UNIVERSITY OF EDUCATION, WINNEBA

THE IMPACT OF GOVERNMENT EDUCATIONAL EXPENDITURE ON ECONOMIC GROWTH IN GHANA

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DECLARATION

STUDENT'S DECLARATION

I, **SYLVIA HOLA KUDADZE,** hereby declare that except reference to people's work which have been duly cited, this project work is the result of my own original research and that it has neither in whole nor part been presented elsewhere.

SIGNATURE: …….....

DATE:…….

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of the project work was supervised by me in accordance with the guidelines on supervision of project works and laid down by the University of Education, Winneba.

SUPERVISOR: DR. THEOPHILUS EDWARD RICHARDSON

SIGNATURE: ……..

DATE: ……

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DEDICATION

I dedicate this work to almighty God for His providence throughout my study at University of Education, Winneba (UEW). I also dedicate this work to my lovely husband Gbande Sulleh.

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ABBREVIATIONS

LDCs	Less Developed Countries
OECD	Organization for Economic Co-operation and Development
MDGs	Millennium Development Goals
ECOWAS	Economic Community of West African States
GDP	Gross Domestic Product
CBN	Christian Broadcasting Network
GNP	Gross National Product
CES	Constant Elasticity of Substitution
TFP	Total Factor Productivity
R&D	Research Development
FMOLS	Fully Modified Ordinary Least Squares
PVECM	Panel Vector Error Correction
EU	European Union,
USA	United States of America
ODA	Foreign Aid
CAP	Capital Formation
LAB	Labor Force Participation
EDU	Government Expenditure on Education
VECM	Vector Error Correction Model
OLS	Ordinary Least Squares
CPI	Consumer Price Index
WDI	World Development Indicators
GSS	Ghana Statistical Service
BoG	Bank of Ghana
ARDL	Autoregressive Distributed Lag
ADF	Augmented Dickey-Fuller

PP	Phillip-Perron
DW	Durbin Watson
AIC	Akaike Information Criteria
SBC	Schwarz Bayesian Criterion
VAR	Vector Auto Regression
UECM	Unrestricted Error Correction Model
ECM	Error Correction Model
CEMAC	Central African Economic and Monetary Community
CUSUM	Cumulative Sum
CUSUMSQ	Cumulative Sum Squared

ABSTRACT

The purpose of this is to examine the relationship between components of educational expenditure and economic growth. The study considered the impacts of expenditure on tertiary, secondary and primary education on economic growth. The study employed quantitative research design to analyse relationship between educational expenditure and economic growth in Ghana. The study employed annual time series data spanning from 1980 to 2019. Data was sourced from World Development Indicators (WDI) 2020, Globaleconomy.com, Ghana Statistical Service (GSS) and Bank of Ghana (BoG). The study tested for unit root and co-integration to ascertain the existence of stationarity and long run relationship among the variables. Based on the result of the unit root test, ARDL and Error Correction (EC) model was adopted. The result shown that there exists long run relationship between components government educational expenditure and economic growth. The study found that expenditure on primary education was statistically insignificant in the long run. The result indicates that in the long run, government educational expenditure (secondary and tertiary), through its impact on human capital, significantly and positively influence economic growth and this means that education contributes meaningfully to the long-term growth of Ghana's economy. It was found that the impacts of expenditure on tertiary education on economic growth is greater than the impacts of expenditure on secondary education on economic growth. The study further revealed that there exists uni-directional granger causality between government education spending and economic growth. That is, it was found that only educational granger causes economic growth but economic growth does not granger cause education expenditure. The study recommend that government should encourage more spending on tertiary education in the form of scholarship to tertiary students, spending on research and developments which will in the long run increase productivity and hence economic growth. Inter-relationships between government expenditure and education quality should be taken into account when formulating education policy to promote economic growth in Ghana.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

According to Ismail (1998), education is considered as a long-term investment that leads to a high production for a country in the future. In fact, economists argued that advanced education sector will certainly lead successfulness of a country's economics and socials development. Therefore, most of the developed and developing countries emphasize the enhancement of educational sector. Government expenditure is the major instrument used by Governments most especially in developing countries to encourage economic growth which is an essential ingredient for sustainable development. One of the major components of government expenditure is educational expenditure. This is due to the fact that education plays a crucial role in the socio-economic development of low- and middle-income countries. Education is both an end in itself and a means for achieving other developmental goals, such as economic growth, poverty reduction, improved health status, greater equity and reduced fertility. Economic growth brings about a better standard of living of the people through provision of better infrastructure, health, housing, education services and improvement in agricultural productivity and food security (Loto 2012).

Mostly, education in the West African region, just like other regions in Africa, is funded by the government, which allocates its public education resources based on the country's priorities and needs. While public education spending priorities will vary from country to country, increased investment in education will help to successfully meet key education targets and build a skilled workforce, (Majgaard, and Mingat, 2012).

In many of the West African countries, the public spending on education is complemented by the private sector through private ownership of some of the educational institutions. Thus, there is a combination of both public and private owned educational institutions at all tiers of education co-existing with one another. Nonetheless, access to higher education is unevenly distributed (World Bank, 2013). This can be attributed to the variations in the number of educational institutions in the countries of the region as the spread of both scarce human and financial resources are skewed throughout the sub-region. This notwithstanding, government role in enhancing education and research, in this region, cannot be underestimated and over time, there has been increased government spending on education (World Bank, 2016) but whether these spending translate to improvements in both education and manpower development remains contentious. Thus, to progress towards greater prosperity and economic growth, countries need to provide higher education that is relevant to current market needs, and this, among others, justifies the need more government spending on education. Endogenous growth model proponents like Lucas, (1988), Romer (1990) and Barro (1991) validated the fact that the role of education in promoting economic growth is significant and positive. Thus, investment on education has a positive effect on both the individual manpower and the economy. Additionally, countries having greater stocks of human capital and investing more on education or research and development will enjoy a faster rate of economic growth. This, they (proponents of the endogenous growth model) suggest, may be one of the reasons for the slow growth rate of certain developing countries including many West African countries. This implies that improving education quality at all levels is imperative for development in West African countries in particular and Africa as a whole. According to Hanushek and Woessmann, (2008) theoretical contributions

emphasize two main transmission mechanisms through which education affects economic growth. First, education increases the human capital of the labor force, which increases labor productivity and transitional growth toward a higher equilibrium output level. And second, in endogenous growth theories, education increases the innovative capacity of the economy, knowledge of new technologies, products and processes, and thus promotes growth.

The nexus between education and economic growth is important, especially in the African countries where the level of education is far behind that of other regions of the world. Education, especially in the Less Developed Countries (LDCs) had been contended to be a major factor in poverty reduction and government expenditure on the educational sector is the catalyst in achieving equity and promoting economic growth and development (Barro, 1991; Hanushek, 1996; Schultz, 1995; Jung and Thorbecke, 2003). Mincer (1993) also emphasized that higher education attainment promotes high income earnings and increase job securities of workers. According to Sen (1999), schooling is desirable not only for individuals but for society as a whole. This means that returns to investment in education is both private and social and it is for this reason in almost all the developing countries, the government is the main provider of education at the primary and secondary levels.

Education is the cornerstone of economic growth and social development. At the aggregate level, it is believed that a better-educated workforce improves a nation's stock of human capital, which is crucial for increased productivity and economic development (Barro, 1996; Romer, 1986; Lucas, 1988; Ravallion and Chen, 1997). From an economic standpoint, education is associated with high rates of return, both private and social especially in developing countries (Psacharopoulos and Patrinos, 2004).

Knowledge is now the main source of long-term economic growth of each of the world economies. Modern tendencies of development in market economies show that education and investment in human resources are among the priorities of the national strategy and national policy, economic and technological progress. There is increasing empirical evidence that education matters, not only for the personal development, health status, social inclusion and labour market prospects of individual learners, but also for the broader economic performance of countries. As the world has entered the age of the knowledge economy, education through human capital generally play a critical role in driving economic growth in both advanced economies and the emerging or developing economies. Indeed, the role of education through human capital in fostering economic growth is well recognized in the literature thus, the justification for higher government expenditure on education. A crucial issue in this regard is the role of public policy in helping countries to meet the MDGs. In most countries, the public sector plays a dominant role in providing the educational services necessary to build human capital. As such, the impact of this spending on social indicators that might help countries meet the MDGs (via their salutary effects on economic growth) is of great interest. The importance of education for economic development was first spotted by father of economics, Adam Smith. Adam Smith represented the idea of specialization of labor.

According to Smith, the amount of annual products of a nation depends on two factors: the amount of labor employed in the production and productivity of labor. According to Smith, the first factor is of lesser importance than the other factors, as can be seen from the fact that people in earlier times lived much poorer than modern people, even though the percentage of the employed labor was much higher. Smith primarily indicates the importance of the division of labor, as well as first-rate factor

increase in national wealth. From the above it can be concluded that it is necessary to invest resources to people who are employed to train and educate to work in certain professions. Therefore, it is very important to invest in education. Even in some texts, lectures or videos on the internet we can hear that the modern school was specifically made for the needs of industrialization. In fact, if you compare schools have classrooms that are like production facilities in the factories, the bell that marks the beginning and end of classes, such as in factories that marks the beginning and end of the work shift, the students are divided by grade, as in factories for the production facilities, and students in schools are doing exactly what their task is, as in factories where each plant has a specific role in the production process.

1.2 Statement of the Problem

Government activities in the form of expenditure play an active role in promoting macroeconomic performance of a country (Chude & Chude, 2013; Ebaidalla, 2013). Barro and Redlick (2009) established that economic or GDP growth responds positively to changes in each component of government spending more. Therefore, growth of government expenditure leads to economic growth. In recent years, the effect of government spending on economic growth with its corresponding policy implications has aroused the interest of researchers both theoretically and empirically. Government expenditures on education can be interpreted as investments in human capital and there is lot of both theoretical and empirical literature which emphasized the role of education in economic growth of every economy. Among the prominent studies which emphasized the importance of education in economic growth are Romer (1990), Lucas (1988), Theodore Schultz (1961), Solow (1957) and Adam Smith (1776).

Countries across the globe are seeking to improve their human capital base by investing tremendously in education (Chandra, 2010; Pradhan, 2009; Lin, 2003). Ghana's commitment towards education has been tremendous. According to World Bank collection of development indicators, about significant part of Ghana's annual national budget (about 3.9894% of GDP in 2018) have been allocated to the educational sector. Additionally, within the ECOWAS sub-region Ghana is among the countries with the highest education expenditures as a percent of government spending. For various countries, investment in education has been the primary and foremost objective to create better human resources which can bring economic development of the nation by providing skilled labour force. Therefore, the impact of educational spending on economic growth is one of the crucial issues in the economic literature.

There are a lot of empirical research papers that estimate the relationship between public expenditure on education sector and economic growth. However, they come out with different conclusions on the relationship between public expenditure of education and economic growth. Researchers are inconclusive as to whether education expenditures are productive and therefore associated with higher per capita real GDP growth. A number of researchers find evidence that education or education expenditures have direct or indirect positive effect on economic growth. Barro (1991) finds a positive correlation between education expenditures and economic growth. Gemmell (1996) finds both the levels of human capital and their growth rates to be important determinants of economic growth. Benhabib and Speigel (1994) find evidence that education influences the rate of technological progress. Other researchers find either weak or no evidence that education or education expenditures enhance economic growth. Devarajan et al (1996) find negative correlations between

the share education expenditures in government budget and economic growth in most of their estimates. Devarajan et al (1996) however attributed the negative impact of education expenditures in some countries on excessive expenditures, rendering them unproductive on the margin. Benhabib and Speigel (1994) find weak evidence of a relationship between changes in educational attainment of the labor force and economic growth. However, the weak statistical relationship between education and economic growth can be attributed to measurement errors and influential outliers in the cross-country sample. Most of the studies mentioned above use cross-section analysis. While cross section analysis is informative of the correlation that can be established from the data. This however motivates the researcher to employ the same topic to country specific to Ghana by using time series data as most of the earlier studies are cross-country analysis. Also most of the research conducted on the impacts of educational expenditure on economic growth failed to look at the impacts of expenditure of the various level of education such as primary, secondary and tertiary education. This study however will address the gap in research by looking at the impacts of expenditure on the various level of education such as primary, secondary and tertiary on economic growth.

1.3 Purpose of the Study

The purpose of this is to examine the relationship between components of educational expenditure and economic growth. The study considered the impacts of expenditure on tertiary, secondary and primary education on economic growth.

1.4 Research Objectives

The aim of this paper is to explore whether government expenditure on education has impacts on economic growth in Ghana using time series data from 1969 to 2019.

Specifically, the study seeks to:

i. To determine the long run relationship between educational expenditure (Primary, Secondary and Tertiary) and economic growth

ii. To estimate the impact of expenditure on various level of education on economic growth

iii. To investigate granger causality between educational expenditure and economic growth.

1.5 Research Hypothesis

1. H_o: There is no long run relationship between government educational expenditure and economic growth.

   H_a: There is long run relationship between government educational expenditure and economic growth.

2. H_o: There is no impact of government expenditure on the various level of education on economic growth

   H_a: There is an impact of government expenditure on the various level of education on economic growth.

3. H_o: There is no granger causality between government educational expenditure and economic growth.

   H_a: There is granger causality between government educational expenditure and economic growth.

1.6 Significance of the Study

The significance of the study is entrenched in the belief that government educational expenditure is important to economic growth in every economy. The states of affairs regarding public spending are topics that have attracted considerable debate in both developed and developing economies. Although there are significant studies on the impacts of government educational expenditure on economic growth, still more needs

to be done in terms of policies directed to the expenditure on various level of education as well as policies to shape the education industry. This research thesis therefore, will to be an addition to the existing studies by empirically analyzes the impact of government educational expenditure on economic growth in Ghana using annual time series data from 1980 to 2019.

Also, it is believed that, the outcome of the empirical findings from this study will benefit policy makers, researchers among others the government, those in charge of managing government treasury to have an insight into areas where public funds can be channeled so as to promote economic development and growth. Finally, findings of this study will stand as a better avenue to assist government and all stakeholders by aiding them to make rational choice in initiating and allocating public funds to the benefit of the entire population and promote economic growth.

1.7 Scope of the Study

This thesis is set to examine the impacts government educational expenditure on economic growth in Ghana. This study will use annual time series data covering a time period of 40 years (1980 to 2019). The reason from choosing this time period is to fully capture the impacts of government educational expenditure on economic growth. This is because it takes a longer time for the expenditure on education to reflect on the production capacity of every economy and for this reason the researcher chose a time period of 40 years to fully capture the impacts of government educational expenditure on economic growth.

1.8 Organisation of the Study

The study is organized under five chapters. Chapter one comprises the background to the study, statement of the problem, objectives of the study, research hypotheses, significance of the study, scope and organization of the study. The chapter two

presents the review of related literature covering both theoretical and empirical review. Chapter three will discuss the methodology adopted for the study. Specifically, it highlights the research design, theoretical and empirical model specifications as well as description and sources of data. Chapter four covers results and discussion. The final chapter, five summarizes the main findings of the study, discusses the policy implications and recommendations for economists and policy makers in Ghana, and finally acknowledges the limitations of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter is devoted to the review of literature related to government educational expenditure and economic growth nexus. This was aimed at getting supporting theories and empirical evidence for the study. This chapter will be mainly organised in three sections.

The first section will look at conceptual review which will consider review of related concepts to the study. The second section will look at theoretical review which will consider theories of growth and theories of government expenditure. The third section will look at empirical review where the existing empirical works on the topic will be reviewed.

2.1 Definitions of Concepts

This section will consider concepts related to the topic such as concepts of government, expenditure, education and growth.

2.1.1 Concept of Expenditure and Public Expenditure.

Expenditure simply means the action of spending funds. Expenditure represents a payment with either cash or credit to purchase goods or services. Expenditure is recorded at a single point in time (the time of purchase), that is, expenditure is a stock variable compared to an expense which is allocated or accrued over a period of time, that is flow variable.

Public expenditure is spending made by the government of a country on collective needs and wants such as pension, provisions (such as education, healthcare and housing), security, infrastructure and among others. Sources of government revenue

include taxes, and non-tax revenues. Government expenditure refers to the allocated resources handled by the government for its own interest and the nation at large. It can also be referred to as government spending. The resources are distributed in such a way that it reaches the various sectors of the economy like the education sector, health sector, agricultural sector etc. Government expenditure, also known as government or public spending is usually classified into capital and recurrent expenditure. Public spending is more efficient in production of services. Capital spending has been defined as the payment for non financial assets employed in a production process that exceeds period of one year while recurrent spending refers expenditure on non repayable arrangements in a period of one year. This consists of payments of wages, salaries and supplements, buying of goods and services etc. According to Edame and Eturoma (2014), government spending is affected by speed growth of the populace, changes in a country's demography, people's taste, rise in technological demand for industrialization, increase in urbanization, increase in currency depreciation overtime etc On the other hand, education outcomes refers to the objectives of learning upon which higher education programs are built. Government spending can also be defined simply as the knowledge, skills, attitudes, and values that tertiary students will need to achieve success in their various working places, families and communities (Palomba and Banta, 1999).

In the 17th and the 18th centuries, public expenditure was considered wastage of money. Thinkers believed government should stay with their traditional functions of spending on defense and maintaining law and order. Until the 19th century, public expenditure was limited as laissez faire philosophies believed that money left in private hands could bring better returns. In the 20th century, John Maynard Keynes argued the role of public expenditure in determining levels of income and

distribution in the economy. Since then, government expenditures have shown an increasing trend.

2.1.2 Concept of Growth

Economic growth in its simplest term can be explained as sustainable increase in the capacity of goods and services produced in economy from one time period to another. In simplest terms, economic growth refers to an increase in aggregate production in an economy. It can be measured in nominal or real (adjusted for inflation) terms. Traditionally, aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP), although alternative metrics are sometimes used.

In economics, growth is commonly modeled as a function of physical capital, human capital, labor force, and technology. Simply put, increasing the quantity or quality of the working age population, the tools that they have to work with, and the recipes that they have available to combine labor, capital, and raw materials, will lead to increased economic output. The "rate of economic growth" refers to the geometric annual rate of growth in GDP between the first and the last year over a period of time. This growth rate represents the trend in the average level of GDP over the period, and ignores any fluctuations in the GDP around this trend. Economists refer to an increase in economic growth caused by more efficient use of inputs (increased productivity of labor, of physical capital, of energy or of materials) as intensive growth. In contrast, GDP growth caused only by increases in the amount of inputs available for use (increased population, for example, or new territory) counts as extensive growth.

2.2 Review of Theoretical Literature

The section will look at theories of government expenditure and theories of economic growth. However, the main theory guiding this work is endogenous growth theory proposed by Paul Romer and Robert Lucas in the mid-1980.

2.2.0 Theories of Government Expenditure

2.2.1 Wagner's Law Public expenditure

Wagner's law of state is known as the law of increasing state spending, is a principle named after the German economist Adolph Wagner (1835–1917) but the law was postulated by Wagner in (1883). He first observed it for his own country and then for other countries. The theory holds that for any country, that public expenditure rises constantly as income growth expands. It states that in the long run economic growth causes government expenditure. The law predicts that the development of an industrial economy will be accompanied by an increased share of public expenditure in gross national product. This school of thought posits that, public expenditure is a consequence of economic growth. Thus, the Wagner's hypothesis argues that expansion in government spending is the outcome of economic growth since growth of the economy widens the role and the activities of the government, and eventually escalates public expenditure. He expressed that as per capita income grows, growth is witnessed in the society through rapid urbanization and increase enlightenments from the people. This will automatically causes an increase in relative share of public sector in national output. To Wagner, the public's resultant increased in the relative share of public sector resulting from inevitable centralization of economic functions is due to growing needs for economic development vis-à-vis an increasing need for government to improve agriculture and social welfare of the people. In his own opinion towards the end of his analysis, Wagner contends that in a

situation where market failure is evident, government expenditure must be geared up in order to accentuate economic development of the state (Wagner, A., 1883)

Wagner's law suggests that a welfare state evolves from free market capitalism due to the population voting for ever-increasing social services as general income levels grow across broad spectrums of the economy. In spite of some ambiguity, Wagner's statement in formal terms has been interpreted by Richard Musgrave as follows: As progressive nations industrialize, the share of the public sector in the national economy grows continually. Wagner (1893) designed three focal bases for the increased in state expenditure. Firstly, during industrialization process, public sector activity will replace private sector activity. State functions like administrative and protective functions will increase. Secondly, governments needed to provide cultural and welfare services like education, public health, old age pension or retirement insurance, food subsidy, natural disaster aid, environmental protection programs and other welfare functions. Thirdly, increased industrialization will bring out technological change and large firms that tend to monopolize. Governments will have to offset these effects by providing social and merit goods through budgetary means. That is, according to Wagner, social activities of the state, (ii) administrative and protective actions, and (iii) welfare functions are the three things that increase public expenditure. The material below is an apparently much more generous interpretation of Wagner's original premise.

