Autonomous Decline in Investment: Keynesian View



Source: Froyen (1999)

Appendix D

Natural Rate of Unemployment Theory

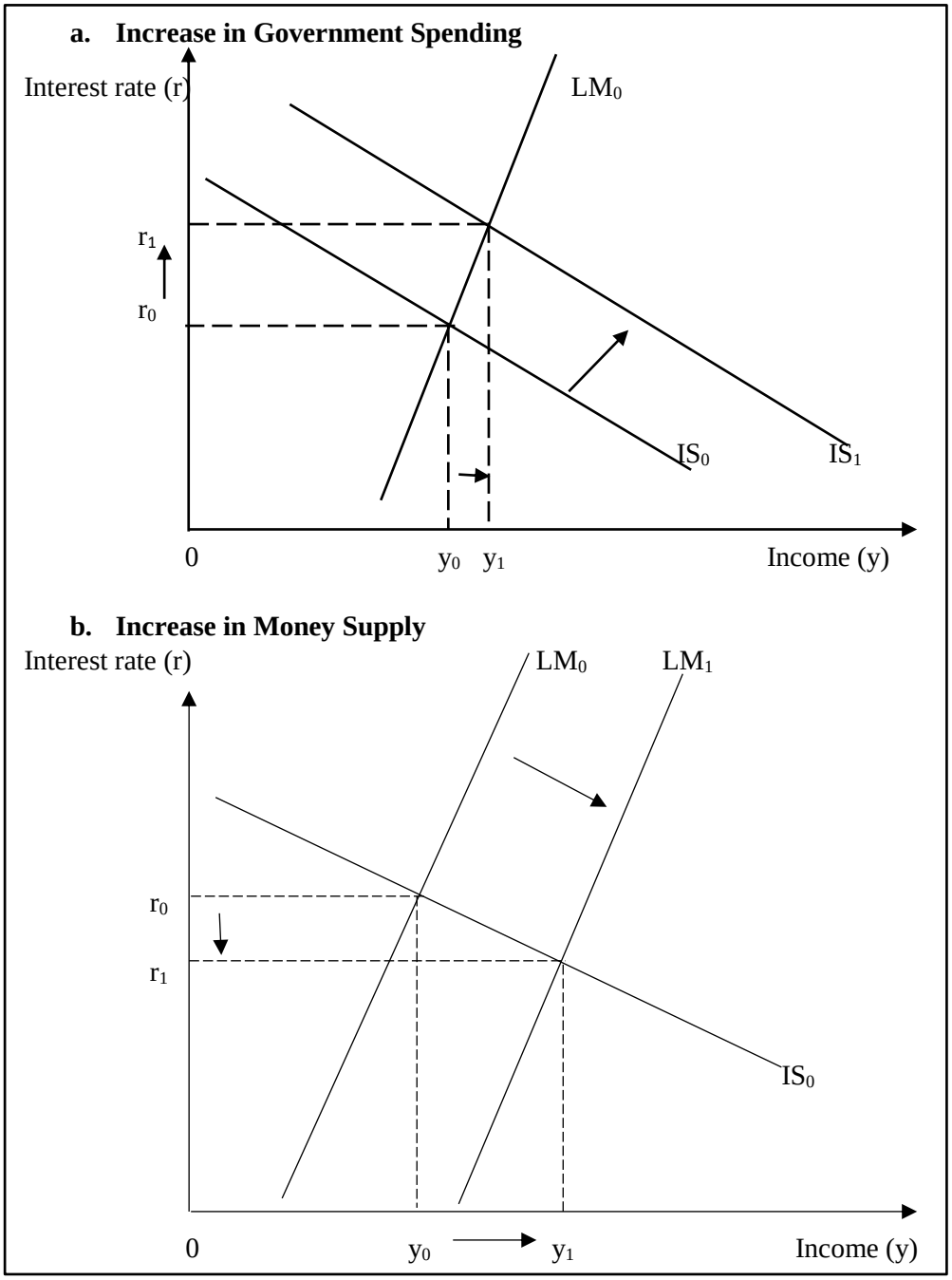


Source: Froyen (1999)

Appendix E

Effects of Increase in Government Spending and Money Supply:

