

**PUBLIC SPENDING AND ECONOMIC GROWTH IN ZAMBIA  
– AN ECONOMETRIC ANALYSIS**

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By

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## **ABSTRACT**

The importance of understanding the relationship between fiscal policies and economic growth has inspired many scholars to investigate the underlying relationship between these variables. In Zambia the growth in public expenditure has become a topical issue in the light of escalating debt levels and widening budget deficit; as a result, the government is constantly under pressure to borrow to cover the deficit.

The aim of this study was to analyze the effect of government expenditure on economic growth in Zambia. The study used secondary data which was sourced from the Zambian Ministry of Finance and World Bank websites for the period from 1991 to 2015. The data was analyzed using E-Views 9.5 student version. The econometric tools used to analyze the data are the Autoregressive Distribution Lag (ARDL) and the Pairwise Granger Causality Test. The variables included in the research are public expenditure and economic growth. Both variables were stationary at first difference.

Empirical finding from the study indicates that there is a positive and significant relationship between public expenditure and economic growth in Zambia both in the short-run and the long-run. Further, Granger causality test demonstrated a unidirectional causality from public expenditure to economic growth. This finding validated the fact that the Zambian fiscal environment is aligned to the Keynesian theory as opposed to Wagner's Law.

In essence, the study recommended more allocation of resources towards public expenditure, including exploiting public-private partnerships as a way of increasing expenditure towards social sectors and infrastructure without necessarily increasing the strain on government resources.

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## **GLOSSARY OF TERMS**

ADB	Asian Development Bank
AfDB	African Development Bank
CASSE	Centre for the Advancement of the Steady State Economy
CEA	Council of Economic Adviser
GDP	Gross Domestic Product
GDI	Gross Domestic Income
GRZ	Government of the Republic of Zambia
HIPC	Heavily Indebted Poor Countries
IMF	International Monetary Fund
MGI	McKinsey Global Institute
OCED	Organization for Economic Co-operation and Development
SAP	Structural Adjustment Programme
WB	World Bank



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# **1. INTRODUCTION**

## **1.1 Research Area**

According to the World Bank (2009, 1), ‘an effective state is vital for the provision of goods and services – and the rules and institutions – that allow markets to flourish and people to lead healthier, happier lives.’ For this reason governments play a significant role in economic affairs of every state through spending, regulating and enterprising, governments do this for three fundamental reasons, (1) to uphold the framework of the economy, (2) for allocative efficiency, to correct market failure and (3) on grounds of equity, that is, for the sake of fairness or the reduction of excessive poverty (Ross, Forsyth and Huq, 2009). To play this role governments mobilize resources through taxes, fees, commissions and debt to meet its obligations to the citizens.

Sustainable economic growth and development are macroeconomic objectives that are pursued by all nations (Garba and Abdullahi, 2013). In pursuing this objective most developing countries use public expenditure as the main instrument in promoting economic growth (Musaba, Chilonda and Matchaya, 2013). In their quest for economic growth and development, governments particularly those in developing countries have resorted to spending more than the revenue that they generate. To illustrate the point, in the year 2000 Zambia’s total public expenditure was around 33% of GDP and its external debt was US\$6.3 billion. In the same year Zambia reached the decision point under Enhanced Heavily Indebted Poor Country (HIPC) initiative which resulted in substantial debt relief. In 2006, at the completion point of the initiative, Zambia’s external debt was around US\$600 million (AfDB/OECD, 2003). By 2015 Zambia’s total public expenditure as a percentage of GDP was at 24.6%, however, government external debt by the end of August 2015 had again risen to US\$6.3 billion (GRZ, 2016). The seemingly lower percentage of government expenditure compared to GDP in 2015 can be attributed to the rapid growth in GDP which was recorded between 2005 and 2014 at an average rate of 6.8% per annum (IMF, 2016).

Zambia's public expenditure figures have grown by 349% from K9,042 million in 2007 to K40,640 million at year end in 2014 (IMF, 2015). Over the same period, Zambia's total public debt grew by 200% from US\$3 billion in 2007 to around US\$9 billion by July 2015 (GRZ, 2015). As a percentage of GDP, Zambia's total public debt has increased from 20.6% in 2011 to 35.1% at year-end 2014 (IMF, 2015). This picture is not unique to Zambia, according to Mckinsey Global Institute (MGI) (2015), since 2007 global government debt has grown by US\$25 trillion from US\$33 trillion in 2007 to US\$58 trillion in 2014. MGI (2015, 1) further states that 'there are few indicators that the current trajectory of raising leverage will change, especially in light of diminishing expectation of economic growth.' Zambia's situation is worsened due to inadequate copper production at the moment as a result of low demand for the commodity resulting in low prices on the international market and electricity generation constraints. Copper has been and remains the key revenue earner for Zambia, this is despite challenges associated with taxation for the industry regarding achieving appropriate levels of taxation that balance the needs of the government and also promotes investment in the sector. There are also challenges in the effective administration of tax revenue (UKAID, World Bank, 2011).