- **Socio-political**, that is the state social functions expand over time: retirement insurance, natural disaster aid (either internal or external), environmental protection programs, among others.

- **Economic**: science and technology advance, consequently there is an increase of state assignments into the sciences, technology and various investment projects, among others.
- **Historical**: the state resorts to government loans for covering contingencies, and thus the sum of government debt and interest amount grow; that is., it is an increase in debt service expenditure.

In his Finanzwissenschaft (1883) and Grundlegung der politischen Wissenschaft (1893), Adolf Wagner pointed out that public spending is an endogenous factor, which is determined by the growth of national income. Hence, it is national income that causes public expenditure. The Wagner's Law tends to be a long-run phenomenon: the longer the time-series, the better the economic interpretations and statistical inferences. This school of thought views public expenditures as an endogenous factor or as an outcome but not a cause of growth in national income. This means that as real income surges up there is a long-propensity for the share of public expenditure to rise relative to national income. In short, Wagner's law states that public expenditure rises faster than national output. This implies that as national income increases, the size of government expenditure also increases to meet the increased social, administrative and protective function of the state. This point of view theoretically suggests that larger government expenditure is likely to be detrimental to economic growth. This is due to the fact that government operations are sometimes performed inefficiently.

2.2.2 Musgrave Theory of Public Expenditure Growth

The theory states that there is a functional relationship between the growth of an economy, and the growth of the government activities, so that the government sector grows faster than the economy (Musgrave, 1969). These interventions by the

government have cost, leading to increase in public expenditure in the economy. The Musgrave's theory enunciates that changes income elasticity for public expenditure is in three district but related series of per-capita income. One in the lower level of per capita income, the demand for services has a tendency to be small. The reason for this is that such income is channeled to satisfy the initial needs of the people and if these per capital income strive to surpass the level of income of the lower income earners, the demand for services supplied by the public sector will increase most importantly in the areas of health, education and transportation. The result is that government will be constrained to gear up expenditures on those services. At the higher level of per-capita income, most importantly in developed economies, once the basic needs are provided and satisfied, the rate of public expenditure do have the habit of decreasing more and more Musgrave (1969).

2.2.3 The Wiseman Peacock Displacement Hypothesis

Alan Peacock and Jack Wiseman in their well-known 1961 monograph The Growth of Public Expenditure in the United Kingdom explained their hypothesis according to which government expenditure tends to evolve in a step like pattern, coinciding with social upheavals, notably wars. Underlying the hypothesis is the notion of tolerable taxation levels. Peacock and Wiseman did not present any formal statistical tests of the displacement hypothesis, instead relied on the visual inspection of the plots of government expenditure against GDP. Peacock and Wiseman (1967) suggested that the growth in public expenditure does not occur in the same way that Wagner theorized. Peacock and Wiseman choose the political propositions instead of the organic state where it is deemed that government like to spend money, people do not like increasing taxation and the population voting for ever-increasing social services. There may be divergence of ideas about desirable public spending and limits of

taxation but these can be narrowed by large-scale disturbances, such as major wars. According to Peacock and Wiseman, these disturbances will cause displacement effect, shifting public revenue and public expenditure to new levels. Government will fall short of revenue and there will be an upward revision of taxation. Initially, citizens will engender displeasure but later on, will accept the verdict in times of crisis. There will be a new level of "tax tolerance". Individuals will now accept new taxation levels, previously thought to be intolerable. Furthermore, the public expect the state to heal up the economy and adjust to the new social ideas, or otherwise, there will be the inspection effect. Peacock and Wiseman viewed the period of displacement as reducing barriers that protect local autonomy and increasing the concentration power over public expenditure to the Central government. During the process of public expenditure centralization, the role of state activities tend to grew larger and larger. This can be referred to the concentration process of increasing public sector activities.

The three basic propositions underlying the P-W analysis are that (i) governments can always find profitable ways to expend available funds, (ii) citizens, in general, are unwilling to accept higher taxes, and (iii) governments must be responsive to the wishes of their citizens. From these basic tenets P-W derive the key concept of a "tolerable burden of taxation". It is assumed that notions about taxation remain fairly stable in peacetime. As a consequence, the limited revenue capacity of the government in peacetime prevents major increases in expenditures. Therefore, in settled times the desired government expenditures and the limits of taxation are likely to diverge. During periods of social upheaval such as war this divergence is likely to be narrowed, permanently displacing the burden of taxation upward. The end result is the attainment of a new expenditure plateau at a higher level than before the onset of

the upheaval. In times of crisis formerly unacceptable revenue-raising methods will be tolerated, and (it is claimed) the higher tax tolerance will persist even after the crisis subsides, thus enabling the government to implement expenditure programs that it previously desired but could not finance. Furthermore, P-W argue that a war brings into focus problems that were not identified before. This is called the "inspection effect". As noted, it is quite clear that P-W posit that the “tolerable burden of taxation” is the engine that runs the displacement effect. Unfortunately, it is not quite clear how this concept should be defined.

2.2.4 The Keynesian Theory of Government Expenditure

Keynesian economics is a macroeconomic economic theory of total spending in the economy and its effects on output, employment, and inflation. Based on his theory, Keynes advocated for increased government expenditures and lower taxes to stimulate demand and pull the global economy out of the depression. Following the 1929-30 Great Depression, the classical economists that opposed government interventions, on the notion that government interventions bring more harm than good to an economy and that the private sector should carry out most of the activities, argued that strong trade unions prevented wage flexibility which resulted in high unemployment. The Keynesians, on the other hand, favored government intervention to correct market failures. In 1936, John Maynard Keynes’ (1883-1946) “General Theory of Employment, Interest and Money”, criticized the classical economists to put too much emphasis on the long run. According to Keynes, “we are all dead in the long run”. Keynes believed depression needed government intervention as a short term cure. Increasing saving will not help but spending. Government will increase public spending giving individuals, purchasing power and producers will produce

more, creating more employment. This is the multiplier effect that shows causality from public expenditure to national income.

Keynes categorized public expenditure as an exogenous variable that can generate economic growth instead of an endogenous phenomenon. Hereby, Keynes believed the role of the government to be crucial as it can avoid depression by increasing aggregate demand and thus, switching on the economy again by the multiplier effect. It is a tool that bring stability in the short run but this need to be done cautiously as too much of public expenditure lead to inflationary situations while too little of it leads to unemployment.

In conclusions, Wagner's law viewed that public expenditure is a consequence rather than cause of national income hence; it plays no role in generating national income. While Keynes viewed that public expenditure is a cause rather than effect of national income therefore can be used to heighten economic activities. Succeeding all the above theories, one can choose how to spend the government revenues optimally in order to maximize economic welfare and/or social welfare. The theoretical approach to public spending is likely to be based on the Wagner's law. This theory was developed by Adolf Wagner and it gained significant importance so as several empirical researches is being performed on the Wagner's law.

2.3 Theories of Economic Growth

2.3.1 Harrod-Domar Growth model

The Harrod–Domar model is a Keynesian model of economic growth. It is used in development economics to explain an economy's growth rate in terms of the level of saving and of capital. It suggests that there is no natural reason for an economy to have balanced growth. The model was developed independently by Roy F. Harrod in 1939, and Evsey Domar in 1946, although a similar model had been proposed

by Gustav Cassel in 1924.The Harrod–Domar model was the precursor to the exogenous growth model. The Harrod Domar Model suggests that the rate of economic growth depends on two things: Level of Savings (higher savings enable higher investment) Capital-Output Ratio. A lower capital-output ratio means investment is more efficient and the growth rate will be higher. Thus, the model emphasizes the importance of savings which must be used for investment to accelerate economic growth. The main assumptions of the Harrod-Domar models are as follows: (i) a full-employment level of income already exists, (ii) there is no government interference in the functioning of the economy, (iii) capital is the only scarce resource (iv) capital and output are in constant proportion, (v) consumption and savings are also in constant proportion to income, (vi) no depreciation assumed in the model as well as no gestation period for capital and finally, (vii) the model assumed a closed economy.

According to the Harrod–Domar model there are three kinds of growth: warranted growth, actual growth and natural rate of growth. Warranted growth rate is the rate of growth at which the economy does not expand indefinitely or go into recession. Actual growth is the real rate increase in a country's GDP per year. Natural growth is the growth an economy requires to maintain full employment. For example, if the labor force grows at 3 percent per year, then to maintain full employment, the economy’s annual growth rate must be 3 percent. Although the Harrod–Domar model was initially created to help analyse the business cycle, it was later adapted to explain economic growth. Its implications were that growth depends on the quantity of labour and capital; more investment leads to capital accumulation, which generates economic growth. The model carries implications for less economically developed countries, where labour is in plentiful supply in these countries but physical capital is not,

slowing down economic progress. LDCs do not have sufficiently high incomes to enable sufficient rates of saving; therefore, accumulation of physical-capital stock through investment is low. The model implies that economic growth depends on policies to increase investment, by increasing saving, and using that investment more efficiently through technological advances. The model was constructed on the following factors.

Savings (S) is some proportion (s) of national income (Y)

Hence, $S = sY$

(1)

Net investment (I) is defined as the change in capital stock in the economy and is denoted as ΔK

Hence, $I = \Delta K$

(2)

Change in capital stock to national output is denoted by capital output ratio (k) and it is further simplified as;

$K/Y = k$ or $\Delta K/ \Delta Y = k$ or $\Delta K = k \Delta Y$

(3)

In the Keynesians model, national savings (S) must equal net investment

Hence, $S = I$

(4)

From equation (1) above, $S = sY$ and also, from equation (2) and (3) above, $I = \Delta K = k \Delta Y$

Therefore, the identity of savings equaling investment can be written as;

$S = sY = k\,\Delta Y = \Delta K = I$

(5)

Equation (5) can be rewritten as:

$sY = k\,\Delta Y$

(6)

dividing equation (6) by Y, gives

$$\frac{sY}{Y} = \frac{k\Delta Y}{Y}$$

$$s = \frac{k\Delta Y}{Y}$$

(7)

dividing equation (7) by k

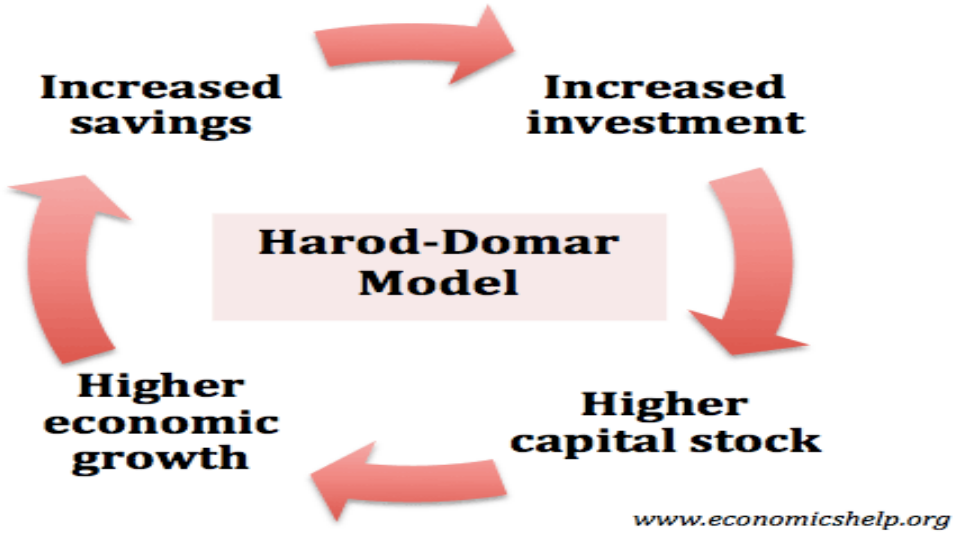
$$\frac{s}{k} = \frac{k\Delta Y}{kY}$$

$$\frac{s}{k} = \frac{\Delta Y}{Y}$$

(8)

Where $\frac{\Delta Y}{Y}$ is the growth rate, (s) is national savings ratio and (k) national capital output ratio.

Hence, equation (8) is the simplified version of the Harrod-Domar growth model which states that the rate of economic growth ($\Delta Y/Y$) is determined jointly by national savings ratio (s) and national capital output ratio (k). The diagram below further simplified Harrod-Domar model.



The main criticism of the model is the level of assumption, one being that there is no reason for growth to be sufficient to maintain full employment; this is based on the belief that the relative price of labour and capital is fixed, and that they are used in equal proportions. The model also assumes that savings rates are constant, which may not be true, and assumes that the marginal returns to capital are constant. Furthermore, the model has been criticized for the assumption that productive capacity is proportional to capital stock, which Domar later stated was not a realistic assumption. Also the Harold Domar theory was critised of simplification in growth research, giving insufficient arguments that economic growth is only due to investment and has ignored the following: (i) Inefficient investment will not lead to growth; (ii) Growth using alternative solutions without using investment solutions; (iii) Investments to a certain degree will be subject to a gradual decrease in income rules Models that can not cope with difficulties in developing countries are difficult to cushion, which can have the following consequences: (i) the imbalance between accumulation and consumption; (ii) Dependent on loans; (iii) The government becomes a big debtor and risk of bankruptcy.

2.3.2 Neoclassical Growth Model

Neoclassical growth theory is an economic theory that outlines how a steady economic growth rate results from a combination of three driving forces labor, capital, and technology. The theory states that short-term equilibrium results from varying amounts of labor and capital in the production function. The theory also argues that technological change has a major influence on an economy, and economic growth cannot continue without technological advances. The Solow–Swan model is an economic model of long-run economic growth set within the framework of neoclassical economics. It attempts to explain long-run economic growth by looking at capita accumulation, labor or population growth, and increases in productivity, commonly referred to as technological progress. At its core is a neoclassical (aggregate) production function, often specified to be of Cobb–Douglas type, which enables the model "to make contact with microeconomics" The model was developed independently by Robert Solow and Trevor Swan in 1956, and superseded the Keynesian Harrod–Domar model.

Solow extended the Harrod–Domar model by adding labor as a factor of production and capital-output ratios that are not fixed as they are in the Harrod–Domar model. These refinements allow increasing capital intensity to be distinguished from technological progress. Solow sees the fixed proportions production function as a "crucial assumption" to the instability results in the Harrod-Domar model. His own work expands upon this by exploring the implications of alternative specifications, namely the Cobb–Douglas and the more general constant elasticity of substitution (CES). Although this has become the canonical and celebrated story in the history of economics, featured in many economic textbooks, recent reappraisal of Harrod's work has contested it. One central criticism

is that Harrod's original piece was neither mainly concerned with economic growth nor did he explicitly use a fixed proportions production function. A standard Solow model predicts that in the long run, economies converge to their steady state equilibrium and that permanent growth is achievable only through technological progress. It must be stressed that neoclassical growth model emphasize technological progress as the engine of growth but technological progress is exogenous. Thus, it does not explain technological progress but instead take it as given. Both shifts in saving and in population growth cause only level effects in the long-run (that is, in the absolute value of real income per capita). An interesting implication of Solow's model is that poor countries should grow faster and eventually catch-up to richer countries. This convergence could be explained by:

- Lags in the diffusion on knowledge. Differences in real income might shrink as poor countries receive better technology and information;
- Efficient allocation of international capital flows, since the rate of return on capital should be higher in poorer countries. In practice, this is seldom observed and is known as Lucas' paradox

A mathematical implication of the model (assuming poor countries have not yet reached their steady state).

The model can be explained using a Cobb-Douglas production which assume constant returns to scale to capital (K) and effective labour (AL) and perfect competition. Thus, the Cobb-Douglas production function is shown below as;

$Y = AL^{1-\alpha}K^{\alpha}$, $0 < \alpha < 1$

where A denotes the current state of labour augmenting technological knowledge which is supposed to grow at an exogenously determined constant rate; Y represent aggregate output; K denotes capital.

Increasing any one of the inputs shows the effect on GDP and, therefore, the equilibrium of an economy. However, if the three factors of neoclassical growth theory are not all equal, the returns of both unskilled labor and capital on an economy diminish. These diminished returns imply that increases in these two inputs have exponentially decreasing returns while technology is boundless in its contribution to growth and the resulting output it can produce. Although, the neoclassical model fits some stylized facts, when used for growth accounting it turns out that the model is unable to explain growth rates of output by relying on the accumulation of physical inputs (capital and labour), once output is corrected for increase in physical inputs, a large and persistently positive residual remains called the Solow – residual (Mulder, De Groot, & Hofkes, 2001). The Solow-residual captures the fundamental driving force behind economic growth, namely technological progress.

The key assumption of the neoclassical growth model is that capital is subject to diminishing returns in a closed economy.

- Given a fixed stock of labor, the impact on output of the last unit of capital accumulated will always be less than the one before.
- Assuming for simplicity no technological progress or labor force growth, diminishing returns implies that at some point the amount of new capital produced is only just enough to make up for the amount of existing capital lost due to depreciation. At this point, because of the assumptions of no technological progress or labor force growth, we can see the economy ceases to grow.

- Assuming non-zero rates of labor growth complicate matters somewhat, but the basic logic still applies – in the short-run, the rate of growth slows as diminishing returns take effect and the economy converges to a constant "steady-state" rate of growth (that is, no economic growth per-capita).
- Including non-zero technological progress is very similar to the assumption of non-zero workforce growth, in terms of "effective labor": a new steady state is reached with constant output per worker-hour required for a unit of output. However, in this case, per-capita output grows at the rate of technological progress in the "steady-state" (that is, the rate of productivity growth).

Key conclusion of the neoclassical model of growth:

I. Output as a function of growth: The neoclassical growth model explicates that total output is a function of economic growth in factor inputs, capital, labour and technological progress.

II. Growth rate of output in a steady-state equilibrium: The growth of total output in a steady-state equilibrium is equal to the growth rate of the population or labour force and is never influenced by the rate of savings.

III. Increased steady-state per capita income level: While the rate of savings does not influence the steady-state economy growth rate of total output, it does result in an increase in the steady-state level of per capita income and, therefore, total incomes as well, as it raises the total capital per head.

IV. Long-term growth rate: The long-term growth rate of an economy is solely determined by technological progress or regress.

2.3.3 Endogenous Growth Model

Endogenous growth models are also one of the widely used growth models put forward by Paul Romer and Robert Lucas in the mid-1980s. This theory came about because most economists had registered dissatisfactions with the neo-classical growth theories which failed to explain technological progress but instead take it as exogenously given. Endogenous growth theory is one of the mainstream economics approaches to modeling economic growth. Endogenous growth theory is an economic theory which argues that economic growth is generated from within a system as a direct result of internal processes. The principal engine behind endogenous growth is the elimination of the assumption of decreasing returns to "capital." In order to justify this radical departure from a long established assumption of microeconomic theory, Romer and his followers have broadened the definition of capital to include human capital and/or knowledge capital. Endogenous growth theory explains long-run growth as emanating from economic activities that create new technological knowledge. Endogenous growth is long-run economic growth at a rate determined by forces that are internal to the economic system, particularly those forces governing the opportunities and incentives to create technological knowledge. In the long run the rate of economic growth, as measured by the growth rate of output per person, depends on the growth rate of total factor productivity (TFP), which is determined in turn by the rate of technological progress. Endogenous growth theory challenges this neoclassical view by proposing channels through which the rate of technological progress, and hence the long-run rate of economic growth, can be influenced by economic factors. It starts from the observation that technological progress takes place through innovations, in the form of new products, processes and markets, many of which are the result of economic activities. For example, because firms learn from

experience how to produce more efficiently, a higher pace of economic activity can raise the pace of process innovation by giving firms more production experience. Also, because many innovations result from R&D expenditures undertaken by profit-seeking firms, economic policies with respect to trade, competition, education, taxes and intellectual property can influence the rate of innovation by affecting the private costs and benefits of doing R&D.