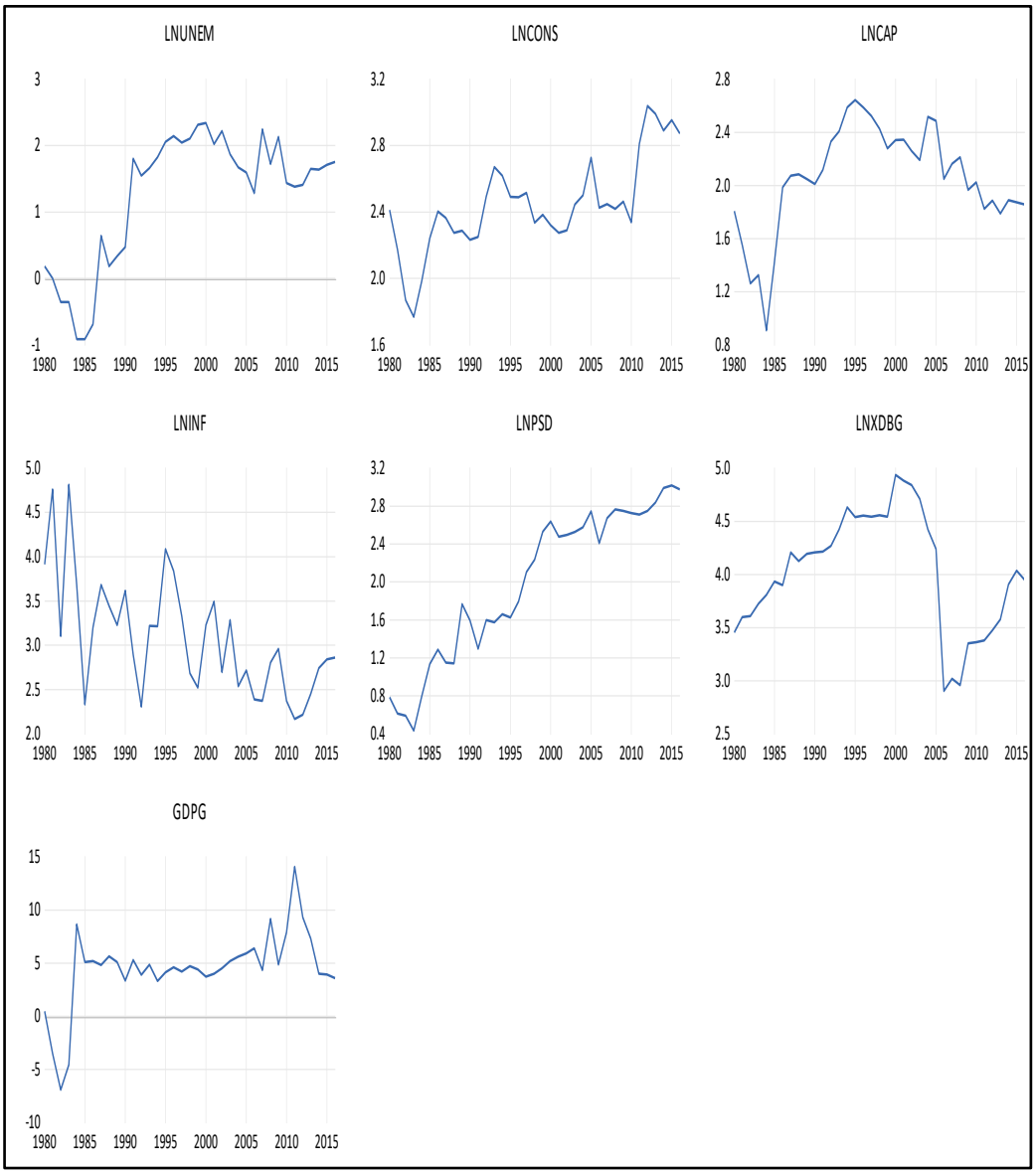
The Monetarist Case



Source: Froyen (1999)

Appendix F

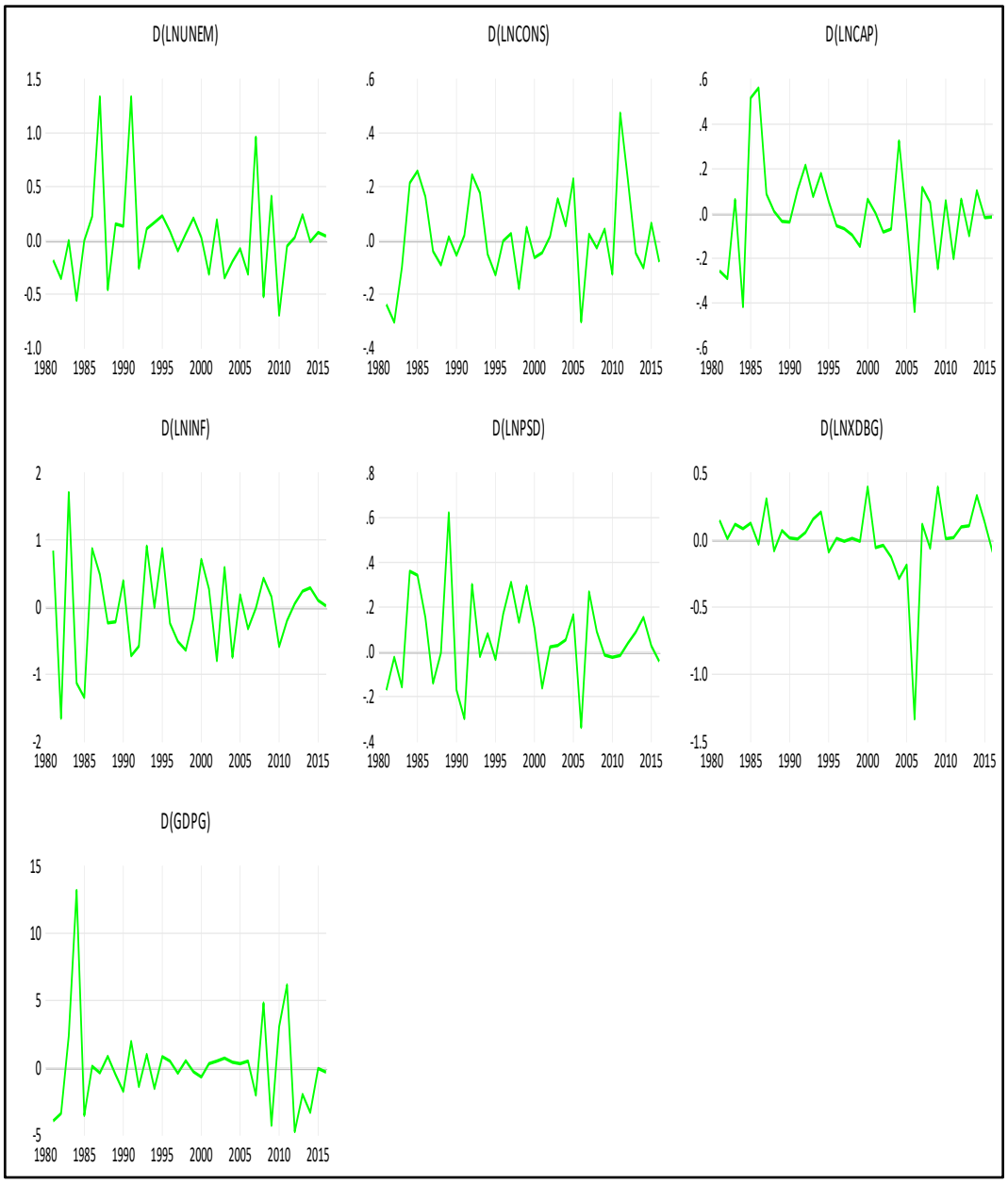
Plots of Variables in Levels from 1980– 2016