The rise in public expenditure has been across developing countries, in 1960 public expenditure was below 15% of GDP (World Bank, 1992), by close of 2002 expenditure had risen above 32% of GDP (Fan and Saurkar, 2003). This growth in expenditure comes at a cost. In order to facilitate growth in expenditure, governments increase taxes, fees, commissions and in most cases contract additional debt. Mitchell (2005) argues that '*high taxes discourage productive behavior, borrowing may lead to higher interest costs and inflation debases a nation's currency resulting in widespread economic distortions.*'

Given the above statements, it seems the rise in public spending is meant to spur economic growth. Mitchell (2005) argues that advocates of bigger governments spending claim that '*government programs provide valuable public goods such as education, health and infrastructure.*' Further, Shonchoy (2010) also states that large

public expenditure in health, education and public infrastructure increases economic growth which has an impact on social welfare and poverty reduction. Proponents of higher government spending claim increased government expenditure can boost economic growth by putting money into people's pockets. This too is the commonly held belief among the Keynesian economist that more public spending increases demand which results in economic growth. This argument provides grounds for this research to examine whether the behavior of the Zambian public expenditure and economy as a whole can be hinged on Keynesian economic theory.

## **1.2 Problem Statement**

The intention of this study was to determine the effect of public spending on economic growth in Zambia. Many similar studies have been conducted a few on African countries (Kweka and Morrissey, 2000; Jung and Thorbeeke, 2001 and Garba and Abdullahi, 2013) but most of them have focused on European and Asian countries (Li and Liang 2010; Soli, Harvey and Hagan, 2008; Dipietro and Anoruo, 2012 and Ahmad, 2014. However, as argued by Mitchell (2005); Muthui, Kosimbei, Maingi and Thuku (2013) literature from these studies reveals no consensus on the impact of government spending on economic performance. Nevertheless, these studies have provided insightful sources of economic growth. Consequently, it is worthwhile to explore the effect of government expenditure on economic growth on a developing country like Zambia, which has gone through Structural Adjustment Programme (SAP) and also benefited from debt write-off through the HIPC completion point.

As argued by Ogbuagu (2015) understanding the relationship between fiscal policies and economic growth has raised massive debate theoretically and empirically. Growth in public expenditure in Zambia has become a topical issue in the light of escalating public expenditure which is resulting in a widening budget deficit; as a result, the government is constantly under pressure to borrow to cover the deficit. Zambia's public expenditure has grown by 349% from K9,042 million in 2007 to K40,640 million at year end in 2014 (IMF, 2015). Over the same period, Zambia's total public debt stock has grown by 200% from US\$3 billion in 2007 to around US\$9 billion by July 2015 (GRZ, 2015).

Between 2012 and 2015 Zambia issued three Eurobonds amounting to US\$3 billion, the first bond was issued in April 2012 amounting to US\$750 million, the second was issued in June 2014 amounting to US\$1 billion and the last one was issued in July 2015 which amounted to US\$1.25 Billion. According to the Government of the Republic of Zambia, these bonds were issued to facilitate infrastructure development in road, energy, health and water, education and transport sectors. On the other hand, public concern is that the government has excessively borrowed within a short period of time and there is a belief that government expenditure has been excessive. Zambia is a beneficiary of debt write-off through the HIPC completion point incentive under World Bank and IMF. Through this initiative, Zambia's debt was reduced to almost zero.

However, on the other hand, government's view is that more public spending will result in economic growth, as the government builds roads, schools, hospitals and as more people benefit from the social welfare programs (GRZ, 2014). This view is backed by the Keynesian economists who postulate that an increase in fiscal spending stimulates demand that leads to economic growth. Government expenditure is presumed to be a veritable tool for economic growth and development (Uchenna and Evans, 2012). According to Nworji, Okwu, Obiwuru and Nworji (2012, 4), 'in the Keynesian model, an upward adjustment in government expenditure results in higher economic growth. On the contrary, the neo-classical economist's view is that government fiscal policy does not have any effect on the growth of national output'. Mitchell (2005) also argues that the excessive growth of the American public spending in the last couple of years has negatively impacted on America's economic growth.

Given the concerns raised above, this study will attempt to evaluate the relationship between public spending and economic growth and in a way validate or dispute the Keynesian theory in relation to Zambian public spending.