For simplicity and better understanding, this paper will elaborate on the AK model which is the common endogenous growth model:

2.3.4 The AK Model

The first version of endogenous growth theory was AK theory, which is the simplest endogenous model, gives a constant-savings rate of endogenous growth and assumes a constant, exogenous, saving rate. It models technological progress with a single parameter (usually A). It uses the assumption that the production function does not exhibit diminishing returns to scale to lead to endogenous growth. Various rationales for this assumption have been given, such as positive spillovers from capital investment to the economy as a whole or improvements in technology leading to further improvements. The AK model did not make an explicit distinction between capital accumulation and technological progress. In effect it lumped together the physical and human capital whose accumulation is studied by neoclassical theory with the intellectual capital that is accumulated when innovations occur. An early version of AK theory was produced by Frankel (1962), who argued that the aggregate production function can exhibit a constant or even increasing marginal product of capital. This is because, when firms accumulate more capital, some of that increased capital will be the intellectual capital that creates technological progress, and this technological progress will offset the tendency for the marginal product of capital to

diminish. The models of endogenous growth are primarily concerned with establishing how technological progress can bring about increasing returns to scale.

The AK model by Arrow (1962) emphasizes the possibility of productivity depending on output per worker. This implies that technological progress can occur, though unintended, by "learning by doing". As workers continue to specialize in the production process, the productivity of their input will become higher through this specialization. Technological progress in the AK model is modeled as the difference in the initial productivity of the factor before learning by doing and the productivity of the factor after learning by doing – which will be higher. The AK model is very similar in its postulates of what drives economic growth with the neoclassical growth model. In the AK neoclassical growth model, economic growth is induced by savings and capital accumulation, whereas in the AK model, economic growth is induced by savings, capital accumulation, and efficiency. Efficiency is defined as the increase in the productivity of factor inputs by "learning by doing".

2.4 Critique of Endogenous Growth Models

One of the biggest criticisms aimed at the endogenous growth theory is that it is impossible to validate with empirical evidence. The theory has been accused of being based on assumptions that cannot be accurately measured. The three endogenous growth models AK model, Product Variety Model and the Schumpeterian Growth Model were overviewed in a very simplistic manner for even the layman. However, this overview will not be complete without highlighting the drawbacks of these models, according to the literature. In a general sense, endogenous growth models as a whole depend to a large extent on the assumptions of the neoclassical theory which has proven inadequate for developing economies. The endogenous growth models abstract from reality wrongly by assuming the symmetry of sectors in the economy or

that there is a single product market. Inefficiencies arising from poor infrastructure, institutional inadequacies and perfect markets, institution and transaction costs are some common variables that impede economic growth in developing economies. It also neglects the political nature of innovation – where countries create a strong barrier to innovations. In specific terms, starting with the AK model, the model did not explicitly differentiate between capital accumulation and technological progress. It lumps up all the characteristics of capital together with all the characteristics of technological progress. Also, the neoclassical proponents have argued that the AK model cannot explain cross country convergence – when a country grows faster if it is farther below its steady state. For the product variety model, it fails to capture the role of exit and turnover (creative destruction) in the growth process, even though there is strong evidence of exit and turnover of firms in inducing productivity growth (Comin and Mulani, 2007). The Schumpeterian model on the other hand is plagued with the problems of scale effects – concluding that larger economies can induce economic growth – and the absence of capital's role in the growth process. The model also neglects the problem of financial constraints by assuming perfect financial markets: in reality some financial markets work better than others.

2.5 Conclusion on Endogenous Growth Theory

An endogenous growth theory implication is that policies that embrace openness, competition, change and innovation will promote growth. Conversely, policies that have the effect of restricting or slowing change by protecting or favouring particular existing industries or firms are likely, over time, to slow growth to the disadvantage of the community. The impact of endogenous growth models can be deduced from its conclusions on the roles and dynamics of innovations and discovery, introduction of new approaches to modeling economic growth, and a different perspective from the

neoclassical growth theory. Endogenous growth models are an important theoretical framework for understanding the growth process. They highlight inter – relationships within the society that helps policy makers. These theories are important because they emphasize that capital accumulation and innovations can induce economic growth, while diminishing returns can reduce it. These models show how long run economic growth can be achieved through spillovers and scale effects of ideas and research within the economy.

2.6 Review of Empirical Literature

Eggoh, Houeninvo & Sossou (2015) on the topic education, health and economic growth in African countries with sample of 49 African countries over the period from 1996 to 2010 found that public expenditures on education and health have a negative impact on economic growth, whereas human capital stock indicators have a slight positive effect. Furthermore, Eggoh, Houeninvo & Sossou (2015) empirical investigations suggest that education and health spending are complementary. Then, public investment in education and health should be jointly increased and their efficiency in order to expect positive impact of human capital on growth in African countries. Adewumi & Enebe (2019) revealed that increase government education and health expenditure have positive and significant impact on primary and secondary school enrolment. The Granger causality result also shows that there is bidirectional causality between government health expenditure and primary as well as secondary school enrolment Adewumi & Enebe (2019) further shows that there is bidirectional causality between government educational expenditure and secondary school enrolment. The implication of this is that government of these countries must take adequate measures to ensure proper allocations and utilization of funds to these sectors in order to achieve a meaningful human capital development.

Mallick, Das and Pradhan (2016) investigated dynamics of expenditure on education and economic growth in selected 14 major Asian countries by using balanced panel data from 1973 to 2012. The results of Pedroni co-integration state the existence of long-run equilibrium relationships between expenditure on education and economic growth in all the countries. The results revealed a positive and statistically significant impact of education expenditure on economic development of all the 14 Asian countries (Bangladesh, China, Hong Kong, India, Japan, Nepal, Pakistan, Malaysia, The Philippines, Saudi Arabia, Singapore, Sri Lanka, Thailand, and Turkey). Further, the panel vector error correction (PVECM) presents unidirectional Granger causality running from economic growth to expenditure on education both in the short- as well as in the long-run. But, expenditure on education only Granger causes economic growth in long-run in all the countries. As a group, the FMOLS shows a positive impact of educational expenditure on economic growth. The study argues that education sector is one of the important ingredients of economic growth in all 14 Major Asian countries. Education sector should be given priority, and a handsome share of total expenditure of the governments should be made on education sector by enhancing various elementary, higher and technical educations in the respective nations to have the skilled man power for the long-term economic development. Carsamer & Ekyem (2015) revealed that educational expenditure positively increases school enrolments at both primary and secondary school levels with stronger impact at the secondary level. The results also show that while political instabilities decrease school enrolment, educational reforms do otherwise. Our analysis identifies per capita income as a channel through which universal basic education can be achieved. Musaba, Chilonda, & Matchaya (2013) revealed short run results showed no significant relationship between government sectoral expenditure and economic

growth. The long run results showed a significant positive effect on economic growth of expenditure on agriculture and defence. According to Musaba, Chilonda, & Matchaya (2013), the expenditures on education, health, social protection and transportation and communication were negatively related to economic growth. To boost economic growth efficient management of resources allocated to all sectors should be emphasized.

Owusu-Nantwi (2015) investigated the relationship between education expenditure and economic growth in Ghana. Vector error correction and cointegration analysis are employed to test for the causal relationship between the variables for the period 1970 to 2012. The empirical results show a positive and significant long-run relationship between education expenditures and real GDP, gross capital formation as well labor force participation. The results indicate that education contributes meaningfully to the long-term growth of Ghana's economy. Also, in the short-run, Granger causality runs both directions between economic growth and education expenditures. Musila & Belassi (2004) shown that education expenditure per worker has a positive and significant impact on economic growth both in the long run and short run. The estimates of error correction model suggest that a 1% increase in average education expenditure per worker will lead to about 0.04% increase in output in the short run. The cointegration estimates show that a 1% increase in average education expenditure per worker will increase output by about 0.6% in the long run. Anyanwu & Erhijakpor (2007) shown that government expenditure on education has a positive and significant direct impact on primary and secondary education enrolment rates. Among the SANE, Nigeria has the greatest positive influence on increasing both primary and secondary education enrolment rates. The paper also finds that other policy interventions, such as consolidating and sustaining democracy, accelerating national income, and

international community fulfilling its aid promises to Africa, can also be helpful in moving African countries (including the SANE) toward the Millennium Development Goals (MDGs). As such, higher expenditure alone is not sufficient to achieve the MDGs or to attain higher quantum and quality of human capital.

Tomić (2015) Based on the analysis for (EU)European Union, USA, Japan and BRIKS, it was found that there is a positive correlation between the amount of public expenditure on education and economic growth in these countries. It was found that among India in BRIKS group, Italy, Luxembourg and Slovenia within the EU, achieved the highest economic growth, because a 1% increase in public expenditure on education comes up more than 1% growth in the value of log (GDP). Observed between groups of the European Union, USA and Japan, the largest growth is achieved in Japan with 0.87% growth in log (GDP), while the lowest growth is achieved in EU (as a group), where the increase in expenditure on education by 1%, the growth of log (GDP) for the 0.77%.Darkoh (2014) found a positive relationship between government expenditure and economic growth. Also, a positive relationship was found between economic growth and trade openness, foreign direct investment, consumption, capital and labour force while ODA was found to be negatively related to economic growth. Darkoh (2014) recommends that governments should embark on expansionary fiscal policies in the form of investing in infrastructure particularly investing in human capital which in turn will increases the productivity of labour leading to economic growth. Government promotion of more trade liberalisation policies in order to increase import and exports is recommended. Also, deliberate attempt should be made to ensure that economies attract foreign direct investment. Governments should endeavour to reduce the effect of aid on economic growth by reducing the over reliance on aid and finding alternative way of funding government

infrastructure. Amaghionyeodiwe (2019) investigated government spending on education and economic growth in West African countries. Data for the study covers the period 1990 to 2016 for 15 selected ECOWAS countries. The study findings include that government spending on education and economic growth in West African countries are positively and significantly related. Long-term Granger causality exits while there is no evidence of short-run Granger causality from government educational expenditure to economic growth. This indicates that in the long run, government educational expenditure, through its impact on human capital, significantly and positively influence economic growth. Thus, in the West African region, such spending on education should be encouraged in the public sector. One way to encourage this is to allow and encourage regional collaboration amongst the countries as this will allow resources to be concentrated, and knowledge to be shared across the countries in the region and subsequently boost economic growth.

Hussin, Muhammad, Hussin & Razak (2012) focused on the long-run relationship and causality between government expenditure in education and economic growth in Malaysian economy. Time series data is used for the period 1970 to 2010 obtained from authorized sources. Findings from Hussin, Muhammad, Hussin & Razak (2012) show that economic growth (GDP) positively cointegrated with selected variables namely fixed capital formation (CAP), labor force participation (LAB) and government expenditure on education (EDU). With regard to the Granger causality relationship, it is found that the economic growth is a short term Granger cause for education variable and vice versa. Furthermore, this study has proved that human capital such as education variable plays an important role in influencing economic growth in Malaysia. Adu & Ackah (2015) found out that, in both the long run and short run, government capital expenditure has a significant negative impact on

economic growth but recurrent expenditure has a positive effect on economic growth in both the long run and the short run though it was not significant in the short run. The study therefore advocates for fiscal discipline and efficiency in the disbursement of capital expenditure to trigger positive benefits in the future. Mukhtarov, Mammadov & Hamidov (2019) revealed that there is a long run relationship between government expenditures on education and economic growth in Azerbaijan. Moreover, estimation results of VECM show that government expenditures on education has positive and statistically significant impact on economic growth in the long-run. The paper concludes that a concerted effort should be made by policy makers to boost educational investment in order to accelerate economic growth. Ayertey, Asiedu-Nketiah, Brown & Mamun Miah (2018) found out that human capital whether it is developed or under developed has a tremendous impact on the growth of an economy both in the short and long term. The findings of this study hold important policy implications for countries in West Africa, specifically Ghana.

Using panel data set on US states for some selected years, Godspeed (2000) focused on empirical investigation on the nature of the relationship among education spending, inequality and economic growth. The result revealed that while other sorts of government spending have negative and insignificant impact on economic growth, education expenditure has a positive and significant impact on economic growth. However, the impact is indirect as because it was found to increase economic growth by reducing inequality. Similarly, Josaphat and Oliver (2000) employed time seriesdata to conduct a study on the impact of public expenditures on economic growth of Tanzania for of a period of 32 years. They disaggregated the total government expenditure into expenditure on physical investment which was found to have a negative impact on growth, consumption expenditure which effects on growth

was found to be positive and human capital investment which was discovered to have insignificant impact on economic growth. Oluwatobi Stephen and Ogunrinola Oluranti (2011) for Nigeria found that there is a positive relationship between the growth of expenditures for education and economic growth using an expanded model of economic reproduction, where they add to the analysis impact of costs of education and health care. Sinha D. (1998) found in Malaysia that there is a long-term relationship between the cost of education and economic growth, but that there is no mutual relationship between the increase in the cost of education and economic growth. Avina Sabah Idrees and Muhammad Wasif Siddiqi (2013) based on panel analysis found that there is a positive relationship between the rising cost of education and economic growth, and there is the effect of reaching the developed economies based on the investment in education.

Study by Mansur et al (2009) found that education provides better employment opportunities and thus, increases the level of income of an individual. Therefore, education is perceived to be an important factor in human capital formation. The study also found that a correlation exists between education investment among women and fertility. In Africa, educated women are able to get higher wages, and tend to have educated children. A study of the joint development of government expenditures and economic growth in 23 OECD countries conducted by Lamartina and Zaghini (2011) showed that there is a structural positive correlation between public spending and per capita GDP. Thus an increase in government's spending on human capital development is expected to culminate in an increase of per capita output. Ogujiuba and Adeniyi (2004) examined the impact of government education expenditure on economic growth. Their result showed a statistically significant positive relationship between economic growth and recurrent expenditure on

education, while capital expenditure was wrongly signed and not significant in its contributions. Lawanson (2009) took this study further by including both the health and education expenditures in her model. Her objective was to examine the role of human capital investment (proxied by total government expenditure on education and health) on economic growth in Ghana. After regressing GDP on government expenditure on education, government expenditure on health and the enrolment rates, she found out that a clear relationship exists between human capital development and economic growth. However, unlike the study by Ogujiuba and Adeniyi (2004), the study did not disaggregate expenditure figures on health and education into the recurrent and capital components. His result shows that human capital investment as a share of real output has positive but statistically insignificant effect on the growth rate of real GDP.

Hussin et. al., (2012) examined the long run relationship and causality between government expenditure on education and economic growth in the Malaysian economy using a Vector Auto Regression model for the period 1970 to 2010. Findings from this study showed that economic growth (GDP) positively co-integrated with fixed capital formation, labor force participation and government expenditure on education. With regard to the short-run relation, it is found that there is a short-run bidirectional relationship between economic growth and education expenditures. The study indicates that education expenditure plays an important role in influencing Malaysia's economic growth. Chandra (2010) studied the relationship between economic growth and education expenditures for India over the period 1951-2009 using restricted vector autoregression method. The results indicated that there is a short run bi-directional link between education expenditure and economic growth for India. Muktdair-Al-Mukit (2012) study was on the long-run relationship between

public expenditure on education and economic Growth in Bangladesh. He used an econometric model and time series data from 1995 to 2009. His findings indicate that public spending in education has a positive and significant impact on economic growth in the long run. Furthermore, he observed that a one percent increase in public expenditure in education contributes 0.34% increase in GDP per capita in the long run.

Mekdad, Dahmani and Louaj (2014) studied the relationship between education and economic growth in Algeria over the period 1974 to 2012 with the use of endogenous growth model. Their results support their paper's main hypothesis that public spending on education affects positively economic growth in Algeria. They also found a bilateral causality and long run relationship between per capita GDP and public education expenditure. Lawanson (2015) empirically investigated the relevance of educational and health components of human capital to economic growth, using a panel data from sixteen West African countries over the period 1980 to 2013 and using the Diff-GMM dynamic panel technique. His findings indicate that coefficients of both education and health have positive statistically significant effects on GDP per capita thus affirming the strong relevance of human capital to economic growth of West Africa.

Mussagy and Babatunde (2015) study focused on the effect of government education expenditure and economic growth in Mozambique using a cointegration approach and quarterly data between 1996 and 2012. They found out that the government expenditure on education in Mozambique was quite low and the government spending allocated from the budget was not more than 20% in the past 15 years. This was below the recommended percentage of 26% set by UNESCO and NEPAD (2002). Their cointegration and error-correction analysis confirmed that a long run

relationship exists between economic growth and government expenditure in Mozambique. Hua (2016) did a master's thesis on the Relationship between public expenditure on education and economic growth in China. He used unit root and granger casualty analysis and data from 1992 to 2013 and found that the contribution of public expenditure on education is significant and high and that GDP granger causes public expenditure on education but public expenditure on education does not granger cause GDP. Mallick, Pradeep and Pradhan (2016) investigated dynamics of expenditure on education and economic growth in selected 14 major Asian countries by using econometric analysis and balanced panel data from 1973 to 2012. The results of Pedroni cointegration state the existence of long-run equilibrium relationships between expenditure on education and economic growth in all the countries. Also, expenditure on education only Granger causes economic growth in long-run in all the countries. The result of the Fully Modified OLS (FMOLS) shows a positive impact of educational expenditure on economic growth. The study argues that education sector is one of the important ingredients of economic growth in all 14 Major Asian countries.

Wang,Ying and Shasha Liu (2016) constructed a panel data model to investigate the effect of education human capital on economic growth, using the latest education data of 55 countries and regions from 1960 to 2009. He subdivided education human capital into higher education, secondary education and primary education; it also examines the effect of different education level on economic growth. Their result shows that in general, education human capital has a significant positive impact on economic growth. The positive impact of higher education on economic growth is especially significant, however, the primary education and secondary education does not have a significant impact on economic growth.

Babatunde (2018) investigated government spending on infrastructure in Nigeria. She used both primary and secondary data. The secondary data comprise of reported annual spending on selected infrastructure and annual Gross Domestic Products for 1980 to 2016. She also carried out unit root and co- integration tests using Augmented Dickey–Fuller and Phillip–Perron model. Weighted least square was used to test the sample of 37-year annual time series using vector error correction model. Her findings indicate that government spending on transport and communication, education and health infrastructure has significant effects on economic growth while spending on agriculture and natural resources infrastructure recorded a significant inverse effect on economic growth in Nigeria.

Mariana (2015) and Eggoh et al. (2015) found a negative relationship between education expenditures and economic growth. In some studies, like Nketiah-Amponsah (2009), Griliches (1997), Çetin and Ecevit (2010), Pamuk ve Bektaş (2014), relationship between these two variables was not determined. Li and Kong (2012) empirically investigated long-term relationship between education spending and economic growth for China.

Their findings are very similar to Mallick and Dash (2015), where both studies found that there is one-way causality relationship between government education expenditures and economic growth. Sunde (2017) found a long term relationship between education expenditure and economic growth as in Mukit's (2012) research.

2.7 Chapter Summary

This chapter captured information on the review of literary works by other researchers and authors in relation to the themes of the study. The chapter looked at the conceptual review which included concept of government spending and concept of growth. The chapter also reviewed theories related to the topic which included

theories of government spending or expenditure and theories of growth. There was also review of empirical literature on government spending and economic growth.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter discusses the methodological model suitable for conducting the study. This chapter will emphasize on research design, model specification, justification and measurement of the variables, nature and source of data, estimation techniques and testing techniques such as unit root and co-integration.

3.1 Research Design

Considering the objectives of the study quantitative research design will be adopted to analyse relationship between educational expenditure and economic growth in Ghana. Specifically, the quantitative research approach will be used to address the research hypotheses of the study. The entire study would follow the positivist philosophy which underpins quantitative methodology. Positivists believe that the reality is objectively given and measurable using properties independent of the researcher (Antwi & Hamza, 2015). They use validity, reliability, objectivity, precision and generalisability to judge the rigor of quantitative studies as they intended to describe, predict and verify empirical relationships in relatively controlled settings.

3.2 Theoretical Model Specification

In order to carry out an empirical investigation on the impact government educational expenditure on economic growth in Ghana, both neoclassical and endogenous model will be used to derive the empirical model for this study. The study will adopt the neoclassical production function and it is formulated as follows:

$$Y = f(A, K, L) \quad (9)$$

This means that output (Y) is function of Technology (A) which is assumed to be constant, capital (K) and labour (L).