Source: Computed by the author.

Appendix G

Plots of First Differenced Variables from 1980-2016



Source: Computed by the author.

Appendix H - 1

Augmented Dickey – Fuller Test for Order of Integration at Levels

Var.	Intercept (Constant)			None			Intercept and Trend			I(d)
	Stats	Lag	Prob.	Stats	Lag	Prob.	Stats	Lag	Prob.	
lnUNEM	-1.51	0	0.517	-0.17	1	0.619	-1.73	0	0.72	
lnCONS	-2.08	1	0.253	0.30	0	0.768	-3.70	1	0.04	
lnCAP	-1.60	0	0.474	-0.26	0	0.587	-1.44	0	0.83	
lnPSD	-1.01	0	0.738	1.33	0	0.951	-2.56	0	0.30	
lnINF	-3.75	0	0.007	-1.15	1	0.222	-5.21	0	0.00	I(0)
lnXDBG	-1.66	0	0.440	0.08	0	0.701	-1.81	0	0.68	
GDPG	-2.99	0	0.046	-1.63	0	0.097	-3.35	0	0.08	

Source: Computed by the author.

Appendix H - 2

Augmented Dickey – Fuller Test for Order of Integration at First Difference

Var.	Intercept(constant)			None			Intercept and trend			I(d)
	Stats	Lag	Prob.	Stats	Lag	Prob.	Stats	Lag	Prob.	
lnUNEM	-7.54	0	0.000	-7.53	0	0.000	-7.50	0	0.000	I(1)
lnCON	-4.97	0	0.000	-4.98	0	0.000	-4.86	0	0.002	I(1)
lnCAP	-5.51	0	0.000	-5.59	0	0.000	-5.59	0	0.000	I(1)
lnPSD	-5.98	1	0.000	-5.91	0	0.000	-6.07	1	0.000	I(1)
lnINF	-6.40	1	0.000	-6.49	1	0.000	-6.30	1	0.000	I(0)
lnXDBG	-2.96	1	0.049	-3.01	1	0.004	-5.28	0	0.000	I(1)
GDPG	-6.93	0	0.000	-7.01	0	0.000	-6.13	1	0.000	I(1)

Source: Computed by the author

Appendix I - 1

Phillips-Perron Test for Order of Integration at Levels

	Intercept			None			Intercept and Trend			
Var.	PP-Stats	Bw	Prob.	PP-Stats	Bw	Prob.	PP-Stats	Bw	Prob.	I(d)
lnUNEM	-1.43	6	0.557	-0.40	6	0.534	-1.64	3	0.758	
lnCON	-1.50	4	0.523	0.60	10	0.842	-3.31	2	0.080	
lnCAP	-1.68	1	0.435	-0.26	0	0.587	-1.54	1	0.798	
lnPSD	-0.92	10	0.770	1.77	4	0.979	-2.62	1	0.275	
lnINF	-3.66	1	0.009	-0.89	8	0.324	-5.25	6	0.000	I(0)
lnXDBG	-1.86	2	0.347	0.06	1	0.695	-1.87	1	0.649	
GDPG	-2.70	6	0.084	-1.42	4	0.141	-3.08	5	0.126	

Source: Computed by the author

Appendix I – 2

Phillips-Perron Test for Order of Integration at First Difference

	Intercept			None			Intercept and Trend			
Var	PP-Stats	Bw	Prob.	PP-Stats	Bw	Prob.	PP-Stats	Bw	Prob.	I(d)
lnUNEM	-7.51	4	0.000	-7.51	3	0.000	-7.57	6	0.000	I(1)
lnCON	-8.65	32	0.000	-5.56	17	0.000	-8.06	31	0.000	I(1)
lnCAP	-5.51	3	0.000	-5.59	2	0.000	-6.24	8	0.000	I(1)
lnPSD	-7.99	10	0.000	-5.93	2	0.000	-11.95	19	0.000	I(1)
lnINF	-15.58	18	0.000	-12.56	13	0.000	-24.48	31	0.000	I(0)
lnXDBG	-5.31	0	0.000	-5.39	0	0.000	-5.281	0	0.001	I(1)
GDPG	-7.90	6	0.000	-7.869	6	0.000	-9.189	10	0.000	I(1)