### **1.3 Purpose and Significance of the Research**

The purpose of the study is to develop a detailed understanding of the impact of public expenditure on economic growth in Zambia. This study used aggregate government

expenditure as opposed to disaggregate expenditure. For the purpose of understanding the impact of public expenditure on economic growth, aggregate public expenditure is appropriate as it is sufficient to give a picture of the impact on economic growth. This study serves as a first step in understanding the existence of co-integration between public expenditure and economic growth in Zambia. However, disaggregate expenditure is important in follow-up studies which are meant to establish which specific sector expenditures generate a positive and significant contribution to economic growth and which one have a negative impact. Therefore, it is hoped that the knowledge from this study will help stir further research in this area of study and will also help fiscal policy formulators to have a detailed understanding of the effect of public spending on economic growth in Zambia and possibly influence the levels of spending.

This study will contribute to the body of knowledge by making known the effect of public expenditure on economic growth in Zambia. The knowledge of the effect of public expenditure on economic growth is very important as it helps achieve targeted expenditure which results in economic growth. Most public expenditure is undertaken with a view to attaining economic growth, but without evidence of the effects of public expenditure on economic growth such decisions to spend or increase expenditure are speculative. Therefore, this study will make a significant contribution to the Zambian fiscal policy formulation by informing it of the effects of public expenditure on economic growth.

Furthermore, this research utilized the most recent data and employed both descriptive analysis and more advanced econometric techniques to study the effect of public expenditure on economic growth in Zambia.

Prior to this research, Jung and Thorbeeke (2001) conducted a study where they examined '*the impact of public education expenditure on human capital, growth and poverty in Tanzania and Zambia.*' The rest of the known studies that covered Zambia examined a number of other countries in a single study such as the study conducted by Fan and Saurkar (2003) which examined data from 17 developing countries. Therefore,

this study will add to the contribution of the earlier known studies. Suffice to mention that there are *'very few studies on this subject that have been conducted on African countries especially the sub-Saharan countries'* (Odhiambo, 2015).

Over the last ten years, Zambia's public expenditure has massively expanded and this is not unique to Zambia. Yu, Fan and Magalhaes (2015) observed growth in public expenditure in 147 countries that they studied between 1980 and 2010. In most countries, the growth in public expenditure is financed through debt. As a result, this debt increases future public expenditure through debt servicing. This necessitates the need to determine whether there is a relationship between public spending and economic growth and whether the Zambian public expenditure policy can be hinged on the Keynesian theory.

The debate on the effects of government expenditure on economic growth has raged on for many years and still attracts a lot of interest because of the importance of the subject. This study is seeking to contribute to the existing body of knowledge by providing insights into the effect of public expenditure on economic growth on a developing country, Zambia, which underwent an IMF and World Bank Structural Adjustment Programme and also benefited from debt relief.

#### **1.4 Research Questions, Objectives and Hypothesis**

The ultimate goal of this research is to examine the effect of public spending on economic growth in Zambia between 1991 and 2015. On 17<sup>th</sup> December 1990, article 4 of the Zambian constitution was repealed to pave way for reintroduction of multi-party politics which culminated in the elections of 1991 where the Movement for Multi-party Democracy (MMD) was elected into power. This also marked a transition for Zambia from a command to a liberalized economy. As a result, the country benefited significantly from favorable donor support and also won the support of the World Bank and IMF which culminated into debt relief. In the following years, the government aggressively embarked on massive infrastructure development which has resulted in a

corresponding growth in public expenditure. This growth in public expenditure has mainly been financed by external debt as evidenced by the rise in the external debt stock.

In summary, there is a need for better understanding of the relationship between public spending and economic growth. More specifically, the following research questions need to be addressed;

1. What is the effect of public expenditure on economic growth in Zambia?
2. What sought of relationship exists between public expenditure and economic growth in Zambia?

The exploration of the above research questions leads into the following research aims;

1. To determine the effect of public expenditure on economic growth in Zambia.
2. To establish the short run and long run relationship between public spending and economic growth.
3. To analyze the direction of causality between public expenditure and economic growth in Zambia.
4. To highlight pertinent practical findings related to public expenditure and economic growth in Zambia that will assist policy-makers and key sector role-players with decision making.

The above aims feed into the following research objectives;

1. To run a regression equation which will determine whether there is co-integration between public expenditure and economic growth in Zambia?
2. To run Augmented Dickey-Fuller test to established the order of integration of the variables under research and determine the appropriateness of subsequent tests



3. To run an error correction model (ECM) and autoregressive distributive lag (ARDL) test to determine the long run and short run relationship between public spending and economic growth in Zambia.
4. To run Pairwise Granger causality test to determine which of the two, namely public expenditure or economic growth Granger causes the other in Zambia.
5. To formulate a framework that will facilitate the decision-making processes of policy-makers and key sector role-players in Zambia.

❖ **RESEARCH HYPOTHESIS**

$H_0$  : There is no relationship between public spending and economic growth.

$H_1$  : There is a relationship between public spending and economic growth.