3.3 Empirical Model Specification

The model, following Feder (1983) and Ram (1986) specification incorporates government educational expenditure (GE) into the equation as an independent variable and the above model will be re-formulated as;

$$Y = f(A, K, L, GE) \quad (10)$$

Government educational expenditure can be divided into expenditure on primary education (PE), expenditure on secondary education (SE) and expenditure on tertiary education (TE), equation (10) is specified as:

$$Y = f(A, K, L, PE, SE, TE) \quad (11)$$

The study will however include other control variables that influence output in the economy. These control variables will include: Inflation (IFL), Inflation (INFL), trade openness (OPEN) and terms of trade (TOT). Equation (11) will then be specified as:

$$Y = f(A, K, L, PE, SE, TE, IFL, OPEN, TOT)$$

(12)

$$Y = \beta_0 + \beta_1 K + \beta_2 L + \beta_3 PE + \beta_4 SE + \beta_5 TE + \beta_6 IFL + \beta_7 OPEN + \beta_9 TOT + \varepsilon$$

(13)

Applying natural logarithm to equation (13)

$$lnY = ln\beta_0 + \beta_1 lnK + \beta_2 lnL + \beta_3 lnPE + \beta_4 lnSE + \beta_5 lnTE + \beta_6 lnIFL + \beta_7 lnOPEN + \beta_9 lnTOT + \varepsilon$$

(14)

Where

Y= total output measuring economic growth

K = capital stock

L = total labour force

PE = expenditure on primary education

SE = expenditure on secondary education

TE = expenditure on tertiary education

IFL = inflation

OPEN = trade opennes

TT = terms of trade

Ln = natural logarithm

ε = error term

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9$ = parameters to be estimated

3.4 Definition and measurement of variables

Economic growth can be explained as the continuous or sustained increase in the real gross domestic product (GDP) or national product of an economy overtime. However, this study uses real GDP (RGDP) to proxy for economic growth. The justification for using real GDP to represent economic is that other researchers such as (Aladejare, 2013; Okoro, 2013; Al-Fawwaz & Al-Sawai'e, 2013; Chinweoke et al, 2014) have used it in their work as dependent variable measuring economic growth. Real GDP is the nominal GDP adjusted for inflation.

Gross fixed capital formation is used as substitution for capital stock (K). Gross fixed capital formation is defined as the total value of additions to fixed assets by domestic enterprises, less disposals of fixed assets during the year, plus additions to the value of non-produced assets such as discoveries of mineral deposits, plants, machinery and equipment purchases; and the construction of infrastructure and commercial and industrial buildings (Baafi, 2010; Barro, 1996). Gross fixed capital formation has generally been considered as the engine of growth of the Ghanaian economy as in most other economies due the additions it makes to capital stock. It is an important factor in the determination of aggregate output. All other things being equal, an increase in the level of capital formation will improve the economy's productivity

potential and therefore economic growth. The size of physical capital stock positively affects the level of aggregate demand and also determines the productive capacity of the economy. It is important to emphasize that high rate of capital formation (investment) results in high economic growth (Barro, Mankiw & Sala-i-Martin, 1992). Therefore, the coefficient of physical capital stock is expected to be positive.

Labour force participation ration will be used to represent labour. Labour force is defined as the number of people who are employed plus the unemployed who are looking for work. To be considered part of labour force, one must be available, willing to work and have looked for a job recently. Simply labour force is all people who are of working age and able and willing to work. Labour force also plays a vital role in economic growth of every country, infact there cannot be economic growth without labour . Economies with high labour force are expected to have higher output hence increase in economic growth. Therefore the expected coefficient of labour is expected to be positive. However, the positive relationship will be achieved depending on the ability of the economic system to absorb and productively employ these added workers, an ability largely associated with the rate and type of capital accumulation and the availability of related factors such as managerial and administrative skills (Amoako-Gyampah & Acquaah, 2008)

Government educational expenditure is measured using government expenditure on primary, secondary and tertiary level of education. Government educational expenditure refers to total government's budget of a country allotted in different educational activities. Educational expenditure plays a very important role in economic growth through human capital development. Educational expenditure improves the human resources of a country and through improved human resources, the production capacity of the economy will increase hence increase in economic

growth. The expenditure on the various levels of education is expected to have positive influence on economic growth.

Inflation is measured using consumer price index. Inflation is one of the important determinants of economic growth in Ghana. Consumer Price Index (CPI) is a measure that captures the changes in the price level of a market basket of consumer goods and services purchased by the household. In this study, the CPI is employed to control for the effect of high oil price on domestic goods and services. Rapid increases in the general price level of the economy may result in uncertainty about the future profitability of investment projects. This is because, higher prices of consumer goods and services may dampen demand for goods and services in the economy and for this reason, investors may resort to more conservative investment strategies than would otherwise be the case, eventually leading to lower levels of investment and economic growth. As a result, the coefficient of CPI is expected to be negative (Georgantopoulos & Tsamis, 2012).

Trade openness implies how open an economy is to international trade. It is one measure of the extent to which a country is engaged in the global trading system. Trade openness is the sum of imports and exports normalized by GDP. That is trade openness is calculated by dividing the aggregate value of imports and exports over a period by the gross domestic product of the same period. The trade-to-GDP ratio is an indicator of the relative importance of international trade in the economy of a country. Trade transactions may directly generate cross-border financial flows including trade credits, exports insurance, and payment facilitation. Openness to trade has negative effect on growth in countries with low financial development, but has insignificant impact in countries with high financial development. Trade openness is conducive to

economic growth in low-inflation countries but has insignificant impact on growth in high-inflation countries.

Terms of trade (TOT) is the relative price of exports in terms of imports and is defined as the ratio of exports prices to import prices. An improvement in a country's terms of trade benefits that country in the sense that the country can buy more imports for any given level of exports. Increase in terms of trade would lead to increase in investment and thus economic growth will increase.

3.5 Sources of Data

Based on the topic and the objectives of the study, only secondary data will be used. Conversely, the secondary data involve an examination of already existing data from WDI, the Globaleconomy.com, Ghana statistical service (GSS) and Bank of Ghana (BoG). Annual time series data for Ghana from 1980 to 2019 will be used for the study.

3.6 Estimation Techniques

In order to analyse short run and long run relationship between government educational expenditure and economic growth maximum likelihood-based approach - Autoregressive Distributed Lag (ARDL) model proposed by Pesaran and Shin (1998) will be adopted for this study. The ARDL approach to cointegration is argued to be the single equation equivalence of the maximum likelihood approach of Phillips and Hansen (1990) fully modified ordinary least squares procedure (Pesaran & Shin, 1998). To examine the direction of causality between government educational expenditure and economic growth, the study used the Granger causality test within the framework of co-integration and error-correction models. The study will explore the time series properties of the data by employing the Augmented Dickey-Fuller (ADF)

and the Phillip-Perron (PP) test to check for the order of integration and stationary. The stability and diagnostic test statistics of the ARDL model is observed to ensure the reliability and the goodness of fit of the model. And also, the study will apply Granger-causality to test for the causality between government educational expenditure and economic growth. The causality test is preceded by co-integration testing since the presence of co-integrated relationships has implications for the way in which causality testing is carried out.

3.7 Unit Root Tests

Because time series data are usually characterized by spurious regression results, various test need to be conducted to correct errors in the data such as testing for the existence of unit root for each of the variables. It is therefore important to test for the statistical properties of variables when working with time series data. The reason is that time series data are seldom stationary at level forms. A time series is said to be stationary if its mean, variance and auto covariances are independent of time. Generally, regression associated with non-stationary time series produces spurious results or regression. This is the situation when the regression results show a high and significant relationship among variables when no relationship actually exist. Again, with spurious results, the usual test statistics (t, F, DW, and R2) will not have standard distributions if some of the variables in the model have unit roots (Stock & Watson, 1988). A wide range of unit root tests can be used to determine the stationarity of the series. But this study will adopt both the Phillip Perron (PP) and the Augmented Dickey-Fuller (ADF) tests.

Even though these tests have common features, they differ regarding the way they correct for autocorrelation in the residuals. The PP nonparametric test generalises the ADF procedure, by allowing for less restrictive assumptions for the time series being

studied. The lag-length will be chosen using the Akaike Information Criteria (AIC) and Swartz Bayesian Criterion (SBC) for both the ADF and PP test. The sensitivity of ADF tests to lag selection makes the PP test an important additional tool for making inferences about unit roots. The basic formulation of the

ADF is:

$$\Delta X_t = \alpha + \delta t + \rho X_{t-1} + \sum_{i=1}^{\rho} \theta_i \Delta X_{t-1} \varepsilon_t$$

(15)

Where Xt represents the series at time t, Δ is the first difference operator, α, δ, , and θ are parameters to be estimated and ε is the stochastic random disturbance term. Accordingly, the ADF and the PP test the null hypothesis states that a series contains unit root (non-stationary) against the alternative hypothesis of no unit root (stationary). That is:

$$H_o : \rho = o$$

$$H_a : \rho \neq o$$

If the t-statistic is more negative than the critical values, the null hypothesis is rejected and the conclusion is drawn that the series is stationary. On the contrary, if the t-statistic is less negative than the critical values, the null hypothesis is accepted and the conclusion is that the series is non-stationary.

3.8 Co-integration Test

There are a number of techniques gthat exist for testing the existence of equilibrium long-run relationship among time series variables. Some of these techniques include the Engle and Granger (1987), the Fully Modified Ordinary Least Squares (FMOLS)

procedures of Phillips and Hansen (1990); the Johansen (1988); or the Johansen and Juselius (1990); and the Autoregressive Distributed Lag (ARDL) approach by Pesaran and Shin (1998); and Pesaran et al., (2001) to establish the long-run relationship in bivariate and multivariate frameworks. The study adopted the currently developed Bounds Test approach to cointegration by Pesaran and Pesaran (1997), Pesaran and Shin (1998) which was further expanded by Pesaran et al. (2001). The bounds test approach to cointegration is adopted for this study due to its advantages over the Johansen approach to cointegration.

The bounds test approach to co-integration produces more robust results in small samples than the Johansen approach. Thus, ARDL technique is more suitable and efficient for small and finite samples compared with the Johansen approach that requires large data samples for one to get a valid result (Pesaran & Shin, 1998). Also, the ARDL approach to co-integration is most appropriate compared to the other co-integration procedures in the sense that, the other approaches to co-integration require that all regressors be integrated of the same other, but the ARDL approach can be used whether the regressors are integrated of order one or order zero, that is, I(1) or I(0) variables. This implies that the ARDL technique rules out the pre-testing problems related to standard co-integration, which requires that the variables be classified into I (0) or I (1) (Pesaran, Shin, & Smith, 2001). For example, if we are not certain about the stationarity properties of the data, then using the ARDL technique is the most appropriate model for empirical work.

The first step in any cointegration procedure is to identify the degree of integration of each variable in the model. Nevertheless, this depends on which unit roots test one employs and different unit root tests could lead to contradictory results (Bahmani-Oskooee, 2002). Employing conventional unit roots tests such as the Augmented

Dickey Fuller and the Phillips-Perron tests for instance, may lead to an erroneous conclusion that unit root is present in a series that is actually stationary around a one-time structural break (Perron, 1991). The ARDL approach is appropriate due to its inherent ability to mitigate these problems. One complexity associated with the Johansen co-integration technique is that the ARDL approach to co-integration ignores what pertains to the large number of choices that must be made. These include choices such as the number of endogenous and exogenous variables to be included in the model, the treatment of deterministic elements, as well as the order of VAR and the optimal number of lags to be used. The estimation procedures are quite responsive to the method used to make these choices and decisions (Pesaran & Shin, 1999).

Finally, with the ARDL technique, it is possible that different variables have different optimal lags lengths, whereas in Johansen-type models this is not allowed. Pesaran and Pesaran (1997) maintain that, the ARDL technique comprise basic two steps. One, the existence of any long-term relationship between the variables of interest is determined using an F-test. Two, the analysis is to estimate the coefficients of the long-run relationship and determine their values, followed by the estimation of the short-run elasticity of the variables with the error correction representation of the ARDL model. By employing the ECM version of ARDL, the speed of adjustment to equilibrium will be determined.

The study advanced to estimate the short run and long run elasticities by employing the Unrestricted Error Correction Model (UECM) that has unrestricted intercepts and no trends based on the assumption made by Pesaran et al. (2001). Based the analysis, equation (14) can be specified in ARDL framework as:

$$ln\Delta RGDP = \alpha_o + \sum_{i=1}^{\rho} \alpha_{1i}\, \Delta lnRGDP_{t-i} + \sum_{i=1}^{\rho} \alpha_{2i}\, \Delta lnK_{t-i} + \sum_{i=1}^{\rho} \alpha_{3i}\, \Delta lnL_{t-i} +$$

$$\sum_{i=1}^{\rho} \alpha_{4i}\, \Delta lnPE_{t-i} + \sum_{i=1}^{\rho} \alpha_{5i}\, \Delta lnSE_{t-i} + \sum_{i=1}^{\rho} \alpha_{6i}\, \Delta lnTE_{t-i} + \sum_{i=1}^{\rho} \alpha_{7i}\, \Delta lnIFL_{t-i} +$$

$$\sum_{i=1}^{\rho} \alpha_{8i}\, \Delta lnOPEN_{t-i} + \sum_{i=1}^{\rho} \alpha_{10i}\, \Delta lnTOT_{t-1} + \delta_1 lnRGDP_{t-1} + \delta_2 lnK_{t-1} + \delta_3 lnL_{t-1} + \delta_4 lnPE_{t-1} + \delta_5 lnSE_{t-1} + \delta_6 lnTE_{t-1} + \delta_7 lnIFL_{t-1} + \delta_8 lnOPEN_{t-1} + \delta_{10} lnTOT_{t-1} + v_t \quad (15)$$

Where $\triangle$ represents the first difference operator, ρ is the lag order selected by the Schwarz Bayesian Criterion (SBC), α0 is the drift parameter, and v_t is the error term which is N (0, δ^2). The parameters αij are short-run parameters and δij are the long-run multipliers.

The study will therefore examine the relationship between government educational expenditure and economic growth by estimating equation (15) with the bounds test using the OLS method, which is generally the first procedure in the ARDL model. The F-test or Wald test will be employed for the examination of the existence of long-run relationship among the variables in equations (14) given as follows: The null hypotheses of no long-run relationship among the variables in equations (15) is tested against the alternative hypotheses of a long- run relationship as follows:

$$H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = \delta_8 = \delta_9 = \delta_{10} = 0$$

$$H_a : \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq \delta_8 \neq \delta_9 \neq \delta_{10} \neq 0$$

To test for co-integration among the variables under investigation the F-statistics or Wald statistics will be used . Given that, the asymptotic distribution of the F-statistic is non-standard without taking into account the independent variables being I (0) or I (1), Pesaran and Pesaran (1997) have provided two sets of critical values for the different numbers of regressors (k), and whether the ARDL model contains an intercept and/or trend. As a result, the calculated F-statistic is compared with these sets of critical values developed on the basis that the independent variables are I(d)

(where $0 \leq d \leq 1$). The lower critical bound presupposes that all the variables are I (0), meaning that there is no cointegration among the variables, but the upper bound presumes that all the variables are I (1). Hence, if the calculated F- statistic falls outside the upper critical value, then a null hypothesis of no co-integration will be rejected irrespective of whether the variables are I (0) or I (1) indicating a long run relationship among the variables being studied. On the other hand, if the F-statistic falls below the lower bound, then the null hypothesis of no cointegration cannot be rejected. In the same way, if the F-statistic lies within the lower critical and upper critical bounds, then the test is inconclusive and it depends on whether the variables under examination are I (0) or I (1). In the face of this circumstance, the test for unit roots on the variables being studied becomes imperative (Pesaran & Pesaran, 1997).

To be able to identify the optimal lag length for each variable, the ARDL procedure estimates $(P+1)^{k+1}$ the number of variables, where P is the maximum number of lags to be used, and k is the number of regressors in the equation (Shrestha & Chowdhury, 2005). The optimal lag length of the ARDL model is chosen based on the Schwarz-Bayesian Criterion (SBC) or the Akaike Information Criterion (AIC). The SBC adopts the smallest possible lag length and it is therefore described as the parsimonious model compared to the AIC which makes use of the maximum relevant lag length (Jalil, Ma, & Naveed, 2008). Given that cointegration has been established from the ARDL model, the long run and error correction estimates of the ARDL and their asymptotic standard errors are then obtained.

$$lnRGDP = \alpha_o + \sum_{i=1}^{\rho} \alpha_{1i}\, lnRGDP_{t-i} + \sum_{i=0}^{\rho} \alpha_{2i}\, lnK_{t-i} + \sum_{i=0}^{\rho} \alpha_{3i}\, lnL_{t-i} +$$

$$\sum_{i=0}^{\rho} \alpha_{4i}\, lnPE_{t-i} + \sum_{i=0}^{\rho} \alpha_{5i}\, lnSE_{t-i} + \sum_{i=0}^{\rho} \alpha_{6i}\, lnTE_{t-i} + \sum_{i=0}^{\rho} \alpha_{7i}\, lnIFL_{t-i} +$$

$\sum_{i=0}^{\rho} \alpha_{8i}\, lnOPEN_{t-i} + \sum_{i=0}^{\rho} \alpha_{10i}\, lnTOT_{t-1} + \upsilon_t$

(16)

This is followed by the estimation of the short- run elasticities of the variables with the error correction representation of the ARDL model. The presence of long-run relationship among the variables requires the estimation of the unrestricted ARDL error correction representation as follows:

$$lnRGDP_t = \alpha_o + \sum_{i=1}^{\rho} \delta_{1i}\, \Delta lnRGDP_{t-i} + \sum_{i=0}^{\rho} \delta_{2i}\, \Delta lnK_{t-i} + \sum_{i=0}^{\rho} \delta_{3i}\, \Delta lnL_{t-i} + \sum_{i=0}^{\rho} \delta_{4i}\, \Delta lnPE_{t-i} + \sum_{i=0}^{\rho} \delta_{5i}\, \Delta lnSE_{t-i} + \sum_{i=0}^{\rho} \delta_{6i}\, \Delta lnTE_{t-i} + \sum_{i=0}^{\rho} \delta_{7i}\, \Delta lnIFL_{t-i} + \sum_{i=0}^{\rho} \delta_{8i}\, \Delta \mathrm{lnOPEN}_{t-i} + \sum_{i=0}^{\rho} \delta_{10i}\, \Delta \mathrm{lnTOT}_{t-1} + \xi \mathrm{ECM}_{t-1} + \upsilon_t$$

(17)

Where ξ is the speed of adjustment of the parameter to long-run equilibrium following a shock to the system and ECM_{t-1} is the residuals obtained from equations (15). The coefficient of the lagged error correction term, ξ, is expected to be negative and statistically significant to further validate the presence of a co-integrating relationship among the variables in the model.

3.9 Granger Causality Test

One of the major objectives of empirical econometrics has been the examination of causal relationships among economic variables. Engle and Granger (1987) are of the view that, co-integrated variables must have an error correction representation. According to Gujarati and Porter (1999), among the implications of Granger representation theorem is that, if non-stationary series are co-integrated, then one of the series must granger cause the others. To identify the direction of causality in the

existence of co-integrating vectors, Granger causality was carried out based on the following:

$$Y_t = \alpha_0 + \sum_{i=1}^{\rho} \alpha_{1i} \Delta Y_{t-1} + \sum_{i=1}^{\rho} \alpha_{2i} X_{t-1} + v_t \quad (18)$$

$$X_t = \beta_o + \sum_{i=1}^{\rho} \beta_{1i} \Delta X_{t-1} + \sum_{i=1}^{\rho} \beta_{2i} Y_{t-1} + \eta_t \quad (19)$$

The assumption here is that the error terms satisfy the criteria

$$E(\upsilon_t) = E(\eta_t) = E(\upsilon_t \upsilon_s) = E(\eta_t \eta_s) = 0 \text{ and } E(\upsilon_t \upsilon_t) = \sigma_{\upsilon}^2, E(\eta_t \eta_t) = \sigma_{\eta}^2$$

The causality in equation (18) should run from X_t to Y_t on condition that the estimated coefficients on the lagged variable X_t are significantly different from zero. In other words, the coefficients of α_i are different from zero (i.e. $\alpha_i \neq 0$).