Source: Computed by the author

Appendix J

Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	20.54947	NA	0.024972	-0.855851	-0.586494	-0.763993
1	88.06664	107.2332*	0.000500*	-4.768626*	-4.454375*	-4.661458*
2	88.14068	0.113235	0.000530	-4.714158	-4.355014	-4.591679
3	88.95234	1.193620	0.000538	-4.703079	-4.299042	-4.565291

Appendix K

Pairwise Correlation Results

	lnUNEM	lnCAP	lnCONS	lnINF	lnPSD	lnXDBG	GDPG
lnUNEM	1.000	0.755	0.510	-0.366	0.751	0.310	0.302
lnCAP	0.755	1.000	0.345	-0.164	0.422	0.525	0.244
lnCONS	0.510	0.345	1.000	-0.506	0.697	-0.056	0.519
lnINF	-0.366	-0.164	-0.506	1.000	-0.661	0.204	-0.589
lnPSD	0.751	0.422	0.697	-0.661	1.000	-0.016	0.558
lnXDBG	0.310	0.525	-0.056	0.204	-0.016	1.000	-0.109
GDPG	0.302	0.244	0.519	-0.589	0.558	-0.109	1.000

Source: Computed by the author.

Appendix L

Diagnostic and Stability Tests

1. Ramsey RESET Test for Model Specification

	Value	df	Probability
t-statistic	0.752377	23	0.4595
F-statistic	0.566071	(1, 23)	0.4595
Likelihood ratio	0.875297	1	0.3495

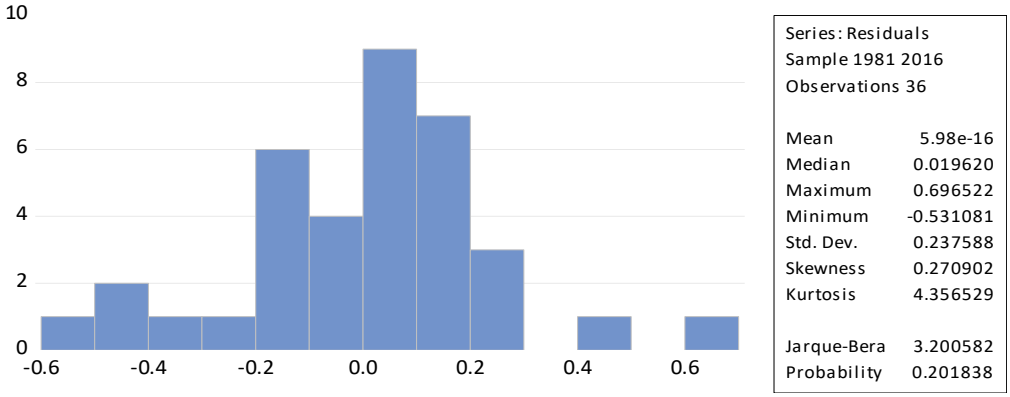
2. Serial correlation Test using Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.000798	Prob. F (1,23)	0.9777
Obs*R-squared	0.001249	Prob. Chi-Square (1)	0.9718

3. Heteroscedasticity Test using Breusch-Pagan-Godfrey

F-statistic	0.974063	Prob. F (11,24)	0.4944
Obs*R-squared	11.11141	Prob. Chi-Square (11)	0.4340
Scaled explained SS	8.287945	Prob. Chi-Square (11)	0.6873

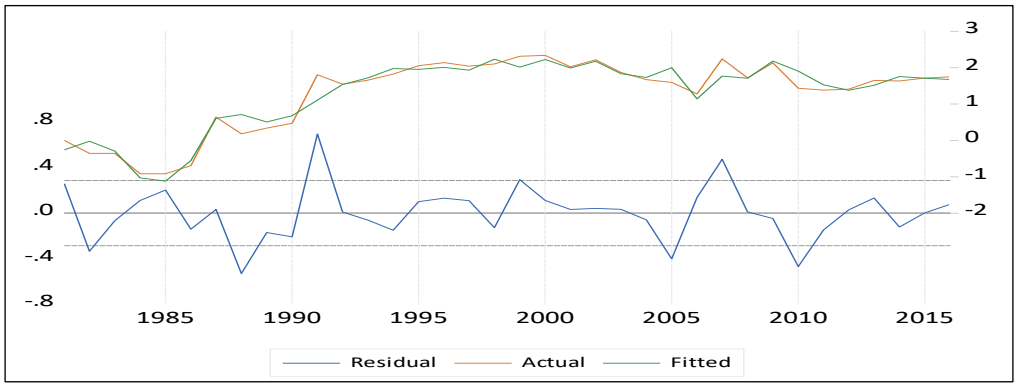
4. Normal Distribution Test using Jarque-Bera (JB)



Source: Computed by the author.