## **1.5 Research Scope and Assumptions**

This subject of examining the impact of public spending on economic growth is quite wide and complex. It takes many dimensions i.e. some scholars have looked at a number countries in a single study, others have examined a single country, case study approach, yet others also examined the impact of total public spending on economic growth, while others examined the impact of sector spending on economic growth. Further, these studies have also been conducted in different time periods.

This study will examine the effect of total public expenditure on economic growth in Zambia and the study will examine data for the period 1991 to 2015. In order to ensure the credibility of the research data and findings, this research only used data from post liberalization Zambia. Prior to 1991, the Zambian economy was run on socialist principles. The selected research period (1991 – 2015) will still guarantee a large sample size of data which will not compromise the research tests. Further, this research will rely on aggregate data on public expenditure and annual GDP figures.

Though care will be taken by treating the data to eliminate some distortions, this study assumes the accuracy of the data on account of the sources.

## **1.6 Conclusion**

This chapter introduced the subject under study by providing a background to the study. Increasing levels of government spending and debt were highlighted and the reasons behind this increase were also mentioned. The increase in spending is ideally meant to spur economic growth; however, many studies done in this area have different and conflicting conclusions. Therefore, this study will attempt to explain the causal effect of government expenditure on economic growth in Zambia. This chapter also showed how this study will contribute to the body of knowledge by examining the effect of public expenditure on economic growth in Zambia with data drawn from 1991 to 2015. The significance of this study has been outlined and arising from the research question, aims and objectives, the research has come up with a null and alternative hypothesis. This chapter concluded with the research scope and assumptions.

The structure of the rest of the report will be as follows; Chapter two highlights the current thinking around the subject under consideration in this research. This will be achieved through a thorough review of the current academic literature on the subject under research. Chapter three outlines the research methodology that will be used to investigate the research question. Chapter four will present and analyze the research findings. Chapter five will sum up all the work contained in this study and will provide recommendations based on findings and gaps contained in this study. Therefore, this chapter will rely on the previous chapter to draw the conclusions that arise from this exploration.

## **2. LITERATURE REVIEW**

### **2.1 Introduction**

Many studies have been conducted around government spending; however, currently there appear not to be any consensus on what should be the conclusive impact of public spending on economic growth. Mitchell (2005) argues that at the moment economic theory does not generate strong conclusions on the impact of government spending on economic performance. He further argues that there are indications of circumstances where less government spending will enhance economic growth and other circumstances where higher levels of government spending would be desirable. This can also be partially explained by budget implementation challenges particularly faced by low-income countries as explained by Olomola cited by Oniore (2014), that the budget process has always been faced with great challenges. The most visible of these challenges are associated with budget implementation. The most common being about non-release, partial release and delays in releasing approved funds for budget expenditure. It has also been well observed that a quarter to which funds are related may end before the related funds are made available. This has a negative implication for institutional planning and management as well as the overall impact of the budget on development and economic growth. This point is supported by Dabla-Norris, Allen, Zanna, Prakash, Kvintradze, Iledo, Yachovlev and Gollwitzer (2010) as they argued that sustainable and credible fiscal framework depends on the budget being implemented as approved, which in turn is determined by the realism of the underlying economic and fiscal projections, the extent to which the budgetary cost of policy decisions are taken into account, and the effectiveness of arrangements for overseeing and monitoring the budget process. In the absence of such conditions, the discrepancy between planned and actual spending can potentially be large, thereby undermining both fiscal discipline and the credibility of the budget as a statement of government intent. These challenges and inadequacies tend to distort the ultimate outcomes of spending objectives in many cases.

Mitchell (2005) further states that economic activity is very low or non-existent where there is no government presence, but it jumps dramatically as key functions of government are introduced and financed. At this point, the benefits of government

expenditure outweigh the costs. He further argues that at some point government spending becomes a burden, either because government becomes too huge or because outlays are misallocated or challenges and inadequacies highlighted above begin to manifest. In such cases, the cost of government exceeds the benefits.

## **2.2 Theoretical Background**

The size of government spending and its impact on long-term economic growth and the reverse have been topical for more than a decade now. Many studies have analyzed the relationship between government spending and economic growth and how they impact on each other and observed contrasting results from these studies. Therefore, the future still holds hope in a formalized relationship between government spending and economic growth, or a better explanation of the causes of the variation in these research results.