In much the same way, the causality in equation (19) runs from Y_t to X_t on condition that the estimated coefficients on Y_t as a group are significantly different from zero (i.e $\beta_i \neq 0$). Bidirectional causality results when X_t causes Y_t and Y_t causes X_t . Thus, the lagged values of both X_t and Y_t as a group in equations (18) and (19) are significantly different from zero (i.e. $\alpha i = \beta_i \neq 0$).

Chapter Summary

The chapter was basically concerned with methodological issues. These include research design employed, theoretical model specification, empirical model specification, definition and measurement of variables, methods employed to analyze data, estimation techniques, source of data, and definition of variables of the study.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

This chapter fundamentally looks at the presentation of data and discussion of results. The various models stated in chapter three of this study has been estimated and discussed in this chapter. The discussion has been done in line with the research hypotheses and objectives of this study.

4.1 Descriptive Statistics

This section looks at descriptive statistics or basic summary of variables used in the study. The descriptive statistics will consider the mean, median, standard deviation, maximum, minimum and skewness of the series.

Table 1: Descriptive Statistics

Vari.	GDPPC	INV	LF	TE	SE	PE	TOT	OPEN	INFL
Mean	821.785	18.126	8.290	88.1338	90.8630	91.33789	139.7675	62.881	29.4375
Median	408.635	19.86	8.18	88.7475	91.0146	91.01463	130.615	67.485	18.13472
Maxi.	2345.39	30.05	12.92	100.885	100.885	100.88571	209.52	116.05	122.874
Min.	258.47	2.25	4.21	73.1246	73.1246	78.48702	89.22	6.32	3.030303
Std.D.	677.551	7.99499	2.316	7.96908	7.3594	5.76130	34.325	28.042	27.6631
Skew.	1.071	-0.3956	0.2797	-0.35041	-0.6586	0.65868	0.3508	-0.3059	2.14435
Obs.	40	40	40	40	40	40	40		40

Source; Author's computation using E-views econometric software.

Table 1 above shows descriptive statistics of the series of the study. The descriptive statistics considers the mean, median, maximum, minimum, standard deviation and skewness of the variables of interest. These are common measures of determining the

variables which are normally distributed. In normally distributed data, the mean and the median should have equal values.

The result from table 1 above shows that half of the variables of the study is normally distributed. Variables such as Investment (INV), Labour force (LF), Expenditure on Tertiary Education (TE), Expenditure on Secondary Education (SE) and Expenditure on Primary Education (PE) are normally distributed. This is because these variables have their mean almost equal to the standard deviation. However, GDP per capita (GDPPC), terms of trade (TOT), trade openness (OPEN) and inflation (INFL) are not normally distributed. This is because these variables have their mean significantly different from the standard deviation. According to Musyoka (2008) if the mean is higher than the median then the distribution is positively skewed and distribution is negatively skewed when mean is lower than the median. Thus, from table 1, GDP per capita (GDPPC), Labour force (LF), Expenditure on Primary Education (PE), terms of trade (TOT)and inflation (INFL) are positively skewed because these variables have their mean higher than their median. Nevertheless, Investment (INV), Expenditure on Tertiary Education (TE), Expenditure on Secondary Education (SE) and trade openness (OPEN) are negatively skewed.

Standard deviation is a measure of average distance between each variable and its mean. A low standard deviation indicates that the variable tends to be close to the mean of the data set, while a high standard deviation indicates that the variable spread out over a wider range of values. From table 1, standard deviation of Labour force (LF) and Expenditure on Primary Education (PE) turned out to be relatively low which indicates that Labour force (LF) and Expenditure on Primary Education (PE) are not widely spread away from its mean. Nevertheless, GDP per capita (GDPPC), terms of trade (TOT), trade openness (OPEN) and inflation (INFL), investment(INV),

Expenditure on Tertiary Education (TE) and Expenditure on Secondary Education (SE) have relatively high standard deviation and hence these variabes are widely spread from their mean.

4.2 Stationarity Test

Table 2: Augmented Dickey Fuller (ADF) Test Result

Levels			First Difference			
Variables	**ADF Statistics**	**Lag**	**Variables**	**ADF Statistics**	**Lage**	**I(0)**
GDPPC	0.640 [0.9886]	3	ΔLGDPPC	-2.709 [0.000]***	3	I(1)
INV	-2.258 [0.1859]	3	ΔL INV	-2.899 [0.0455]**	3	I(1)
LF	1.825 [0.9984]	3	ΔL LF	-3.326 [0.0138]**	3	I(1)
TE	-1.906 [0.3294]	3	ΔLTE	-4.553[0.0002]***	3	I(1)
SE	-1.846 [0.3577]	3	ΔLGEX	-3.327 [0.0137]**	3	I(1)
PE	-2.809 [0.0570]	3	ΔL PE	-3.966[0.0006]***	3	I(1)
TOT	-1.249 [0.6522]	3	ΔLTOT	-3.761 [0.003]***	3	I(1)
OPEN	-2.350 [0.1564]	3	ΔL OPEN	-3.136 [0.0240]**	3	I(1)
INFL	-6.285[0.0000]***	3	–	–	3	I(0)

Source: Author's computation using E-views econometric software.

NB: (*)Significant at the 10%; (**)Significant at the 5% and (***) Significant at the 1%

Source; Arthur's computation using E-views econometric software.

Table 2 above shows result of Augmented Dickey Fuller (ADF) test for the variables of the study. Although the bounds test (ARDL) approach to co-integration does not necessitate the pretesting of the variables for unit roots, it is however vital to perform this test to verify that the variables are not integrated of an order higher than one. The aim is to ascertain the absence or otherwise of I(2) variables to extricate the result from spurious regression. The variables of the study are real GDP per capita (GPPC), Investment (INV), Labour force (LF), Expenditure on Tertiary Education (TE), Expenditure on Secondary Education (SE) and Expenditure on Primary Education (PE) Terms of trade (TOT), trade openness (OPEN) and inflation (INFL). Augmented Dickey Fuller (ADF) Test Result tests were applied to all variables in levels and in first difference in order to formally establish their order of integration. The optimal number of lags included in the test was based on automatic selection by Akaike Information Criterion (AIC). The study used the P-values to make the unit root decision, (that is, rejection or acceptance of the null hypothesis that the series contain unit root) which arrived at similar conclusion with the critical values.

The results of Augmented Dickey Fuller (ADF) test for unit root for all the variables are presented in Table 2. The null hypothesis is that the series/variables are non-stationary, that is, contains a unit root. The rejection of the null hypothesis for the test is based on the MacKinnon (1991) critical values as well as the probability values. The unit root test results in Table 2 indicate that, the null hypothesis of the presence of unit root for are real GDP per capita (GPPC), Investment (INV), Labour force (LF), Expenditure on Tertiary Education (TE), Expenditure on Secondary Education (SE) and Expenditure on Primary Education (PE) Terms of trade (TOT) and trade openness (OPEN) in their levels cannot be rejected since the P-values of the ADF statistic are not statistically significant at 5% and 1% levels of significance. However,

inflation (INFL) is significant at levels, the null hypothesis of presence of unit root is rejected and hence inflation (INFL) is stationary at levels at 1% level of significance. This means that inflation is I(0) variable.

Since some of the series (real GDP per capita (GPPC), Investment (INV), Labour force (LF), Expenditure on Tertiary Education (TE), Expenditure on Secondary Education (SE) and Expenditure on Primary Education (PE) Terms of trade (TOT) and trade openness (OPEN)) are not stationary at levels, first difference operation was carried out on the raw data and the result is displayed in the first difference column of table 2. At first difference, all the variables, that is, real GDP per capita (GPPC), Investment (INV), Labour force (LF), Expenditure on Tertiary Education (TE), Expenditure on Secondary Education (SE) and Expenditure on Primary Education (PE) Terms of trade (TOT) and trade openness (OPEN) are stationary. This is because the null hypothesis of the presence of unit root (non-stationary) is rejected because the P-values of the ADF statistic are statistically significant at the standard 5 percent significant levels for all the estimates. This means that GDPPC, INV, LF, TE, SE, PE, TOT, OPEN are integrated of order one I(1).

It is therefore clear from the unit test results discussed above as shown in table 2 that the variables are integrated of order one I(1) and order zero I(0). According to Akram (2005) when all the variables are integrate of order or some are integrated of order zero I(0), that is, at levels, ARDL methods can be applied. Since the test results have confirmed the absence of I(2) variables, ARDL methodology is now used for the estimation. The subsequent sections discuss the results of co-integration test, long-run and short-run results.

Table 3: Lag Length Selection for the Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	132.3821	NA	1.82e-12	-7.164691	-6.853621	-7.057310
1	375.0709	374.4342	3.02e-17	-18.23262	-15.74407*	-17.37357
2	443.4389	78.13488*	1.42e-17	-19.33937	-14.67332	-17.72865
3	517.7055	55.16942	1.04e-17*	-20.78317*	-13.93964	-18.42078*

Source: Author's computation using E-views econometric software.

Table 3 above shows the result of lad length selection criterion for the model. The lag length selection was based on Akaike Information Criterion (AIC). From the table 2 above, the maximum time lag is 3 based on the VAR approach.

4.3 Testing for Existence of Long Run Relationship

In the first step of the ARDL analysis, the presence of long-run relationships in equation (17) is tested. As indicated in the table 3 above, the maximum lag length is 3 in the bounds testing approach to co-integration.

Table 4: Results of Bound F Test for Co-integration

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Lag Length	Significant Level.	I(0)	I(1)
F-statistic	9.738677	3	10%	2.12	3.23
			5%	2.45	3.61
			2.5%	2.75	3.99
			1%	3.15	4.43

Source: Author's computation using E-views econometric software.

The joint null hypothesis is that lagged level variables (that is, variable addition test) of the coefficients being zero (no cointegration). From the table 5 above, a clear conclusion can be drawn that the joint null hypothesis of lagged level variables (that is, variable addition test) of the coefficients being zero (no cointegration) is rejected even at 1% level of significance. This conclusion is drawn based on the fact that the F-statistic of 9.738677 is greater than the upper bound critical value of 4.43 at I(1) at 1% level of significance. The results in Table 5 indicate that there is a unique co-integration relationship among the variables when economic growth is normalized. Hence, there is a long-run relationship between economic growth and the explanatory variables in Ghana.

4.4 Long run relationship

After establishing the existence of a long run relationship among the explanatory variables and economic growth, the next step is to determine the nature of the long run relationship using equation (3.3.2). The ARDL co-integration method is used to estimate the long-run coefficients and the short-run parameters of equation (17) in chapter 3. This section highlights the long-run estimation results which addressed the objective of this study of a long-run relationship between component of educational expenditure and economic growth in Ghana. The analysis tests the null hypothesis of no long run relationship between component of educational expenditure and economic growth as against the alternative hypothesis of a long run relationship between component of educational expenditure and economic growth. Based on the results in table 4 above, the null hypothesis of no long-run relationship between the variables was rejected. The results of the long run relationship (parameters) of the ARDL model are estimated and the results are shown in Table 5 below.

Table 5: Long Run Coefficients

Dependent Variable (LGDPPC)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
*L*INV	0.30923	0.08002	3.8645	0.0001
*L*LF	0.67307	0.22784	2.9521	0.0028
*L*TE	0.21092	0.04094	5.1496	0.0005
*L*SE	0.07262	0.01701	4.2561	0.0000
*L*PE	0.05561	0.11931	0.4662	0.6477
L TOT	0.36563	0.05844	6.2561	0.0000
LOPEN	0.60171	0.11418	5.2727	0.0002
LINFL	-0.13424	0.05483	-2.4451	0.0308
C	-962.87430	1021.86949	-0.9422	0.3600

Source: Author's computation using E-views econometric software.

As indicated above, table 5 shows result of long run relationships between economic growth and component of educational expenditure and other explanatory variables in the model. The dependent variable is real GPD per capita (GDPPC) which used to measure economic growth.

From table 5 above, the coefficient of investment (LINV) is 0.30929 and it is significant at 1% level of significance. This means that in the long run, investment is positively related to economic growth. The result shown that when gross fixed capital formation increases by 1% economic growth which is measured by real GDP per capita will increase by approximately 0.31%. As investment increases, productive capacity of the economy is expected to increase and hence increase in economic growth. This finding is in support of Ongo & Vukenkeng (2014). Does gross capital

formation matter for economic growth in the CEMAC sub-region? Ongo & Vukenkeng (2014) used gross fixed capital formation to measure private investment and found that private investment has a significant positive association with economic growth. The result also support that of Gibescu (2010), Meyer & Sanusi (2019)

Labour force (LLF) from the table 5 above has a positive long run coefficient of 0.67307 and significant at 5%. This means that labour force has a long run positive impacts on economic growth. The result indicates that when labour force increases by 1%, economic growth will also increase by approximately 0.67%. This means that countries with large/increasing labour force are expected to have increasing economic growth provided these able labour force are employed in economic activities to increase productive capacity of the country. This finding is line with Shahid (2014) in Pakistan, and Young (2018) in Nigerian,

Also, expenditure on tertiary education (TE) has a positive coefficient of 0.2109 and statistically significant at 1 percent. This however means that as expenditure on tertiary education increases, economic growth also increases in Ghana in the long run. The result indicates that, by magnitude, as expenditure on tertiary education increases by 1 percent in the long run, economic growth will also increase by approximately 21%.

Again, expenditure on secondary education (SE) has a positive coefficient of 0.0726 and statistically significant at 1 percent. This however means that as expenditure on secondary education increases, economic growth also increases in Ghana in the long run. The result indicates that, by magnitude, as expenditure on secondary education increases by 1 percent in the long run, economic growth will also increase by approximately 7%.

However, expenditure on primary education (PE) has a positive coefficient of 0.0556. The result indicates that, by magnitude, as expenditure on secondary education increases by 1 percent in the long run, economic growth will also expected to increase by approximately 7% but expenditure on primary education is not statistically significant and hence conclusion that expenditure on primary education does not influence economic growth in the long run.

Furthermore, terms of trade (TOT) in table 5 above has a positive coefficient of 0.36563 and statistically significant at 1 percent. The result indicate that in the long run, increases by a percentage, economic growth will increase by approximately 37%. This means that in the long run when terms of trade improves, economic growth is also expected to improve.

Also, trade openness (OPEN) from the table 5 above has a positive long run coefficient of 0.601714 and significant at 1%. This means that trade openness has a long run positive impacts on economic growth. The result indicates that when trade openness increases by 1%, economic growth will also increase by approximately 0.60%. This means that the more open an economy is to international trade, the more that economy growths. This finding support the findings of Keho (2017), Dao (2014), Turan & Seni (2014) and Jawaid (2014) who also found a positive impact of trade openness on economic growth.

Lastly, the coefficient of inflation (LINFL) in the table 5 above is -0.134240 which is significant at 5%. This means that inflation negatively influence economic growth in the long run. The result shown that when inflation increases by 1%, economic growth will decrease by approximately 0.13% in the long run. Inflation simply means more money in circulation chasing fewer goods. Hence as inflation increases, productivity decrease and eventually economic growth decreases as well. This result supports the

findings of Ahiakpor & Akapare (2014) which found that inflation and interest rate has a decreasing impact on economic growth and Behera & Mishra (2017), Mamo (2012), Faria, & Carneiro (2001) also found similar result of negative relationship.

In conclusion, government on secondary education and tertiary education significantly influence economic growth in the long run. Expenditure on primary education seems not to influence economic growth in the long run. The impacts of expenditure on tertiary education on economic growth is greater than the impacts of expenditure on secondary education on economic growth. This is because, from table 5 above, expenditure on tertiary education and expenditure on primary education has a coefficient of 0.2109 and 0.0726 respectively.

4.5 Short Run Results

This section presents short run results using error correction model. The result is presented in table 6 below.

Table 6: Short Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LINV)	0.007930	0.002992	2.645245	0.0073
D(LINV(-1))	-0.135892	0.100986	-1.345651	0.5127
D(LLF)	0.117874	0.042568	2.769079	0.0170
D(LLF(-1))	0.037246	0.029043	1.282435	0.2239
D(LTE)	0.001641	0.000503	0.055293	0.0068
D(LSE)	0.021535	0.018093	1.190249	0.2570
D(LPE)	-0.033352	0.011211	-2.974973	0.0116
D(LTOT)	0.016911	0.007471	2.2614343	0.0027
D(LTOT(-1))	0.045699	0.016564	2.758999	0.0173
D(LOPEN)	0.023884	0.003813	6.263444	0.6251
D(LOPEN(-1))	0.150110	0.066729	2.249557	0.0440
D(LINFL)	-0.090363	0.026855	-3.364894	0.0056
D(LINFL(-1))	-0.134228	0.038595	-3.477844	0.0046
ECM(-1)	-0.482434	0.116523	-3.168011	0.0081

Cointeq = LGDPPC - (0.30929*LINV + 0.67307*LLF +0.2109*LTE + 0.0726*LSE + 0.0556*LPE + 0.36563*LTOT + 0.601714*LOPEN + 0.134240**LINFL* -- 962.8730)

Source: Author's computation using E-views econometric software.

The short-run results in table 6 above indicate that any disequilibrium in the system as a result of a shock can be corrected in the long-run by the error correction term. Hence, the error correction term that estimated the short-run adjustments to equilibrium is generated as follows.

ECM = LGDPPC - (0.30929*LINV + 0.67307*LLF +0.2109*LTE + 0.0726*LSE + 0.0556*LPE + 0.36563*LTOT + 0.601714*LOPEN + 0.134240**LINFL* -- 962.8730)

From table 6 above, investment (D(LINV)) has a positive coefficient of 0.007930. This means that in the short run, with a percent increase in investment it will lead to approximately 0.008% increase in economic growth. This is statistically significant at 5 percent. However, the one period lag coefficient of investment (D(LINV(-1)) has a negative value of 0.135892. This means that with lag effect of 1% increase in investment, it would decrease economic growth by 0.14% but this is statistically not significant.

Also, the coefficient of labour force (D(LLF)) in table 6 above is 0.117874 and statistically significant at 5%. This result means that in the short run labour force is positively related to economic growth. With the positive coefficient of 0.117874, it means that when there is 1% increase in labour force in the short run it will result in 0.12% increase in economic growth. But the one period lag coefficient of labour force (D(LLF(-1)) is a positive value of 0.037246. This means that with lag effect of 1% increase in labour force, it would result in approximately 0.04% increase in economic growth but this is statistically significant at 5%.

Table 6 from above shows that expenditure on tertiary education D(LTE) has a short run positive value of 0.001641 and statistically significant at 5 percent. This means that expenditure on tertiary education has a positive impact on economic growth in the short run which is consistent with the long-run results. The result shown that in the

short run when there is 1% increase in expenditure on tertiary education, it would lead to approximately 0.002% increase in economic growth. Also, expenditure on secondary education has a short run positive coefficient of 0.021535. This means that expenditure on secondary education has a short run positive impact on economic growth but however this is statistically insignificant in the short run. However, expenditure primary education D(LPE) has a short run negative value of 0.033352 and statistically significant at5 percent. The result shown that in the short run when there is 1 percent increase in expenditure on primary education, it will lead to approximately 0.033% decrease in economic growth. This however means that expenditure on primary education has a short run negative relationship with economic growth in Ghana [Support] . This can be justified with the fact that as government spend more on primary education, the benefits in the form of higher productivity is not achieved in the short run and since government is spending it will drain the national purse and lead to decrease in economic growth.

Furthermore, terms of trade D(LTOT) in table 6 has a positive coefficient of 0.016911 and its significant at 1 percent level of significance. The result indicate that as terms of trade increase by 1 percent in the short run, economic growth measured by GDP per capita will increase by approximately 0.017%. this means that in the short run, terms of trade positively related to economic growth. This result is line with the long run results in table 5 above. Also, the one period lag coefficient of terms of trade (D(LTOT(-1)) is a positive value of 0.045699 and statistically significant at 5%. This means that with lag effect of 1% increase in terms of trade, it would result in approximately 0.05% increase in economic growth

Again, the result in table 6 above shows that trade openness D(LOPEN) has a positive value of 0.023884. The result shown that in the short run when there is 1% increase in

trade openness, it would lead to approximately 0.02% increase in economic growth. But this is statistically insignificant in the short run. Also, trade openness has one period lag (D(LOPEN(-1)) coefficient of 0.150110 and statistically significant at 5%. This result indicates that with lag effect of 1% increase in trade openness, it would increase economic growth by 0.15%. This means that trade openness in one lag period has a positive impact on economic growth in the short run.