Appendix M

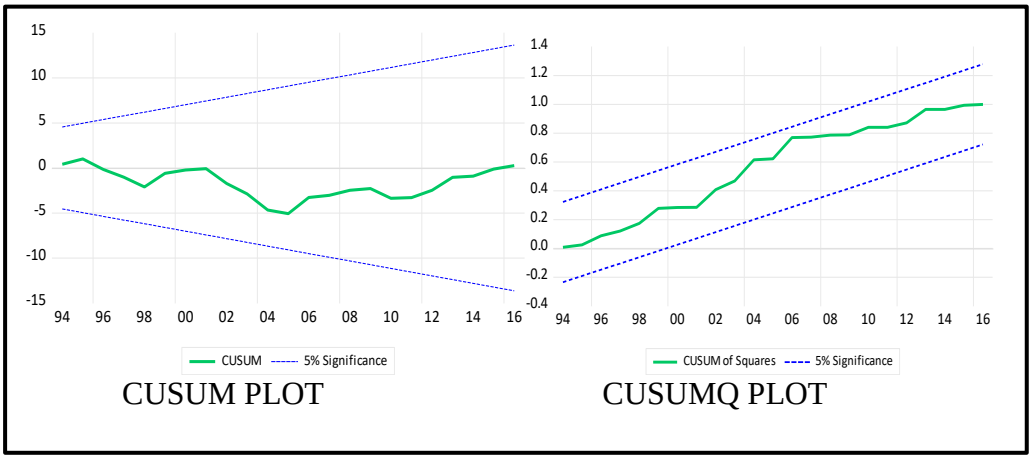
Actual Versus Fitted Residuals



Source: Computed by the author.

Appendix N

Plot of Cumulative Sum of Recursive Residuals (CUSUM) and Plot of Cumulative Sum of Squares of Recursive Residuals (CUSUMQ)



CUSUM PLOT CUSUMQ PLOT

NB: The upper and lower blue lines represent critical bounds at 5% significance level.

Source: Generated by the author

Appendix O

Unit Root Test on Threshold Variables at Levels Using Philips-Perron Test

Variable	Intercept		Trend and intercept		I(d)
	Bandwidth	Probability	Bandwidth	Probability	
UN_g	4	0.0000	5	0.0000	I(0)
CAP_g	1	0.0000	2	0.0008	I(0)
PSD_g	3	0.0000	4	0.0000	I(0)
$XDBG_g$	1	0.0000	1	0.0003	I(0)
INF	3	0.0005	1	0.0000	I(0)
CON_g	20	0.0000	22	0.0000	I(0)

Source: Computed by the author.

Appendix P

Results of Threshold Estimation Using Conditional Least Estimation Method

k	Variable	Coefficient	Std. Error	t-Statistic	Prob.	R^2	DW
	CAP_g	0.514278	0.291998	1.761238	0.0881		
	$D(CAP_g - 3)$	0.144466	0.264736	0.545697	0.5892		
3	$XDBG_g$	1.162603	0.605035	1.921546	0.0639	0.175765	2.2
	PSD_g	-0.989951	0.574548	-1.723010	0.0948		
	INF	-0.003835	0.002964	-1.293952	0.2052		
	C	0.159698	0.226197	0.706016	0.4855		
	CAP_g	-0.382973	0.823055	-0.465307	0.6450		
	$D(CAP_g - 4)$	-1.044145	0.664515	-1.571288	0.1263		
4	$XDBG_g$	1.078069	0.408370	2.639929	0.0129	0.264687	2.2
	PSD_g	-0.944501	0.618347	-1.527461	0.1368		
	INF	-0.004415	0.002929	-1.507334	0.1418		
	C	1.294249	0.597281	2.166901	0.0380		
	CAP_g	0.134206	0.455561	0.294595	0.7703		
	$D(CAP_g - 5)$	-0.451145	0.337043	-1.338541	0.1905		
5	$XDBG_g$	1.203912	0.565553	2.128736	0.0413	0.216427	2.5
	PSD_g	-1.125231	0.576411	-1.952134	0.0600		
	INF	-0.004731	0.002793	-1.694097	0.1003		
	C	0.719416	0.290109	2.479816	0.0188		
	CAP_g	0.356797	0.265402	1.344366	0.1886		
	$D(CAP_g - 6)$	-0.407704	0.250949	-1.624646	0.1144		
6	$XDBG_g$	1.211184	0.589178	2.055720	0.0483	0.214336	2.5
	PSD_g	-1.175474	0.604276	-1.945259	0.0609		
	INF	-0.006733	0.003319	-2.028256	0.0512		
	C	0.726884	0.289271	2.512808	0.0174		
	CAP_g	0.289605	0.295706	0.979370	0.3350		
	$D(CAP_g - 6.5)$	-0.774531	0.243250	-3.184095	0.0033		
6.5	$XDBG_g$	1.193787	0.544693	2.191671	0.0360	0.346718	2.6
	PSD_g	-1.164098	0.525336	-2.215910	0.0342		
	INF	-0.005264	0.002691	-1.955947	0.0595		
	C	0.984517	0.278349	3.536988	0.0013		
	CAP_g	0.039350	0.273427	0.143914	0.8865		