This inter-relationship between public expenditure and economic growth is largely explained by two theories i.e. Wagner's law and Keynesian hypothesis. Wagner considers public expenditure as the endogenous factor that is caused by economic growth by contrast the Keynesian theory considers public expenditure as the exogenous factor that causes Economic growth. According to Bagdigen and Cetintas (2004) Wagner's law and Keynesian theory present two opposite views with regard to the relationship between public expenditure and economic growth. Shonchoy (2010) explains that Adolph Wagner (1835 – 1917), a German political economist, in 1883 hypothesized a well-known relationship between the growth of the economy and relative growth in government spending activities. Wagner's law is fulfilled when the share of public spending in the economy increases as economic growth progresses in response to the intensification of existing activities and extension of new activities. Wagner's law indicates that it is the economic growth that leads to an increase in government spending and not the other way round (Garba and Abdullahi, 2013). Wagner referred to this as the "Law of Increasing Extension of State Activity".

Hall (2010), states that public spending is key to economic growth and development. He argues that it is more efficient and effective compared to markets in financing infrastructure, including roads, electricity and water and other services such as health and education all necessary for modern day society.

According to Mitchell (2005) John Maynard Keynes (1883 – 1946), a British political economist, in 1935 hypothesized that government spending – particularly increases in government spending – boosted growth by injecting purchasing power into the economy. Keynes believed that the solution to unemployment is not to reduce wages and prices as advocated by classical economist, but to increase consumption through the spending of money by the government. According to Keynes government can reverse economic downturns by borrowing money from the private sector and then returning the money to the private sector through various spending programmes. The greatest limitation of the Keynesian theory is its inability to consider the problem of inflation which might be brought about by increased government spending (Muthui et al., 2013).

As explained above Wagner’s Law and Keynesian theory present two opposite directional relationship between government spending and economic growth. As a result studying the causal relationship between government spending and economic growth has had a sustained interest over the last years. It is not surprising therefore that many studies have analyzed this relationship between government spending and economic growth and their effect on each other and there still is not a commonly held conclusion.

### **2.3 The Impact of Sector Spending on Economic Growth**

Most studies that have been conducted to examine the sector impact on economic growth have used functional classification of expenditure. According to Galbraith (2000), most governments classify their expenditure by functional classification so that comparison of major activities over time can be made even as underlying programs and agencies change. Further, functional classification enables analysis of expenditure trends and also enables comparison with the expenditure of other governments. This section of the literature review is focused on studies that have analyzed the impact of expenditure

by sectors on economic growth. Most of the studies that were reviewed in this section of literature review classified expenditure into the following classes; education, health, agriculture, defense, infrastructure, general administrative, recurrent and capital expenditures. However, they all examined the impact of sector expenditure against economic growth as the dependent variable.

Li and Liang (2010) conducted a study in East Asia and found that the impact of public education expenditure on economic growth was a little 'fragile'. The statistical results showed that the statistical impact of health on economic growth is stronger than that of education. Given the results, it makes more sense to invest more in health than education human capital. Li and Liang used panel data set from 1961 to 2007, the study covered East Asia economies including China.

The findings in the study by Li and Liang (2010) are important to this study as they inform this study of the impact of educational expenditure on East Asian economies. Further, Li and Liang (2010) found that health expenditure had a more significant effect on the East Asian economies compared to education expenditure. However, Li and Liang used panel data set from 1961 to 2007, in contrast, this study used time series data from 1991 to 2015. While this study is focused on Zambia and will analyze the whole government expenditure impact on economic growth, Li and Liang's study focused on health and education expenditure in East Asia.

A study by Nworji, Okwu, Obiwuru and Nworji (2012) on effects of public expenditure on economic growth in Nigeria found that a relationship exists between government expenditure and economic growth, and that while some sections of government spending exerted a negative effect on growth and others exerted a positive effect. Expenditure on economic services had insignificant negative effects on economic growth. Capital expenditure on transfers had an insignificant positive effect. However, capital and recurrent expenditure on social and community services and recurrent expenditure on transfers had significant positive effect on economic growth. The study examined data between 1970 and 2009, the time series data analyzed included gross domestic product

(GDP) and government expenditure. The analysis was based on the regression model. The findings by Nworji et al. do not support the findings of an earlier study by Soli, Harvey and Hagan (2008) where they deduced that government capital spending has a negative influence on economic growth, but instead, government recurrent expenditure has a positive effect, though not immediately but after two years.

The study by Nworji, et al. (2012) has significance to this study as it informs this study of the impact of various sector expenditures on economic growth as a whole. It also highlights the fact that some sectors have positive and others have a negative impact on economic growth. Further, Nworji et al.'s study is based on an African country like Zambia and used time series data set from 1970 to 2009 as this study will also use time series data from 1991 to 2015.

Another study by Kweka and Morrissey (2000) on government spending and economic growth in Tanzania, found that increased productive expenditure (physical investment) appears to have a negative impact on growth, however, consumption expenditure was found to have a positive effect on growth, especially private consumption. On the other hand, expenditure on human capital investment was found to be insignificant in the regression probably because any effects would have very long lags, however, this is contrary to the findings by Jung and Thorbeeke (2001) who found that public education spending had a positive impact on economic growth. The study confirmed the view that public spending in Tanzania was not productive mainly due to unfavorable macroeconomic conditions. Kweka and Morrissey concluded by stating that it should not be presumed that public spending is growth-promoting. They examined data for a period 1965 to 1996 and used regression model.