Also, the coefficient of inflation D(LINFL) is -0.090363 and statistically significant at 5 percent. This result indicates that in the short run, inflation has negative effect on economic growth which corresponds with the long run results. This means that in the short run when there is 1% increase in inflation, it will result in 0.09% decrease in economic growth. Also, inflation has one period lag (D(LINFL(-1)) coefficient of -0.134228 which is statistically significant at 5%. This means that with lag effect of 1% increase in inflation, it would lead to 0.13% decrease in economic growth.

Last but not least, the results in table 6 also showed negative sign of error correction term lagged one period (ECM(-1)) and it is highly significant at 5 percent significance level. This confirms the existence of the co-integration relationship among the variables (that is economic growth and component of educational expenditure and other control variables) in the model. The Error Correction Term (ECT) stands for the speed of adjustment to restore equilibrium in the dynamic model following a disturbance. The coefficient of the error correction term (ECM) is -0.482434. This suggests that, about 48 percent of the deviations from the long term output growth caused by previous year's shocks converge back to the long run equilibrium in the current year. The rule of thumb is that, the larger the error correction coefficient (in absolute terms), the faster the variables equilibrate in the long-run when shocked in the previous period (Acheampong, 2007; Oyinlola & Akinnibosun, 2013).

4.6 Granger Causality

This section presents the results of the Granger Causality test. The test seeks to explore the direction of causality between government education expenditure and economic growth in Ghana. The null hypothesis of no causal relationship between government education expenditure and economic growth was tested against the alternative hypothesis of a causal relationship between government education expenditure and economic growth. Having established cointegration among the variables in table 4 above, Granger causality test was then applied to measure the linear causation between government education expenditure and economic growth. The results of the Pair-wise granger causality test are presented in Table 7.

Table 7: Results of Pair-wise Granger Causality Tests

Null Hypotheses	**F-Stats.**	**Prob.**	**Remarks**
LNGDPPC does not Granger Cause LEXEDU	2.5485	0.04044	H_0 Accepted
LNEXDU does not Granger cause LGDPPC	1.4523	0.23571	H_0 Rejected

Source: Author's computation using E-views econometric software.

Table 7 presents granger causality between government education spending and economic growth. The result in table 7 shows that there exist causal relationship between government spending and economic growth. But however, this causal relationship is unidirectional in the sense that only government education spending granger causes economic growth and economic growth do not granger cause education expenditure. The null hypothesis of LGDPPC does not granger cause government education spending (LEXEDU) was rejected even at 5% level of

significance and the null hypothesis of government spending does not granger cause LGDPPC was rejected. Therefore. the conclusion that only education expenditure granger cause economic growth hence uni-directional causal relationship between government education spending and economic growth. However, Owusu-Nantwi, (2015) had causality between government education spending and economic growth from both directions in the short run.

4.7 Model Stability

Cointegration and error correction estimation results are only valid if the residuals of the equations are white noise. Heteroscedasticity and serial correlation diagnostic test were carried out to determine whether the results are robust and good for prediction and policy formulation. Heteroscedasticity, serial correlation and the model stability text are presented in Table 8.

Table (8); Results of the Heteroscedaticity and Serial Correlation Test.

Heteroscedasticity Test: Breusch-Pagan-Godfrey Null Hypothesis: No Heteroscedasticity

F-statistic	1.702458	Prob. F(22,12)	0.1707
Obs*R-squared	26.50727	Prob. Chi-Square(22)	0.2305
Scaled explained SS	1.648738	Prob. Chi-Square(22)	1.0000

Breusch-Godfrey Serial Correlation LM Test:		Null Hypothesis: No Serial Correlation	
F-statistic	1.564676	Prob. F(2,10)	0.2563
Obs*R-squared	8.342172	Prob. Chi-Square(2)	0.0154

Source: Author's computation using E-views econometric software.

The first part of table 8 shows result of heteroscedaticity test. The null hypothesis state that there is no heteroscedaticity present in the model against the alternative hypothesis which state that there is heteroscedaticity present in the model. The probability value (p-value) of the heteroscedaticity test is 0.1707 which is even above 10% hence we fail to reject the null hypothesis and conclude that there is no heteroscedaticity present in the model.

The second part of table 8 shows the result of Breusch-Godfrey serial correlation LM test. The null hypothesis state that there is no serial correlation present in the model against the alternative hypothesis which state that there is serial correlation present in the model. The p-value is 0.2563 which is above 20% and hence we fail to reject the null hypothesis and conclude that there is no serial correlation in the model. These results indicate that the model is good and therefore appropriate for policy formulation and prediction.

To further test the stability of the model, cumulative sum (CUSUM) analysis was carried out (Pesaran & Pesaran, 1997). The result is displayed in figure 1 and 2 below. The cumulative sum test recognizes systematic changes in the regression coefficients or estimates, while the cumulative sum of squares test detects unexpected changes from the constancy of the regression coefficients. The results of the plot of the CUSUM and CUSUMSQ in Figure 1 and Figure 2, respectively lies within the critical bounds at the 5 percent significant confirming the stability of the parameters within the model. Therefore, the study concludes that the model is stable.

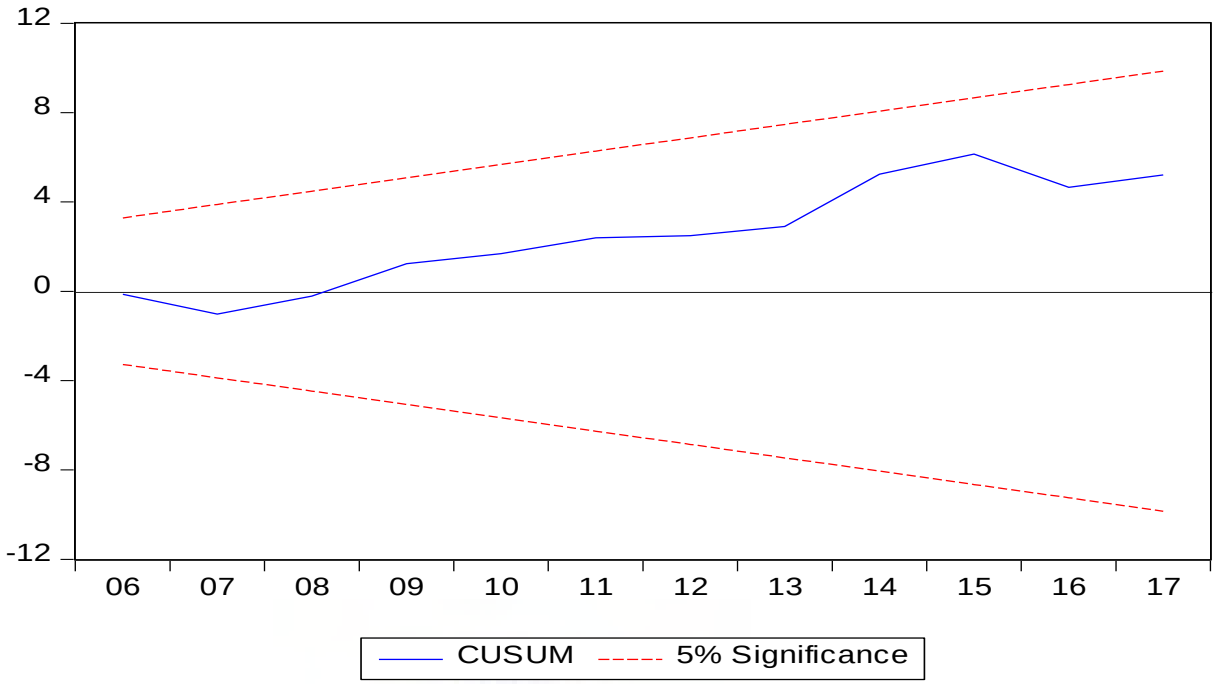


Figure 1: Plot of Cumulative sum of square of recursive residuals for ARDL model

Source: Author's computation using E-views econometric software.

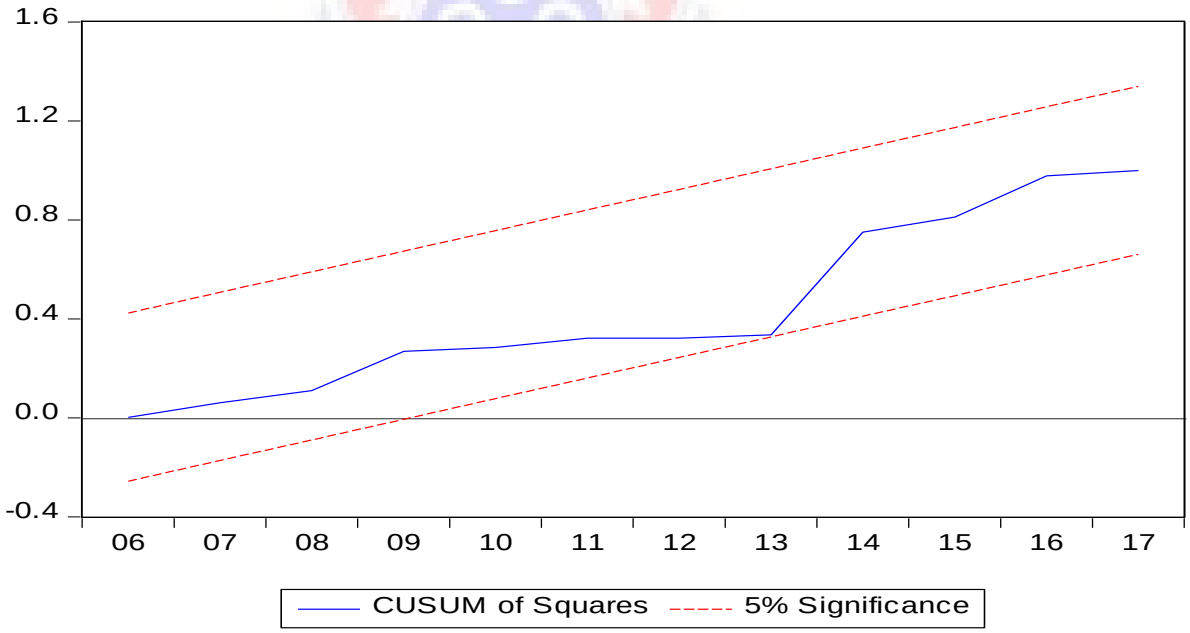


Figure 2: Plot of Cummulative Sum of Recursive Residuals for ARDL Model

Source: Author's computation using E-views econometric software.

4.8 Chapter Summary

This chapter was basically about data presentation and discussion. The organization is chapter was guided by the methodology presented in chapter three of this thesis. Also various test discussed in chapter three of this thesis was used to test the hypotheses of the study as stated in chapter one of this thesis and various conclusion was drawn.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary, conclusions and recommendations of the study. The summary presents a brief overview of the research problem, objectives, methodology and findings, the conclusions highlight the overall outcomes regarding the findings of the study in light of the hypotheses, and the recommendations provide specific remedies to be implemented by particular agencies. The chapter further provides the limitations of the study and direction for future research.

5.1 Summary

The study sought to determine the impact of total component of government education expenditure on economic growth. This study used annual time series data spanning from 1980 to 2019. The study adopted quantitative research design to analyse relationship between educational expenditure and economic growth in Ghana. The study operated on three (3) major objectives. The first objective is to determine the long run relationship between educational expenditure (Primary, Secondary and Tertiary) and economic growth, the second objective is to estimate the impact of expenditure on various level of education on economic growth and the third objective is to establish granger causality between educational expenditure and economic growth. In achieving these objectives, time series variables on selected macroeconomic variables in Ghana was presented and analyzed using advanced econometric techniques by employing E-views econometric software package version 10.

The first step in the estimation process involved testing for the stationarity properties of the variables using Augmented Dickey Fuller test statistics. The unit roots results suggest that some of the variables were found to be integrated of either order zero (0) and some of order one (1), implying mixed I(0) and I(1) variables. The variable inflation was integrated of order zero and the rest of the variables for the study were integrated of order one. The Autoregressive Distributed Lag (ARDL) bounds testing approach was then employed to obtain the long and short-run estimates of the variables since it was the most appropriate method given the mixed I(0) and I(1) variables results of the unit root test. The co-integration analysis revealed the presence of long-run relationship among economic growth, components of education expenditure, investment, labour force, terms of trade, trade openness and inflation. The error correction model also revealed a short run relationship among the variables. It can be said that most the results in the short-run were consistent with the results in the long-run. The positive and negative effects of most of the variables on economic growth were bigger in magnitude in the long-run than in the short-run.

It was revealed that expenditure on tertiary education (TE), expenditure on secondary education and expenditure on primary education have a long run positive relationship with economic growth in Ghana. However, the study revealed that expenditure on primary education is statistically insignificant. This means that in the long run expenditure primary education has no impact on economic growth. Also, it was found that the impacts of expenditure on tertiary education on economic growth is greater than the impacts of expenditure on secondary education on economic growth. The control variables, investment, labour force, terms of trade, trade openness have positive long run relationship with economic growth but only inflation has a negative long run relationship with economic growth.

It was further revealed that expenditure on tertiary education has significant positive relationship with economic growth in the short run. Expenditure on secondary education seems not to significantly influence economic growth in the short run. However, expenditure on primary education had a significant negative relationship with economic growth in the short run.

It was also revealed that investment, labour force, terms of trade, one lag of terms of trade, and one lag of trade openness in the short run has significant positive relationship with economic growth. However, current inflation and one lag period inflation both had significant positive relationship with economic growth in the short run. The value of the coefficient of the error correction term was found to be -0.482434 which suggests that about 48 percent of the disequilibrium caused by previous years' shocks converges back to the long-run equilibrium in the current year. Statistically, any disequilibrium in the Ghanaian economy takes about seven months to restore to equilibrium. The study also revealed that there exist uni-directional granger causality between government education spending and economic growth. That is, it was found that only educational granger causes economic growth but economic growth does not granger cause education expenditure.

The diagnostic tests results show that the model is free of serial correlation and heteroscedasticity at conventional levels of significance. Further, the graphs of the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) show that there is stability of the parameters.

5.2 Conclusions

The main objective of this study is to examine the long run and the short run relationship between government education expenditure and economic growth. Based

on the findings which indicates granger causality between education expenditure and economic growth, it can be concluded that investing in education plays an important role in economic growth in Ghana. Economic growth is driven by new ideas, by discoveries that result in better products and more efficient production technologies. Human capital is the engine of this process and human capital can be improved through education: a better educated labour force increases the return on research and development and ensures that discoveries are more readily absorbed in the productive structure of the economy. In the end, more education equals more economic growth.

5.3 Recommendations

Taking into consideration the findings of this study, the following recommendations are made:

- Government through the Ministry of Finance should be encouraged to spend on education to increase human capital resource in the economy.
- Government should encourage more spending on tertiary education in the form of scholarship to tertiary students, spending on research and developments which will in the long run increase productivity and hence economic growth.
- Inter-relationships between government expenditure and education quality should be taken into account when formulating education policy to promote economic growth in Ghana.
- The researcher will recommend that the policy makers should focus on export promotion strategy to enhance the economic growth in Ghana. Besides, efficient utilization of capital goods should be ensured and reliance on non-capital goods should be less in order to ensure high domestic production in the country

5.4 Limitations of the Study

The major limitation to this study is availability of data. The researcher wished to use data spanning from 1960 to 2018 but due to the unavailability of data on some of the variables of the study, the researcher was limited to data from 1980 to and this serves as great impediment to the conduct of this research work.

5.5 Direction for Further Studies

Due to the limitation of this work, the researcher could not delve deep into the selected topic. The research will also suggest to future researchers to consider government expenditure on health and capital expenditure and their impacts on economic growth in Ghana.

REFERENCES

Abdul-Rahaman, N., Ming, W., Abdul Rahaman, A. B., & Amadu, L. (2018). The Impact of Government Funding on Students' Academic Performance in Ghana. International Education Studies, 11(7), 83-91.

Abukari, Z., Kuyini, A. B., & Kuyini Mohammed, A. (2015). Education and health care policies in Ghana: examining the prospects and challenges of recent provisions. Sage Open, 5(4), 2158244015611454.

Adewumi, B., & Enebe, N. (2019). Government Educational Expenditure and Human Capital Development in West African Countries. *International Journal of Research and Innovation in Social Science (IJRISS), 3 (6)*, 24-54.

Adu, F., & Ackah, I. (2015). Revisiting the Government Spending and Growth analysis in Ghana: A disaggregated Analysis.

Adu, G. (2013). Determinants of economic growth in Ghana: Parametric and nonparametric investigations. The Journal of Developing Areas, 277-301.

Aghion, P., & Howitt, P. (1998). A Schumpeterian perspective on growth and competition. In *New Theories in Growth and Development* (pp. 9-49). Palgrave Macmillan, London.

Ahiakpor, F., & Akapare, I. A. (2014). Short-run and long-run inflation and economic growth nexus in Ghana. *Ghana Journal of Development Studies*, *11*(2), 32-49.

Akram, G., & Siddiqi, S. S. (2005). End conditions for interpolatory septic splines. *International Journal of Computer Mathematics*, *82*(12), 1525-1540.

Akram, M., Khattak, N. U., Iqbal, A., Qureshi, A. A., Ullah, K., & Qureshi, I. E. (2005). Measurement of radon concentration in dwellings of Skardu city, Pakistan. *Radiation measurements*, *40*(2-6), 695-698.

Akram, Q. F. (2005). Multiple unemployment equilibria and asymmetric dynamics—Norwegian evidence. *Structural change and economic dynamics*, *16*(2), 263-283.

Aladejare, S. A. (2013). Government spending and economic growth: evidence from Nigeria.

Al-Fawwaz, T. M., & Al-Sawai'e, K. M. (2013). The relationship between gross domestic product and government expenditures in Jordan: A VAR Approach. *Interdisciplinary Journal of Contemporary Research in Business*, *4*(9), 336-244.

Amaghionyeodiwe, L. A. (2019). Government spending on education and economic growth: a case study of West African countries. working paper, City University of New York, Jamaica, NY,availableat:file:///C:/Users/tzeng/Downloads/GovernmentSpendingOnEducationAndEco_previe% 20 (2). pdf (accessed July 24, 2019).

Amoako-Gyampah, K., & Acquaah, M. (2008). Manufacturing strategy, competitive strategy and firm performance: An empirical study in a developing economy environment. *International journal of production economics*, *111*(2), 575-592.

Antwi, S. K., & Hamza, K. (2015). Qualitative and quantitative research paradigms in business research: A philosophical reflection. *European journal of business and management*, *7*(3), 217-225.

Anyanwu, J., & Erhijakpor, A. E. (2007). *Working Paper 92-Education Expenditures and School Enrolment in Africa: Illustrations from Nigeria and Other SANE Countries* (No. 227).

Arrow, K. J. (1962). Economic welfare and the allocation of resources. *The Rate and Direction of Inventive Activity*.

Asafu-Adjaye, P. (2012). Private returns on education in Ghana: Estimating the effects of education on employability in Ghana. African Sociological Review/Revue Africaine de Sociologie, 16(1), 121-139.

Ayertey Odonkor, A., Asiedu-Nketiah, K., Brown, E. O. A., & Mamun Miah, M. (2018). Human Capital Development and Economic Growth in Developing Economies. Available at SSRN 3305421.

Baafi Antwi, J. (2010). Ghana's Economic Growth in perspective: A time series approach to Convergence and Growth Determinants.

Babatunde, S. A. (2018). Government spending on infrastructure and economic growth in Nigeria. *Economic research-Ekonomska istraživanja*, *31*(1), 997-1014.

Baca Campodonico, J. F., Peschiera Cassinelli, J., & Mesones, J. (2014). The impact of public expenditures in education, health, and infrastructure on economic growth and income distribution in Peru. Health, and Infrastructure on Economic Growth and Income Distribution in Peru (February 14, 2014).

Bahmani-Oskooee, M., & Ng, R. C. W. (2002). Long-run demand for money in Hong Kong: an application of the ARDL model. *International journal of business and economics*, *1*(2), 147.

Barro, R. J. (1991). Economic growth in a cross section of countries. *The quarterly journal of economics*, *106*(2), 407-443.

Barro, R. J. (1996). *Determinants of economic growth: A cross-country empirical study* (No. w5698). National Bureau of Economic Research.

Barro, R. J., & Lee, J. W. (1996). International measures of schooling years and schooling quality. *The American Economic Review*, *86*(2), 218-223.