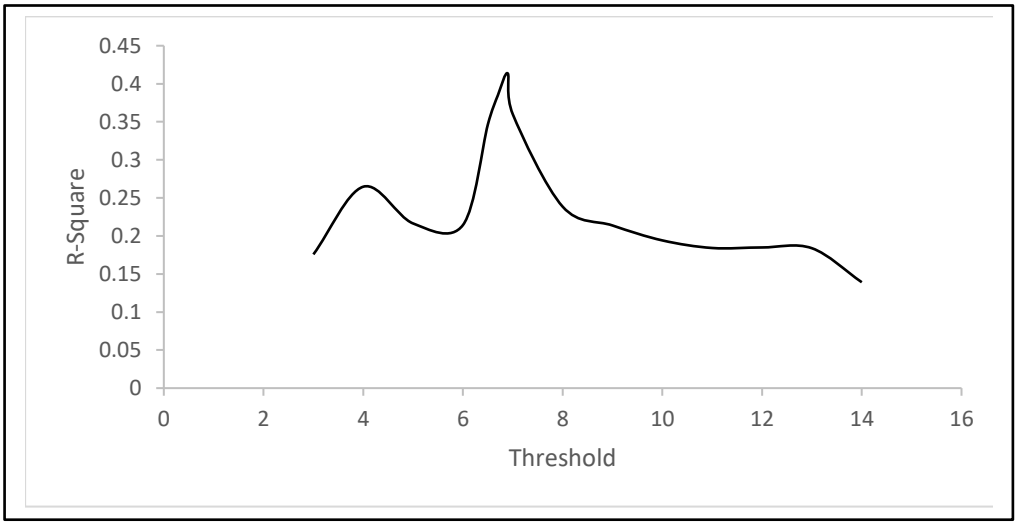
6.7	$D(CAP_g - 6.7)$	-0.925915	0.250118	-3.701915	0.0008	0.384856	2.6
	$XDBG_g$	1.191810	0.540856	2.203564	0.0351		
	PSD_g	-0.949552	0.458225	-2.072238	0.0466		
	INF	-0.004730	0.002649	-1.785703	0.0839		
	C	1.106402	0.269853	4.100015	0.0003		
6.9	CAP_g	0.428962	0.167781	2.556671	0.0157	0.413402*	2.5
	$D(CAP_g - 6.9)$	-1.029357	0.308697	-3.334524	0.0022		
	$XDBG_g$	1.071802	0.484216	2.213480	0.0344		
	PSD_g	-0.942193	0.448859	-2.099087	0.0440		
	INF	-0.004238	0.002388	-1.775005	0.0857		
	C	1.203723	0.308768	3.898469	0.0005		
7	CAP_g	-0.237495	0.377082	-0.629824	0.5334	0.359866	2.5
	$D(CAP_g - 7)$	-0.881512	0.255863	-3.445248	0.0017		
	$XDBG_g$	1.203039	0.517147	2.326299	0.0267		
	PSD_g	-1.052040	0.490649	-2.144179	0.0400		
	INF	-0.004693	0.002670	-1.757497	0.0887		
	C	1.057160	0.275057	3.843416	0.0006		
8	CAP_g	0.130017	0.279909	0.464495	0.6455	0.238491	2.5
	$D(CAP_g - 8)$	-0.418944	0.253862	-1.650284	0.1090		
	$XDBG_g$	1.130596	0.543331	2.080860	0.0458		
	PSD_g	-1.116068	0.545940	-2.044304	0.0495		
	INF	-0.005374	0.003210	-1.674113	0.1042		
	C	0.633599	0.275750	2.297731	0.0285		
9	CAP_g	0.408539	0.196552	2.078533	0.0460	0.213745	2.3
	$D(CAP_g - 9)$	-0.289909	0.211285	-1.372123	0.1799		
	$XDBG_g$	1.118431	0.573479	1.950257	0.0602		
	PSD_g	-1.066943	0.532025	-2.005436	0.0537		
	INF	-0.004786	0.002742	-1.745530	0.0908		
	C	0.477646	0.234745	2.034742	0.0505		
10	CAP_g	0.376941	0.218867	1.722241	0.0950	0.194130	2.4
	$D(CAP_g - 10)$	-0.219739	0.249755	-0.879816	0.3857		
	$XDBG_g$	1.053728	0.586836	1.795608	0.0823		
	PSD_g	-1.038686	0.570306	-1.821277	0.0782		
	INF	-0.003195	0.002809	-1.137451	0.2641		

	C	0.382449	0.194479	1.966527	0.0582		
	CAP_g	0.453901	0.167875	2.703810	0.0112		
	$D(CAP_g - 11)$	-0.156257	0.225558	-0.692755	0.4938		
11	$XDBG_g$	1.153849	0.592110	1.948707	0.0607	0.184162	2.3
	PSD_g	-1.011705	0.615120	-1.644727	0.1105		
	INF	-0.004295	0.003040	-1.412729	0.1680		
	C	0.366637	0.240659	1.523470	0.1381		
	CAP_g	0.488085	0.202832	2.406352	0.0227		
	$D(CAP_g - 12)$	0.231709	0.276850	0.836948	0.4095		
12	$XDBG_g$	1.230458	0.615426	1.999360	0.0550	0.184870	2.2
	PSD_g	-0.937070	0.646058	-1.450442	0.1577		
	INF	-0.001606	0.004161	-0.385831	0.7024		
	C	0.210222	0.220205	0.954664	0.3476		
	CAP_g	0.390579	0.185455	2.106055	0.0443		
	$D(CAP_g - 13)$	0.283589	0.375897	0.754430	0.4569		
13	$XDBG_g$	1.107314	0.673707	1.643615	0.1114	0.183841	2.2
	PSD_g	-1.007007	0.610997	-1.648138	0.1105		
	INF	-0.001963	0.004075	-0.481764	0.6337		
	C	0.254843	0.213356	1.194449	0.2423		
	CAP_g	0.268500	0.143616	1.869566	0.0720		
	$D(CAP_g - 14)$	-0.445580	0.274762	-1.621696	0.1161		
14	$XDBG_g$	1.327688	0.676333	1.963069	0.0596	0.139144	2.2
	PSD_g	-1.065829	0.603232	-1.766863	0.0882		
	INF	-0.003354	0.004266	-0.786160	0.4384		
	C	0.341862	0.229736	1.488063	0.1479		

NB: * denotes the threshold level
Source: Computed by the author.