Kweka and Morrissey (2000) also highlighted the fact that some sector expenditure have positive and others have a negative impact on economic growth. Kweka and Morrissey's most important contribution lies in their assertion that it should not be presumed that public spending is always growth promoting. This point is at the core of this study which is investigating the effect of public spending on economic growth in Zambia. Kweka and

Morrissey study was based on Tanzania and used time series data for a period 1965 to 1996.

Carter, Craigwell and Lowe (2013) found that government expenditure on education typically has a significant and negative impact on economic growth, both in the short and long run, while health and social security spending had little influence on per capita economic growth. These findings on the effects of human capital expenditure are contrary to the finding by Kweka and Morrissey (2000). However, Carter et al, also found total government spending to produce a drag on economic growth, particularly in the short run, with a much small impact over time. This study also concluded that reallocation of government spending from one function to another may have growth enhancing effects without having to change the level of government spending. This study used the Dynamic Ordinary Least Squares and the Unrestricted Error Correctional Model to analyze time series data from Barbados spanning from 1976 to 2011.

They study by Carter et al. (2013) though it examined the sectors expenditure impact; it also examined the impact of total government spending on economic growth. Further, the study by Carter et al. also provided insights into growth-enhancing effects of expenditure reallocation. Though Carter et al. used Dynamic Ordinary Least Squares and the Unrestricted Error Correctional Model to analyze time series data from Barbados spanning from 1976 to 2011; this study will use ADF, ECM, ARDL and Pairwise Granger causality tests to analyze time series data from Zambia for a period 1991 to 2015.

Acosta-Ormaechea and Morozumi (2013) also examined the impact of public expenditure reallocation on economic growth and found that the reallocation involving a rise in education spending has a positive and statistically robust effect on growth, when the compensating factor remains unspecified, or when this is associated with an offsetting reduction in social protection spending. The study also found that public capital spending relative to current spending appears to be associated with higher economic growth. This study was based on IMF's GFS yearbook dataset for the period



1970 – 2010 and 56 countries were considered. The analysis used dynamic panel GMM estimators.

The study by Acosta-Ormaechea and Morozumi (2013) is important in as far as it supports the concept of expenditure reallocation as an economy growth enhancer, though this study is focused on the impact of total government spending on economic growth. Nevertheless, studies by Acosta et al. and Carter et al. could provide valuable insights depending on the findings of this research, as recommendations could be made for future research on Zambia to consider sector impact and examine expenditure reallocations.

Sennoga and Matovu (2010) examined the interrelationship between public expenditure composition and Uganda's development goals including economic growth and poverty reduction. The study demonstrated '*that public spending composition does indeed influence economic growth and poverty reduction*' (Sennoga and Matovu, 2010). To be more specific this study found that improved public sector efficiency coupled with re-allocation of public expenditure away from unproductive sectors such as public administration and security to the productive sectors including agriculture, energy, water and health leads to higher GDP growth rates and accelerates poverty reduction. Additionally, the rate of poverty reduction is faster among rural households compared to urban households. The major contribution of this study is that investing in agriculture particularly in value addition and investing in complementary infrastructures such as roads and affordable energy contributes to higher economic growth rates and accelerates poverty reduction. This study used a dynamic CGE model to analyze this interrelationship.

The key finding in this study by Sennoga and Matovu (2010) is that public spending composition does influence economic growth. However, Sennoga and Matovu's study is based on Uganda and used dynamic CGE model to analyze the interrelationship between sector impact on among other variables economic growth as opposed to what this study

will do by using an econometric model to analyze time series data from Zambia for the period 1991 to 2015.

A study done on public spending in developing countries by Fan and Saurkar (2003) found that government spending on agriculture and infrastructure had large returns to GDP as the study by Sennoga and Matovu (2010) has shown. The study also showed that the impact of infrastructure and agriculture spending on poverty reduction was strong. However, structural adjustment programs adversely affected funding to these two sectors as also argued by Fan and Rao (2003). The study concluded by stating that performance of government spending on economic growth is mixed. In Africa and Asia, government spending on agriculture and education were particularly strong in promoting economic growth.

The study by Fan and Saurkar (2003) makes a significant contribution to this study because it informs the current study of the impact of agriculture and educational expenditure on economic growth in Africa and Asia, especially that this study is focused on Zambia which is an African country.