Barro, R. J., & Redlick, C. J. (2009). Stimulus spending doesn't work. *The Wall Street Journal*, *1*.

Barro, R. J., & Redlick, C. J. (2011). Macroeconomic effects from government purchases and taxes. *The Quarterly Journal of Economics*, *126*(1), 51-102.

Barro, R. J., Mankiw, N. G., & Sala-i-Martin, X. (1992). *Capital mobility in neoclassical models of growth* (No. w4206). National Bureau of Economic Research.

Barro, R., & Redlick, C. (2009). Design and effectiveness of fiscal-stimulus programmes. *VoxEU. org*, *30*.

Basnet, C. (2013). The measurement of internal supply chain integration. *Management Research Review*.

Bawakyillenuo, S., Akoto, I. O., Ahiadeke, C., Aryeetey, E. B. D., & Agbe, E. K. (2013). Tertiary education and industrial development in Ghana. Policy Brief, 33012.

Behera, R., & Mishra, D. (2017). Further results on generalized inverses of tensors via the Einstein product. *Linear and Multilinear Algebra*, *65*(8), 1662-1682.

Benhabib, J., & Spiegel, M. M. (1994). The role of human capital in economic development evidence from aggregate cross-country data. *Journal of Monetary economics*, *34*(2), 143-173.

Bilic, B. (2012). *We were gasping for air*. Nomos Verlagsgesellschaft mbH & Co. KG.

Carsamer, E., & Ekyem, E. (2015). An empirical analysis of government education expenditure on enrolments at primary and secondary school levels in Africa. *International Journal of Economics, Commerce and Management*, *3*(7), 273-294.

Çetin, M., & Ecevit, E. (2010). The effect of health expenditures on economic growth: a panel regression analysis on OECD countries. *Doğuş University Journal*, *1*(2), 166-182.

Chandra, A., Lara-Cinisomo, S., Jaycox, L. H., Tanielian, T., Burns, R. M., Ruder, T., & Han, B. (2010). Children on the homefront: The experience of children from military families. *Pediatrics*, *125*(1), 16-25.

Chandra, B. (2010). *The Rise and Growth of Economic Nationalism in India: Economic Policies of Indian National Leadership, 1880-1905*. Har Anand Publications.

Chandra, V., Park, J., Chun, Y., Lee, J. W., Hwang, I. C., & Kim, K. S. (2010). Water-dispersible magnetite-reduced graphene oxide composites for arsenic removal. *ACS nano*, *4*(7), 3979-3986.

Chandra, V., Park, J., Chun, Y., Lee, J. W., Hwang, I. C., & Kim, K. S. (2010). Water-dispersible magnetite-reduced graphene oxide composites for arsenic removal. *ACS nano*, *4*(7), 3979-3986.

Chin, C. B. (2003). Visible bodies, invisible work: State practices toward migrant women domestic workers in Malaysia. *Asian and pacific migration journal*, *12*(1-2), 49-73.

Chinweoke, N., Ray, N., & Paschal, N. (2014). Impact of government expenditure on Nigeria's economic growth (1992-2011). *The Macrotheme Review: A Multidisciplinary Journal of Global Macro Trends*, *3*(7), 79-87.

Chude, N. P., & Chude, D. I. (2013). Impact of government expenditure on economic growth in Nigeria. *International journal of business and management review*, *1*(4), 64-71.

Chudy, S., & Gieraltowska, U. (2013). Produkty tradycyjne i regionalne z perspektywy szczecińskich studentów. *Journal of Agribusiness and Rural Development*, (01 [27]).

Comin, D. (2010). Total factor productivity. In *Economic growth* (pp. 260-263). Palgrave Macmillan, London.

Comin, D., & Mulani, S. (2007). A theory of growth and volatility at the aggregate and firm level. In *Federal Reserve Bank of San Francisco Proceedings* (No. Nov).

Corriveau, J. L., & Coleman, A. W. (1991). Monitoring by epifluorescence microscopy of organelle DNA fate during pollen development in five angiosperm species. *Developmental biology*, *147*(1), 271-280.

Dao, M., Furceri, D., & Loungani, M. P. (2014). *Regional labor market adjustments in the United States and Europe* (No. 14-26). International Monetary Fund.

Darko, C. K. (2015). Determinants of Economic Growth in Ghana.

Darko, E. A. (2017). *Growth impact of government consumption, transfer and interest payments in Ghana* (Doctoral dissertation, University of Cape Coast).

Darkoh, S. O. (2014). Effect of Government Spending on Economic Growth for Sub-Saharan Africa (Doctoral dissertation, University of Ghana).

Devarajan, S., Swaroop, V., & Zou, H. F. (1996). The composition of public expenditure and economic growth. *Journal of monetary economics*, *37*(2), 313-344.

Domar, E. D. (1946). Capital expansion, rate of growth, and employment. *Econometrica, Journal of the Econometric Society*, 137-147.

Đurović-Todorović, J., Janković-Milić, V., & Popović, Ž. (2017). IMPACT OF EXPENDITURES FOR EDUCATION ON THE COMPETITIVENESS OF THE ECONOMY. *ЗБОРНИК РАДОВА ЕКОНОМСКОГ ФАКУЛТЕТА У ИСТОЧНОМ САРАЈЕВУ*, *6*(14), 43-49.

Đurović-Todorović, J., Janković-Milić, V., & Popović, Ž. (2017). IMPACT OF EXPENDITURES FOR EDUCATION ON THE COMPETITIVENESS OF THE ECONOMY. *ЗБОРНИК РАДОВА ЕКОНОМСКОГ ФАКУЛТЕТА У ИСТОЧНОМ САРАЈЕВУ*, *6*(14), 43-49.

Ebaidalla, E. M. (2013). Causality between government expenditure and national income: Evidence from Sudan. *Journal of Economic Cooperation & Development*, *34*(4), 61.

Edame, G. E., & Eturoma, A. D. (2014). The determinants of public expenditure on educational infrastructural facilities and economic growth in Nigeria. *Journal of Business Management and Economics*, *5*(6), 152-161.

Eggoh, J., Houeninvo, H., & Sossou, G. A. (2015). Education, health and economic growth in African countries. Journal of Economic Development, 40(1), 93.

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, 251-276.

Faria, J. R., & Carneiro, F. G. (2001). Does high inflation affect growth in the long and short run?. *Journal of applied economics*, *4*(1), 89-105.

Frankel, M. (1962). The production function in allocation and growth: a synthesis. *The American Economic Review*, *52*(5), 996-1022.

Gapp, K., Jawaid, A., Sarkies, P., Bohacek, J., Pelczar, P., Prados, J., ... & Mansuy, I. M. (2014). Implication of sperm RNAs in transgenerational inheritance of the effects of early trauma in mice. *Nature neuroscience*, *17*(5), 667-669.

García, C. J., Herrera, S., & Restpro, J. E. (2006). Government expenditure Composition and Growth in Chile.

Gemmell, N. (1996). Evaluating the impacts of human capital stocks and accumulation on economic growth: some new evidence. *Oxford bulletin of economics and statistics*, *58*(1), 9-28.

Georgantopoulos, A. G., & Tsamis, A. (2012). The causal links between FDI and economic development: Evidence from Greece.

Georgantopoulos, A. G., & Tsamis, A. (2012). The interrelationship between money supply, prices and government expenditures and economic growth: A causality analysis for the case of Cyprus. *International Journal of Economic Sciences and Applied Research*, *5*(3), 115-128.

Gibescu, O. (2010). Does the gross fixed capital formation represent a factor for supporting the economic growth?.

Godspeed, T. J. (2000). Education Spending. *Inequality and GDP: Evidence from US States: mimeo, Hunter College-CUNY, New York*.

Granger, C. W. (1988). Some recent development in a concept of causality. *Journal of econometrics*, *39*(1-2), 199-211.

Griliches, Z. (1997). Education, human capital, and growth: a personal perspective. *Journal of Labor Economics*, *15*(1, Part 2), S330-S344.

Grossman, G. M., & Helpman, E. (1991). *Innovation and growth in the global economy*. MIT press.

Guisan, M. C., & Exposito, P. (2010). Health Expenditure, Education, Government Effectiveness and Quality of Life in Africa and Asia. Regional and sectoral Economic studies, 10(1), 115-126.

Gujarati, D. N., & Porter, D. C. (1999). *Essentials of econometrics* (Vol. 2). Singapore: Irwin/McGraw-Hill.

Hanushek, E. A. (1996). Measuring investment in education. *Journal of economic perspectives*, *10*(4), 9-30.

Hanushek, E. A. (2008). Education production functions. *The new Palgrave dictionary of economics*, *2*, 749-52.

Hanushek, E. A., & Woessmann, L. (2008). The role of cognitive skills in economic development. *Journal of economic literature*, *46*(3), 607-68.

Hanushek, E. A., Jamison, D. T., Jamison, E. A., & Woessmann, L. (2008). Education and economic growth: It's not just going to school, but learning something while there that matters. *Education Next*, *8*(2), 62-71.

Harrod, R. F. (1939). An essay in dynamic theory. *The economic journal*, *49*(193), 14-33.

Ho, C. C., & MacDorman, K. F. (2010). Revisiting the uncanny valley theory: Developing and validating an alternative to the Godspeed indices. *Computers in Human Behavior*, *26*(6), 1508-1518.

Howitt, P. (1999). Steady endogenous growth with population and R. & D. inputs growing. *Journal of Political Economy*, *107*(4), 715-730.

Hua, Y. (2016). The relationship between public expenditure on education and economic growth: Evidence from China.

Hussin, M. Y. M., Muhammad, F., Hussin, M. F. A., & Razak, A. A. (2012). Education expenditure and economic growth: a causal analysis for Malaysia. Journal of Economics and Sustainable Development, 3(7), 71-81.

Ismail, A. I. (1998). Prevention of early childhood caries. *Community dentistry and oral epidemiology*, *26*(S1), 49-61.

Jalil, A. (2009, July). Financial Development and Reduced Growth Volatility: Evidence from China. In *International Trade and Finance Association Conference Papers* (p. 21). bepress.

Jawaid, S. T. (2014). Trade openness and economic growth: A lesson from Pakistan. *Foreign Trade Review*, *49*(2), 193-212.

Jeyhoon Tabar, F., Najafi, Z., & Sistani Badooei, Y. (2017). The impact of educational expenditures of government on economic growth of Iran. AD-minister, (30), 217-235.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of economic dynamics and control*, *12*(2-3), 231-254.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with appucations to the demand for money. *Oxford Bulletin of Economics and statistics*, *52*(2), 169-210.

Josaphat, P. K., & Oliver, M. (2000). Government Spending and Economic Growth in Tanzania, 1965–1996. *Credit Research Paper, Centre for Research in Economic Development and International Trade University of Nottingham*, 00-6.

Josaphat, P. K., & Oliver, M. (2000). *Public Expenditure and Economic Performance in Tanzania* (No. 89/45). IMF Working Paper.

Jung, H. S., & Thorbecke, E. (2003). The impact of public education expenditure on human capital, growth, and poverty in Tanzania and Zambia: a general equilibrium approach. *Journal of Policy Modeling*, *25*(8), 701-725.

Keho, Y. (2017). The impact of trade openness on economic growth: The case of Cote d'Ivoire. *Cogent Economics & Finance*, *5*(1), 1332820.

Keynes, J. M. (1936). The general theory of interest, employment and money.

Kofi Boachie, M., Ramu, K., & Põlajeva, T. (2018). Public health expenditures and health outcomes: New evidence from Ghana. Economies, 6(4), 58.

Lamartina, S., & Zaghini, A. (2011). Increasing public expenditure: Wagner's law in OECD countries. *German Economic Review*, *12*(2), 149-164.

Lamartina, S., & Zaghini, A. (2011). Increasing public expenditure: Wagner's law in OECD countries. *German Economic Review*, *12*(2), 149-164.

Landau, D. (1983). Government expenditure and economic growth: a cross-country study. Southern economic journal, 783-792.

Lawanson, A. O. (2015). Economic growth experience of West African region: Does human capital matter. *International Journal of Business and Social Science*, *6*(12), 127-137.

Lawanson, O. I. (2009). Human capital investment and economic development in Nigeria: The role of health and education.

Li, J., & Kong, L. (2012). Equilibrium relationship between education and economic growth. *Advances in Applied Economic and Finance*, *2*(3), 403-406.

Lin, D. (2003). Dependency-based evaluation of MINIPAR. In *Treebanks* (pp. 317-329). Springer, Dordrecht.

Lin, H. T., & Lin, C. J. (2003). A study on sigmoid kernels for SVM and the training of non-PSD kernels by SMO-type methods. *submitted to Neural Computation*, *3*(1-32), 16.

Lin, J., Keogh, E., Lonardi, S., & Chiu, B. (2003, June). A symbolic representation of time series, with implications for streaming algorithms. In *Proceedings of the 8th ACM SIGMOD workshop on Research issues in data mining and knowledge discovery* (pp. 2-11).

Loto, C. A. (2012). Electrochemical noise measurement technique in corrosion research. *Electrochemical Noise Measurement Technique in Corrosion Research*, *7*.

Loto, C. A., Loto, R. T., & Popoola, A. P. I. (2012). Corrosion inhibition of thiourea and thiadiazole derivatives: a review. *Journal of Materials and Environmental Science*, *3*(5), 885-894.

Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of monetary economics*, *22*(1), 3-42.

MacKinnon, J. G. (1991). Critical values for cointegration tests. In *Eds.), Long-Run Economic Relationship: Readings in Cointegration*.

Majgaard, K., & Mingat, A. (2012). *Education in sub-Saharan Africa: A comparative analysis*. The World Bank.

Mallick, L., & Dash, D. P. (2015). Does Expenditure on Education Affect Economic Growth in India? Evidence from Cointegration and Granger Causality Analysis. *Theoretical & Applied Economics*, *22*(4).

Mallick, L., Das, P. K., & Pradhan, K. C. (2016). Impact of educational expenditure on economic growth in major Asian countries: Evidence from econometric analysis. *Theoretical & Applied Economics*, *23*(2).

Mallick, L., Das, P. K., & Pradhan, K. C. (2016). Impact of educational expenditure on economic growth in major Asian countries: Evidence from econometric analysis. *Theoretical & Applied Economics*, *23*(2).

Mamo, A., Cavallone, L., Tuzmen, S., Chabot, C., Ferrario, C., Hassan, S., ... & Malcolm, K. (2012). An integrated genomic approach identifies ARID1A as a candidate tumor-suppressor gene in breast cancer. *Oncogene*, *31*(16), 2090-2100.

Mamo, F. (2012). Economic Growth and Inflation: A panel data analysis.

Mansur, H. S., Costa Jr, E. D. S., Mansur, A. A., & Barbosa-Stancioli, E. F. (2009). Cytocompatibility evaluation in cell-culture systems of chemically crosslinked chitosan/PVA hydrogels. *Materials Science and Engineering: C*, *29*(5), 1574-1583.

Mare, C., Mazzucotelli, E., Crosatti, C., Francia, E., & Cattivelli, L. (2004). Hv-WRKY38: a new transcription factor involved in cold-and drought-response in barley. *Plant molecular biology*, *55*(3), 399-416.

Mariana, D. R. (2015). Education as a determinant of the economic growth. The case of Romania. *Procedia-Social and Behavioral Sciences*, *197*, 404-412.

Matovu, M. J., & Dabla-Norris, M. E. (2002). Composition of government expenditures and demand for education in developing countries (No. 2-78). International Monetary Fund.

Mekdad, Y., Dahmani, A., & Louaj, M. (2014). Public spending on education and economic growth in Algeria: Causality test. *International Journal of Business and Management*, *2*(3), 55.

Mesones, J. A., Peschiera Cassinelli, J. R., & Baca Campodónico, J. F. (2014). The Impact of public expenditures in education, health, and infrastructure on economic growth and income distribution in Peru.

Mincer, J. (1993). *Studies in human capital* (Vol. 1). Edward Elgar Publishing.

Mincer, J. A. (1974). Introduction to" Schooling, Experience, and Earnings". In *Schooling, experience, and earnings* (pp. 1-4). NBER.

Mingat, A., & Majgaard, K. (2012). *Education in sub-Saharan Africa: a comparative analysis*. World Bank Group.

Mohd Hussin, M. Y., & Muhammad, F. Education Expenditure And Economic Growth: A Causal Analysis For Malaysia. Journal Of Economics And Sustainabe Development.

Morley, B. (2006). Causality between economic growth and immigration: An ARDL bounds testing approach. *Economics Letters*, *90*(1), 72-76.

Mukhtarov, S., Mammadov, I., & Hamidov, H. (2019). THE IMPACT OF GOVERNMENT EDUCATION EXPENDITURES ON ECONOMIC GROWTH: EVIDINCE FROM AZERBAIJAN. *Economic and Social Development: Book of Proceedings*, 426-434.

Muktdair-Al-Mukit, D. (2012). Public expenditure on education and economic growth: the case of Bangladesh. *International Journal of Applied Research in Business, Administration & Economics*, *1*, 10-8.

Muktdair-Al-Mukit, D. (2012). Public expenditure on education and economic growth: the case of Bangladesh. *International Journal of Applied Research in Business, Administration & Economics*, *1*, 10-8.

Mulder, P., De Groot, H. L., & Hofkes, M. W. (2001). Economic growth and technological change: a comparison of insights from a neo-classical and an evolutionary perspective. *Technological Forecasting and Social Change*, *68*(2), 151-171.

Mulder, P., De Groot, H. L., & Hofkes, M. W. (2001). Economic growth and technological change: A comparison of insights from a neo-classical and an evolutionary perspective. *Technological Forecasting and Social Change*, *68*(2), 151-171.

Musaba, E. C., Chilonda, P., & Matchaya, G. (2013). Impact of government sectoral expenditure on economic growth in Malawi, 1980-2007. *Journal of Economics and Sustainable Development*, *4*(2), 71-78.

Musgrave, R. A. (1959). Theory of public finance; a study in public economy.

Musgrave, R. A. (1969). Cost-benefit analysis and the theory of public finance. *Journal of Economic Literature*, *7*(3), 797-806.

Musgrave, R. A. (1969). Cost-benefit analysis and the theory of public finance. *Journal of Economic Literature*, *7*(3), 797-806.

Musgrave, R. A. (1969). Theories of fiscal federalism. *Public Finance= Finances publiques*, *24*(4), 521-536.

Musila, J. W., & Belassi, W. (2004). The impact of education expenditures on economic growth in Uganda: evidence from time series data. *The Journal of Developing Areas*, 123-133.

Mussagy, I. H., & Babatunde, M. A. (2015). Government spending on education and Economic growth in mozambique: a cointegration approach. *Revista Electrónica de Investigação e Desenvolvimento*, (5).

Musyoka, A. (2008). *Human capital management practices adopted by the National Social Security Fund* (Doctoral dissertation, University Of Nairobi).

Naveed, A., Jalil, A., & Ahmad, N. (2008). Corruption and Growth: A Nexus Revisited. *Forman Journal of Economic Studies*, *4*.

Nketiah-Amponsah, E. (2009). Public spending and economic growth: evidence from Ghana (1970–2004). *Development Southern Africa*, *26*(3), 477-497.

Obeng, S. K., & Sakyi, D. (2017). Explaining the growth of government spending in Ghana. The Journal of Developing Areas, 51(1), 103-128.

Okoro, A. S. (2013). Government spending and economic growth in Nigeria (1980-2011). *Global Journal of Management And Business Research*.

Oladitan, S. T. (2016). Effect of government expenditure on economic growth in Nigeria (1981-2013) (Doctoral dissertation).

Oluwatobi, S. A., & Ogunrinola, I. O. (2011). Government expenditure on human capital development: Implications for economic growth in Nigeria. *Journal of sustainable development*, *4*(3).

Oluwatobi, S. A., & Ogunrinola, I. O. (2011). Government expenditure on human capital development: Implications for economic growth in Nigeria. *Journal of sustainable development*, *4*(3).

Ongo, E. N., & Vukenkeng, A. W. (2014). Does gross capital formation matter for economic growth in the CEMAC sub-region?. *EuroEconomica*, *33*(2).

Owusu-Nantwi, V. (2015). Education expenditures and economic growth: evidence from Ghana. *Education*, *6*(16).

Oyinlola, M. A., & Akinnibosun, O. (2013). Public expenditure and economic growth nexus: Further evidence from Nigeria. *Journal of economics and international finance*, *5*(4), 146-154.