Appendix Q

Plot of the threshold values and the corresponding R – squares



Source: Computed by the author.

Appendix R

Model Diagnostics and Stability Tests on Estimated Threshold

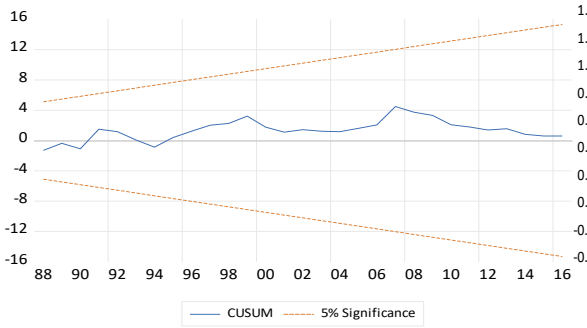
- Serial Correlation Test using Breusch-Godfrey serial correlation LM test

F-statistic	2.079949	Prob. F (1,30)	0.1596
Obs*R-squared	2.398947	Prob. Chi-Square (1)	0.1214

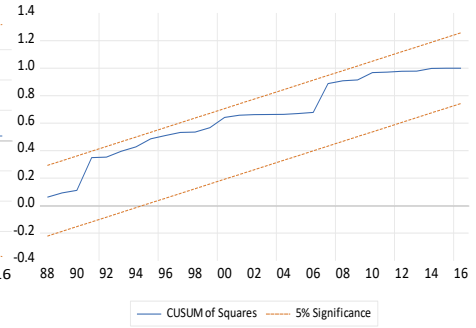
- Heteroscedasticity Test using Autoregressive Conditional Heteroscedasticity (ARCH)

F-statistic	0.904562	Prob. F (1,34)	0.3483
Obs*R-squared	0.932950	Prob. Chi-Square (1)	0.3341

- Stability Test using CUSUM and CUSUMQ



CUSUM PLOT



CUSUMQ PLOT

Note: The upper and lower red lines represent critical bounds at 5% significance level.

Source: Generated by the author.

Appendix S

Sensitivity of the Estimated Threshold to Additional Explanatory Variable.

k	Variable	Coefficient	Std. Error	t-Statistic	Prob.	R^2	DW
3	CAP_g	0.537385	0.298703	1.799062	0.0821	0.177491	2.2
	$D(CAP_g - 3)$	0.135300	0.269697	0.501672	0.6196		
	$XDBG_g$	1.173466	0.628610	1.866763	0.0717		
	PSD_g	-0.960325	0.567452	-1.692344	0.1009		
	INF	-0.004151	0.003033	-1.368895	0.1812		
	$CONS_g$	-0.192968	0.315881	-0.610887	0.5459		
	C	0.179761	0.232969	0.771612	0.4464		
4	CAP_g	-0.353903	0.821642	-0.430727	0.6697	0.268641	2.20
	$D(CAP_g - 4)$	-1.058926	0.679422	-1.558570	0.1296		
	$XDBG_g$	1.091459	0.433959	2.515122	0.0175		
	PSD_g	-0.898910	0.620580	-1.448500	0.1578		
	INF	-0.004895	0.002916	-1.678238	0.1037		
	$CONS_g$	-0.292479	0.335867	-0.870818	0.3908		
	C	1.324898	0.617581	2.145301	0.0401		
5	CAP_g	0.153618	0.463351	0.331538	0.7425	0.217027	2.48
	$D(CAP_g - 5)$	-0.446263	0.344694	-1.294663	0.2053		
	$XDBG_g$	1.209435	0.580836	2.082231	0.0459		
	PSD_g	-1.106235	0.581985	-1.900796	0.0670		
	INF	-0.004907	0.002853	-1.719762	0.0958		
	$CONS_g$	-0.114122	0.278142	-0.410302	0.6845		
	C	0.721395	0.294384	2.450528	0.0203		
6	CAP_g	0.385427	0.261471	1.474073	0.1509	0.216309	2.49
	$D(CAP_g - 6)$	-0.408535	0.252483	-1.618070	0.1161		
	$XDBG_g$	1.221698	0.608263	2.008502	0.0537		
	PSD_g	-1.144180	0.599493	-1.908580	0.0659		
	INF	-0.007071	0.003440	-2.055622	0.0486		
	$CONS_g$	-0.206111	0.279162	-0.738322	0.4661		
	C	0.739459	0.294766	2.508628	0.0178		
	CAP_g	0.314963	0.300394	1.048503	0.3028		
	$D(CAP_g - 6.5)$	-0.773873	0.244134	-3.169874	0.0035		
	$XDBG_g$	1.202917	0.559244	2.150971	0.0397		