Yasin (2008) found that government spending on capital formation, trade-openness and private investment spending all had a positive and significant impact on economic growth. However, the study found that official development assistance and population growth rate were both statistically insignificant to economic growth, this is contrary to the findings of Garba and Abdullahi (2013). This paper examines the impact of government spending on economic growth in Sub-Saharan Africa using panel data set for the period 1987 to 1997. The data input fact was government spending, foreign development assistance, population growth and trade openness. The paper concluded by suggesting increased government spending on capital formation and the creation of a favorable economic environment for sufficient private sector investment spending.

Yasin (2008) used panel data set for the period 1987 to 1997. The data input fact (independent variable) was government spending, foreign development assistance,

population growth and trade openness. This study will use time series data from 1991 to 2015. This study and Yasin's study are similar in that they are both examining the effects of other variables on economic growth.

A study by Musaba, Chilonda and Matchaya (2013) examined the impact of government sectoral expenditure on economic growth in Malawi, using co-integration analysis in the context of error correction model. The sectors examined are agriculture, education, health, defense, social protection, transport and communication. The results of the study showed that in the short run there is no significant relationship between public expenditure and economic growth. However, in the long run, the results indicated a significant positive effect on economic growth of expenditure on agriculture and defense. The expenditure on education, health, social protection and transport and communication were negatively related to economic growth.

The study by Musaba, Chilonda and Matchaya is important to this study though Musaba et al. are examining the government sectoral impact on economic growth and this study is examining aggregate government expenditure, nevertheless, both studies are examining causality between public expenditure and economic growth and both studies are using ECM model to analyze the data and both studies are examining data from Southern African countries.

Jung and Thorbeeke (2001) examined the impact of public education expenditure on human capital, growth and poverty in Tanzania and Zambia, their results showed that education expenditure can raise economic growth. However, to maximize the benefit from education expenditure, a sufficiently high level of physical investment is needed, as are measures that improve the match between the pattern of education output and the structure of effective labour demand. Another important result of this simulation experiment is that a well-targeted pattern of education expenditure can be effective for poverty alleviation. At the time of the study both Tanzania and Zambia were classified as heavily indebted poor countries. Jung and Thorbeeke's study used data from Zambia and Tanzania and examined sector expenditure impact on economic growth while this

study is drawing data only from Zambia and is examining the impact of total expenditure on economic growth. The study by Jung and Thorbeeke is, for now, the closest study to this one, having drawn data from Zambia and having a similar dependent variable economic growth.

All the studies reviewed above are mainly similar to this study in the sense that they have their dependent variable as economic growth; however, they use various sector expenditures as sole or multiple independent variables. The bulk of the studies considered the following as their independent variables; education, health, agriculture, infrastructure, recurrent and capital expenditures. However, these studies do not show a whole picture of total public spending and this is the contribution of this study by using total public spending as the independent variable. Nevertheless, these studies are important in as far as helping to inform policymakers as to which sectors have a greater impact in stimulating economic growth. However, it is important to bear in mind that again in this sphere, there is no consensus from the many studies done on which sector yields more economic growth. Further, some sectors impact is negative while other sector impact is positive while some impacts are significant and others are insignificant. More studies must be done to help shape policy.

#### **2.4 The Impact of Total Spending on Economic Growth**

A study by Bagdigen and Cetintas (2004) analyzed data from Turkey for the period between 1965 and 2000 and used econometric techniques to analyze the causal relationship between public expenditure and economic growth. The study found no causality from either direction in their study. In Bagdigen and Cetintas' study, public expenditure is the dependent variable. The study used co-integration test and Granger causality test and concluded that neither Wagner's Law nor Keynes hypothesis is valid for the Turkish case. Though Bagdigen and Cetintas are using the same variable as this study, this study is using public expenditure as the independent variable while Bagdigen and Cetintas used public expenditure as the dependent variable. However, both studies are employing econometric tools of analyses.

A study by Sevitenyi (2012) analyzed the relationship and direction of causality between government expenditure and economic growth in Nigeria using annual data from 1961 to 2009. The variable government expenditure was total government expenditure at the aggregate level and total recurrent expenditure, total capital expenditure, administration, social and community services, economic services and transfers were at disaggregate level. This study employed an econometric methodology and used co-integration and Toda-Yamamoto Granger Causality test. From the Augmented Dickey-Fuller (ADF) test the study found that the variables were non-stationary at level, but become stationary at first difference. From Toda-Yamamoto causality test the study found unidirectional causality running from total government expenditure to economic growth thereby supporting the Keynesian hypothesis. At the disaggregate level, the research found all variable except total recurrent expenditure to cause economic growth.

The study by Sevitenyi is important to this study because both studies are examining the same variables i.e. public expenditure and economic growth and use a similar data set which is time series data. Further, both studies employed econometric methodology and both examined data from African countries. However, this study is examining data for twenty-five years while Sevitenyi examined 48 years data.