Palomba, C. A., & Banta, T. W. (1999). *Assessment Essentials: Planning, Implementing, and Improving Assessment in Higher Education. Higher and Adult Education Series*. Jossey-Bass, Inc., Publishers, 350 Sansome Street, San Francisco, CA 94104.

Pamuk, M., & Bektaş, H. (2014). Türkiye'de eğitim harcamaları ve ekonomik büyüme arasındaki ilişki: ARDL sınır testi yaklaşımı. *Siyaset, Ekonomi ve Yönetim Araştırmaları Dergisi*, *2*(2).

Peacock, A. T., & Wiseman, J. (1961). Front matter, the growth of public expenditure in the United Kingdom. In *The growth of public expenditure in the United Kingdom* (pp. 32-0). Princeton University Press.

Peacock, A. T., Wiseman, J., & Veverka, J. (1967). *The growth of public expenditure in the United Kingdom* (Vol. 1). Allen & Unwin.

Perron, P. (1991). A continuous time approximation to the unstable first-order autoregressive process: The case without an intercept. *Econometrica: Journal of the Econometric Society*, 211-236.

Perron, P. (1991). Test consistency with varying sampling frequency. *Econometric Theory*, 341-368.

Perron, P. (1997). Further evidence on breaking trend functions in macroeconomic variables. *Journal of econometrics*, *80*(2), 355-385.

Pesaran, M. H. (1997). The role of economic theory in modelling the long run. *The Economic Journal*, *107*(440), 178-191.

Pesaran, M. H., & Shin, Y. (1996). Cointegration and speed of convergence to equilibrium. *Journal of econometrics*, *71*(1-2), 117-143.

Pesaran, M. H., & Shin, Y. (1998). An autoregressive distributed-lag modelling approach to cointegration analysis. *Econometric Society Monographs*, *31*, 371-413.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, *16*(3), 289-326.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, *16*(3), 289-326.

Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American statistical Association*, *94*(446), 621-634.

Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American statistical Association*, *94*(446), 621-634.

Phillips, P. C., & Hansen, B. E. (1990). Statistical inference in instrumental variables regression with I (1) processes. *The Review of Economic Studies*, *57*(1), 99-125.

Pradhan, A. (2009). Some magnetized bulk viscous string cosmological models in cylindrically symmetric inhomogeneous universe with variable Λ-term. *Communications in Theoretical Physics*, *51*(2), 367.

Pradhan, S. C., & Phadikar, J. K. (2009). Nonlocal elasticity theory for vibration of nanoplates. *Journal of Sound and Vibration*, *325*(1-2), 206-223.

Pradhan, S. C., & Phadikar, J. K. (2009). Small scale effect on vibration of embedded multilayered graphene sheets based on nonlocal continuum models. *Physics letters A*, *373*(11), 1062-1069.

Psacharopoulos, G., & Patrinos, H. A. (2004). Human capital and rates of return. *International handbook on the economics of education*, 1-57.

Ravallion, M. (1997). Can high-inequality developing countries escape absolute poverty?. *Economics letters*, *56*(1), 51-57.

Ravallion, M. (1997). Good and bad growth: The human development reports. *World Development*, *25*(5), 631-638.

Ravallion, M., & Chen, S. (2003). Measuring pro-poor growth. *Economics letters*, *78*(1), 93-99.

Ravallion, M., & Chen, S. (2003). Measuring pro-poor growth. *Economics letters*, *78*(1), 93-99.

Robert, L. (1988). On the mechanics of economic development. *Journal of monetary economics*.

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of political economy*, *94*(5), 1002-1037.

Romer, P. M. (1990). Capital, labor, and productivity. *Brookings papers on economic activity. Microeconomics*, *1990*, 337-367.

Romer, P. M. (1990). Endogenous technological change. *Journal of political Economy*, *98*(5, Part 2), S71-S102.

Romer, P. M. (1994). The origins of endogenous growth. *Journal of Economic perspectives*, *8*(1), 3-22.

Sakyi, D. (2017). Explaining the Growth of Government Spending in Ghana. Journal of Developing Areas, 51(1), 103-128.

Schultz, P. W., Oskamp, S., & Mainieri, T. (1995). Who recycles and when? A review of personal and situational factors. *Journal of environmental psychology*, *15*(2), 105-121.

Schultz, T. P. (1995). *Integrated Approaches to Human Resource Development* (No. 719). Center Discussion Paper.

Schultz, T. W. (1961). Investment in human capital. *The American economic review*, 1-17.

Schultz, T. W. (1961). Investment in human capital. *The American economic review*, *51*(1), 1-17.

Schultz, T. W. (1961). Investment in human capital: reply. *The american economic review*, *51*(5), 1035-1039.

Schumpeter, J. (1942). Creative destruction. *Capitalism, socialism and democracy*, *825*, 82-85.

Segerstrom, P. S., Anant, T. C., & Dinopoulos, E. (1990). A Schumpeterian model of the product life cycle. *The American Economic Review*, 1077-1091.

Sen, A. (1999). On ethics and economics. *OUP Catalogue*.

Shahid, M. (2014). Impact of labour force participation on economic growth in Pakistan. *Journal of Economics and Sustainable Development*, *5*(11), 89-93.

Shrestha, M. B., & Chowdhury, K. (2005). A sequential procedure for testing unit roots in the presence of structural break in time series data.

Shrestha, M. B., & Chowdhury, K. (2005). ARDL modelling approach to testing the financial liberalisation hypothesis.

Sinha, D. (1998). Government expenditure and economic growth in Malaysia. *Journal of Economic Development*, *23*(2), 71-80.

Sinha, D. (1998). Government expenditure and economic growth in Malaysia. *Journal of Economic Development*, *23*(2), 71-80.

Smith, A. (1776). An inquiry into the nature and causes of the wealth of nations: Volume One. London: printed for W. Strahan; and T. Cadell, 1776..

Smith, A. (1776). The Causes of the Wealth of Nations. *London: W. Strahan and T. Cadell*.

Smith, A. (1950). An Inquiry into the Nature and Causes of the Wealth of Nations,(1776).

Smith, A. (1950). An Inquiry into the Nature and Causes of the Wealth of Nations,(1776).

Solow, R. M. (1957). Technical change and the aggregate production function. *The review of Economics and Statistics*, 312-320.

Stock, J. H., & Watson, M. W. (1988). Testing for common trends. *Journal of the American statistical Association*, *83*(404), 1097-1107.

Stock, J. H., & Watson, M. W. (1988). Variable trends in economic time series. *Journal of economic perspectives*, *2*(3), 147-174.

Stock, J. H., & Watson, M. W. (1988). *A probability model of the coincident economic indicators* (No. w2772). National Bureau of Economic Research.

Sunde, T. (2017). Education expenditure and economic growth in Mauritius: An application of the bounds testing approach.

Sunde, T. (2017). Foreign direct investment, exports and economic growth: ADRL and causality analysis for South Africa. *Research in International Business and Finance*, *41*, 434-444.

Tomić, Z. (2015). Analysis of the impact of public education expenditure on economic growth of European Union and BRICS. Economic analysis, 48(1-2), 19-38.

Tomić, Z. (2015). Analysis of the impact of public education expenditure on economic growth of European Union and BRICS. *Economic analysis*, *48*(1-2), 19-38.

Turan, G., & Seni, D. (2014). The effect of trade openness on economic growth: Albanian case. *Academic Journal of Interdisciplinary Studies*, *3*(3), 193-193.

Twumasi, R. A. (2012). *The impact of fiscal policy on economic growth in Ghana* (Doctoral dissertation).

Wagner, A. (1883). *Finanzwissenschaft* (Vol. 4, No. 1). CF Winter.

Wagner, A. (1890). *Finanzwissenschaft* (Vol. 4). CF Winter.

Wagner, A. (1892). *Grundlegung der politischen Ökonomie* (Vol. 1). CF Winter'sche verlagshandlung.

Wagner, R. (1893). *Richard Wagner's Prose Works* (Vol. 2). K. Paul, Trench, Trübner & Company, Limited.

Wang, Y., & Liu, S. (2016). Education, human capital and economic growth: Empirical research on 55 countries and regions (1960-2009). *Theoretical Economics Letters*, *6*(2), 347-355.

World Bank Group. (2013). *Global financial development report 2014: Financial inclusion* (Vol. 2). World Bank Publications.

World Bank Group. (2016). *World development report 2016: digital dividends*. World Bank Publications.

Wu, S. Y., Tang, J. H., & Lin, E. S. (2010). The impact of government expenditure on economic growth: How sensitive to the level of development?. *Journal of Policy Modeling*, *32*(6), 804-817.

Young, A. O. (2018). Impact of Labour Force Dynamics on Economic Growth in Nigeria: An Empirical Analysis Using ARDL Bound Testing Approach.

APPENDICES

APPENDIX A

Table 1: Descriptive Statistics

Vari.	GDPPC	INV	LF	TE	SE	PE	TOT	OPEN	INFL
Mean	821.785	18.126	8.290	88.1338	90.8630	91.33789	139.7675	62.881	29.4375
Median	408.635	19.86	8.18	88.7475	91.0146	91.01463	130.615	67.485	18.13472
Maxi.	2345.39	30.05	12.92	100.885	100.885	100.8857	209.52	116.05	122.874
Min.	258.47	2.25	4.21	73.1246	73.12462	78.48702	89.22	6.32	3.030303
Std.D.	677.551	7.99499	2.316	7.96908	7.35904	5.761306	34.325	28.042	27.6631
Skew.	1.07164	-0.3956	0.2797	-0.35041	-0.65868	0.6586876	0.3508	-0.3059	2.14435
Obs.	40	40	40	40	40	40	40		40

Source; Author's computation using E-views econometric software.

APPENDIX B

Table 2: Augmented Dickey Fuller (ADF) Test Result

Levels			First Difference			
Variables	ADF Statistics	Lag	Variables	ADF Statistics	Lage	I(0)
GDPPC	0.640 [0.9886]	3	Δ*L*GDPPC	-2.709 [0.000]***	3	I(1)
INV	-2.258 [0.1859]	3	Δ*L* INV	-2.899 [0.0455]**	3	I(1)
LF	1.825 [0.9984]	3	Δ*L* LF	-3.326 [0.0138]**	3	I(1)
TE	-1.906 [0.3294]	3	Δ*L*TE	-4.553[0.0002]***	3	I(1)
SE	-1.846 [0.3577]	3	Δ*L*GEX	-3.327 [0.0137]**	3	I(1)
PE	-2.809 [0.0570]	3	Δ*L* PE	-3.966[0.0006]***	3	I(1)
TOT	-1.249 [0.6522]	3	Δ*L*TOT	-3.761 [0.003]***	3	I(1)
OPEN	-2.350 [0.1564]	3	Δ*L* OPEN	-3.136 [0.0240]**	3	I(1)
INFL	-6.285[0.0000]***	3	–	–	3	I(0)

Source: Author's computation using E-views econometric software.

APPENDIX C

Table 3: LAG LENGTH SELECTION FOR THE MODEL

Lag	LogL	LR	FPE	AIC	SC	HQ
0	132.3821	NA	1.82e-12	-7.164691	-6.853621	-7.057310
1	375.0709	374.4342	3.02e-17	-18.23262	-15.74407*	-17.37357
2	443.4389	78.13488*	1.42e-17	-19.33937	-14.67332	-17.72865
3	517.7055	55.16942	1.04e-17*	-20.78317*	-13.93964	-18.42078*

Source: Author's computation using E-views econometric software.

APPENDIX D

Table 4: Results of Bound F Test for Co-integration

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Lag Length	Significant Level.	I(0)	I(1)
F-statistic	9.738677	3	10%	2.12	3.23
			5%	2.45	3.61
			2.5%	2.75	3.99
			1%	3.15	4.43

Source: Author's computation using E-views econometric software.

APPENDIX E

Table 5: Long Run Coefficients

Dependent Variable (LGDPPC)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
*L*INV	0.30929	0.0800	3.8645	0.0001
*L*LF	0.67307	0.2278	2.9521	0.0028
*L*TE	0.2109	0.0409	5.1496	0.0005
*L*SE	0.0726	0.0170	4.2561	0.0000
*L*PE	0.0556	0.11931	0.466	0.6477
L TOT	0.36563	0.05844	6.2561	0.0000
LOPEN	0.601714	0.114118	5.272714	0.0002
LINFL	-0.134240	0.054883	-2.445941	0.0308
C	-962.87430	1021.86949	-0.942	0.36007

Source: Author's computation using E-views econometric software.

APPENDIX F

Table 6: Short Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LINV)	0.007930	0.002992	2.645245	0.0073
D(LINV(-1))	-0.135892	0.100986	-1.345651	0.5127
D(LLF)	0.117874	0.042568	2.769079	0.0170
D(LLF(-1))	0.037246	0.029043	1.282435	0.2239
D(LTE)	0.001641	0.000503	0.055293	0.0068
D(LSE)	0.021535	0.018093	1.190249	0.2570
D(LPE)	-0.033352	0.011211	-2.974973	0.0116
D(LTOT)	0.016911	0.00747	2.2614343	0.0027
D(LTOT(-1))	0.045699	0.016564	2.758999	0.0173
D(LOPEN)	0.023884	0.003813	6.263444	0.6251
D(LOPEN(-1))	0.150110	0.066729	2.249557	0.0440
D(LINFL)	-0.090363	0.026855	-3.364894	0.0056
D(LINFL(-1))	-0.134228	0.038595	-3.477844	0.0046
ECM(-1)	-0.482434	0.116523	-3.168011	0.0081

Cointeq = LGDPPC - (0.30929*LINV + 0.67307*LLF +0.2109*LTE + 0.0726*LSE + 0.0556*LPE + 0.36563*LTOT + 0.601714*LOPEN + 0.134240**LINFL* -- 962.8730)

Source: Author's computation using E-views econometric software.

APPENDIX G

Table 7: Results of Pair-wise Granger Causality Tests

Null Hypotheses	F-Stats.	Prob.	Remarks
LNGDPPC does not Granger Cause LEXEDU	2.5485	0.04044	H_0 Accepted
LNEXDU does not Granger cause LGDPPC	1.4523	0.2357	H_0 Rejected

Source: Author's computation using E-views econometric software.

APPENDIX H

MODEL STATBILITY

Table (9); Results of the Heteroscedaticity and Serial Correlation Test.

Heteroscedasticity Test: Breusch-Pagan-Godfrey Null Hypothesis: No Heteroscedasticity

F-statistic	1.702458	Prob. F(22,12)	0.1707
Obs*R-squared	26.50727	Prob. Chi-Square(22)	0.2305
Scaled explained SS	1.648738	Prob. Chi-Square(22)	1.0000

Breusch-Godfrey Serial Correlation LM Test: Null Hypothesis: No Serial Correlation

F-statistic	1.564676	Prob. F(2,10)	0.2563
Obs*R-squared	8.342172	Prob. Chi-Square(2)	0.0154

Source: Author's computation using E-views econometric software.

APPENDIX I

MODEL STATBILITY

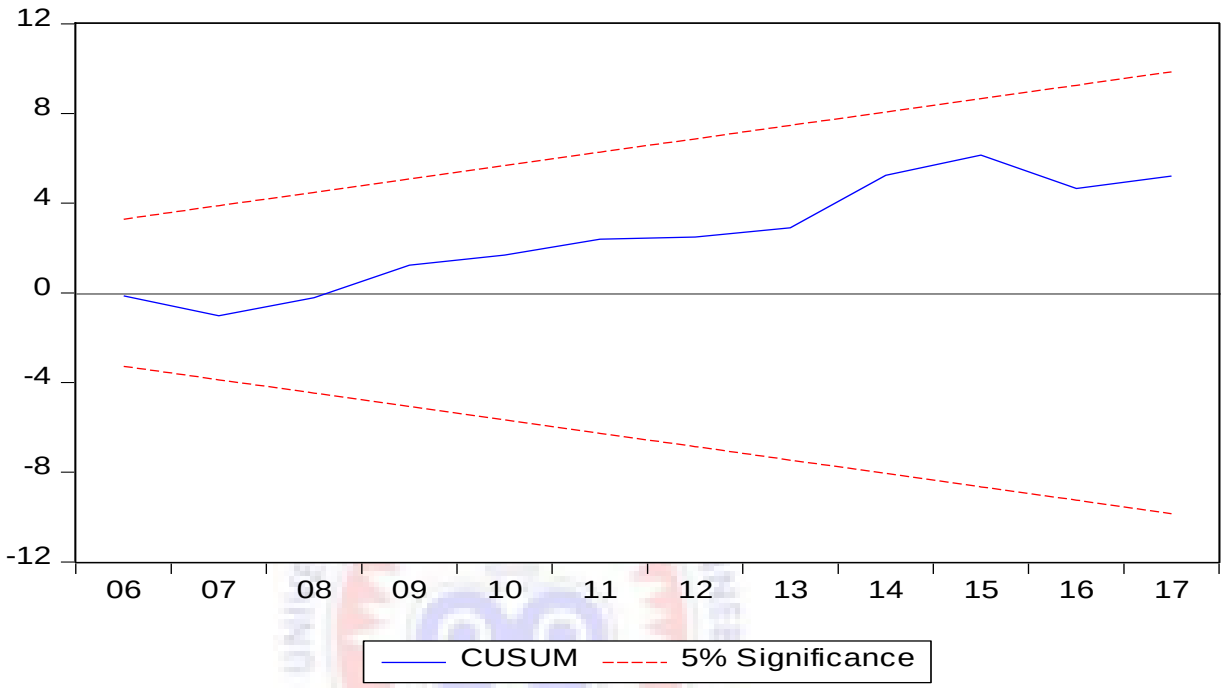


Figure 1: Plot of Cumulative sum of square of recursive residuals for ARDL model

Source: Author's computation using E-views econometric software.

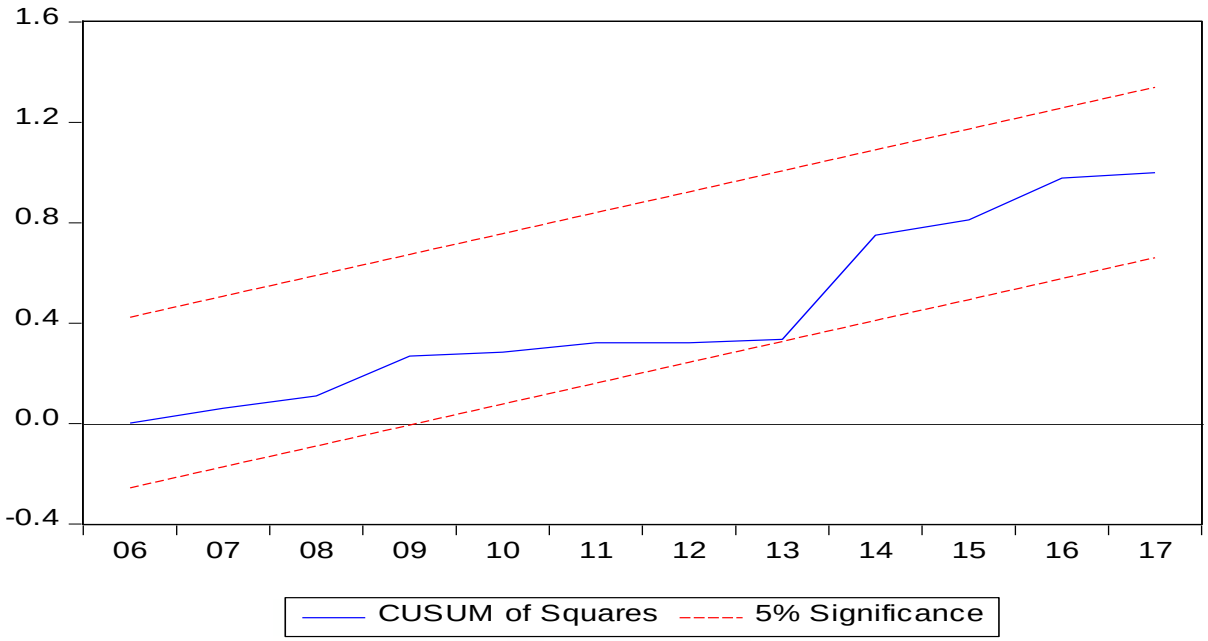


Figure 2: Plot of Cummulative Sum of Recursive Residuals for ARDL Model

Source: Author's computation using E-views econometric software.