6.5	PSD_g	-1.136242	0.522676	-2.173894	0.0377	0.314963	2.68
	INF	-0.005554	0.002825	-1.966348	0.0586		
	$CONS_g$	-0.180322	0.300440	-0.600192	0.5529		
	C	0.994184	0.281288	3.534395	0.0013		
	CAP_g	0.030216	0.272799	0.110763	0.9125		
	$D(CAP_g - 6.7)$	-0.928819	0.255433	-3.636257	0.0010		
	$XDBG_g$	1.189008	0.547361	2.172256	0.0379		
6.7	PSD_g	-0.958034	0.485296	-1.974121	0.0576	0.384999	2.60
	INF	-0.004642	0.002662	-1.744136	0.0914		
	$CONS_g$	0.056029	0.298470	0.187722	0.8524		
	C	1.105738	0.273812	4.038313	0.0003		
	CAP_g	0.411709	0.158345	2.600069	0.0143		
	$D(CAP_g - 6.9)$	-1.037126	0.313187	-3.311526	0.0024	0.414081*	2.47
	$XDBG_g$	1.064800	0.485155	2.194763	0.0361		
6.9	PSD_g	-0.960585	0.475512	-2.020109	0.0524		
	INF	-0.004044	0.002440	-1.657354	0.1079		
	$CONS_g$	0.122058	0.281624	0.433408	0.6678		
	C	1.203585	0.312959	3.845820	0.0006		
	CAP_g	-0.229654	0.376447	-0.610056	0.5464		
	$D(CAP_g - 7)$	-0.879935	0.261929	-3.359448	0.0021		
	$XDBG_g$	1.205392	0.526849	2.287928	0.0294		
7	PSD_g	-1.044672	0.512316	-2.039114	0.0503	0.359969	2.51
	INF	-0.004768	0.002630	-1.812968	0.0799		
	$CONS_g$	-0.047234	0.296831	-0.159127	0.8746		
	C	1.058495	0.279153	3.791804	0.0007		
	CAP_g	0.144351	0.283288	0.509557	0.6141		
	$D(CAP_g - 8)$	-0.415976	0.258915	-1.606614	0.1186		
	$XDBG_g$	1.135310	0.558780	2.031763	0.0511		
8	PSD_g	-1.101943	0.550620	-2.001277	0.0545	0.238832	2.53
	INF	-0.005503	0.003263	-1.686686	0.1020		
	$CONS_g$	-0.086129	0.325856	-0.264316	0.7933		
	C	0.636151	0.281966	2.256129	0.0315		
	CAP_g	0.389726	0.190697	2.043688	0.0499		
	$D(CAP_g - 9)$	-0.302682	0.232788	-1.300247	0.2034		

	$XDBG_g$	1.109626	0.585022	1.896727	0.0675		
9	PSD_g	-1.088830	0.554537	-1.963493	0.0589	0.214344	2.38
	INF	-0.004630	0.002886	-1.604397	0.1191		
	$CONS_g$	0.120476	0.427661	0.281710	0.7801		
	C	0.478490	0.236220	2.025615	0.0518		
	CAP_g	0.380394	0.238974	1.591779	0.1219		
	$D(CAP_g - 10)$	-0.217826	0.279716	-0.778742	0.4422		
	$XDBG_g$	1.055835	0.618295	1.707655	0.0980		
10	PSD_g	-1.035200	0.595444	-1.738534	0.0924	0.194147	2.38
	INF	-0.003234	0.003218	-1.004826	0.3230		
	$CONS_g$	-0.019945	0.439701	-0.045360	0.9641		
	C	0.382891	0.198336	1.930519	0.0630		
	CAP_g	0.500220	0.173985	2.875066	0.0075		
	$D(CAP_g - 11)$	-0.177612	0.238208	-0.745620	0.4619		
	$XDBG_g$	1.167345	0.616871	1.892364	0.0685		
11	PSD_g	-0.958831	0.592218	-1.619051	0.1163	0.188676	2.31
	INF	-0.004895	0.003202	-1.528923	0.1371		
	$CONS_g$	-0.322896	0.321390	-1.004686	0.3234		
	C	0.392678	0.255742	1.535443	0.1355		
	CAP_g	0.502825	0.200996	2.501666	0.0185		
	$D(CAP_g - 12)$	0.219062	0.289351	0.757080	0.4553		
	$XDBG_g$	1.235111	0.634829	1.945582	0.0618		
12	PSD_g	-0.917156	0.634078	-1.446439	0.1592	0.185586	2.25
	INF	-0.001862	0.004191	-0.444254	0.6603		
	$CONS_g$	-0.128388	0.295323	-0.434737	0.6671		
	C	0.220240	0.234447	0.939400	0.3556		
	CAP_g	0.420949	0.175620	2.396936	0.0237		
	$D(CAP_g - 13)$	0.262178	0.388815	0.674299	0.5059		
13	$XDBG_g$	1.133742	0.710713	1.595217	0.1223		
	PSD_g	-0.953428	0.591585	-1.611652	0.1187	0.190461	2.3
	INF	-0.002586	0.004181	-0.618422	0.5415		
	$CONS_g$	-0.331331	0.338179	-0.979751	0.3359		
	C	0.278903	0.230341	1.210827	0.2365		
	CAP_g	0.308484	0.131102	2.352999	0.0262		

	$D(CAP_g - 14)$	-0.463049	0.293826	-1.575931	0.1267		
	$XDBG_g$	1.357733	0.722562	1.879053	0.0711		
14	PSD_g	-0.998649	0.582658	-1.713954	0.0980	0.200825	2.2
	INF	-0.004115	0.004421	-0.930747	0.3602		
	$CONS_g$	-0.425186	0.381738	-1.113815	0.2752		
	C	0.370673	0.245689	1.508712	0.1430		

Note: * denote the threshold level
Source: Computed by the author.