Garba and Abdullahi (2013) also investigated the causal relationship between public expenditure and economic growth in Nigeria and used Johansen co-integration approach and the Granger causality test. Their results indicated a significant long run positive relationship between public expenditure and economic growth in Nigeria. This study also found that there is a positive long-term relationship between population growth rate and economic growth. The results of Granger causality test indicated weak significant bidirectional causality at 10% level; this was attributed to concurrent pursuing of both policies promoting sustainable economic growth and public expenditure.

The study by Garba and Abdullahi examined data from Nigeria another sub-Saharan African country like Zambia, a country this study is focusing on. Both studies are examining the same variables i.e. public expenditure and GDP except for the fact that

Garba and Abdullahi also considered the effect of population growth on GDP and use a similar data set which is time series data. However, this study is examining data for twenty-five years while Garba and Abdullahi examined 30 years data. Further, this study will also use a similar methodology and test to the one used by Garba and Abdullahi. Additionally, this study will use ARDL and ECM as replacements to co-integration test in establishing the long run and short run relationship in this study.

Egbetunde and Fasanya (2013) studied public expenditure and economic growth in Nigeria for the period 1970 to 2010 and their findings indicated that the impact of total public spending on growth was negative contrary to the finding of Nworji et al. (2012) and Garba and Abdullahi (2013). However, the study found that recurrent expenditure had little significant positive impact on growth; this particular finding is consistent with the results of a study by Nworji, et al. (2012), except for the fact that Nworji et al. were more specific with regard to which sectors recurrent expenditure was applied. This study used bound testing (ARDL) approach to examine long run short-run relation in government expenditure and growth in Nigeria.

The study by Egbetunde and Fasanya is important to this study because both studies are examining the same variables i.e. public expenditure and economic growth and use a similar data set which is time series data. However, this study is examining data for twenty-five years while Egbetunde and Fasanya examined 40 years data. Further, this study will also use a similar methodology as the one used by Egbetunde and Fasanya and both studies analyzed data from African countries.

Gangal and Gupta (2013) analyzed the impact of public expenditure on economic growth using data from India for the period 1998 to 2012. This study used annual data on total public expenditure and gross domestic product (GDP) per capita as an indicator for economic growth. Like Garba and Abdullahi (2013), Gangal and Gupta also used the co-integration test and the Granger causality test in addition to the ADF unit root test to analyze the data set. Gangal and Gupta also found that there is a positive relationship between public expenditure and economic growth. The Granger causality test found a

unidirectional relationship from total public expenditure to GDP. The study also found a positive impact of shocks from total public expenditure to GDP and vice versa.

Gangal and Gupta's study was done on India while this study is on Zambia, these two studies have some similarities; both studies are examining the same variables i.e. economic growth and GDP and uses similar data sets i.e. time series data. However, this study is examining data for twenty-five years which is a much larger data sample while Gangal and Gupta who examined 14 years data. Further, this study will also use a similar methodology to the one used by Gangal and Gupta. Further, this study will also use ARDL and ECM as replacements for co-integration test in establishing the long run and short run relationship in this study.

On the contrary, a study by Ahmad (2014) on government expenditure and economic growth found a unidirectional causality running from GDP/ GDP per capita to public expenditure thus supporting Wagner's hypothesis of increasing public sector expenditure in India. Since the study did not find any causality running from public expenditure to GDP, using public expenditure as an effective policy instrument for long run economic growth is not supported by empirical evidence in this study. This study used Engel Yoo three step co-integration method along with Augmented Dickey-Fuller (ADF) test and Engel-Granger causality test on time series annual data for Indian economy for the period 1980-81 to 2012-13.

A study by Medhi (2014) examined the relationship between government spending and GDP growth in India using annual data for the period 1974 to 2010. The study used co-integration and vector error correction mechanism and the following are the findings of the study, the study found long run equilibrium relationship between spending and growth in India. The study also found a unidirectional causality from government spending to economic growth.

Medhi (2014) and Gangal and Gupta (2013) both found a positive relationship between government expenditure and economic growth. Their studies also found causality

running from government expenditure to economic growth. However, on the contrary, Ahmad (2014) found causality running from economic growth to government expenditure. Nevertheless, all three studies Ahmad (2014), Medhi (2014) and Gangal and Gupta (2013) examined data from India and had a similar approach and strategy though their results were not identical. However, Medhi examined thirty-six years data, Ahmad examined thirty-two years data while Gangal and Gupta only used fourteen years data. Though Ahmad and Medhi's study were done on India and this study is on Zambia, these studies have many similarities as they are all examining the same variables i.e. public expenditure and GDP and uses a similar data set which is time series data. However, this study is examining data for twenty-five years while Ahmad examined 32 years data and Medhi used 36 years data. Further, this study will also use a similar methodology to the one used by Ahmad and Medhi.

Another similar study was conducted in Asia to examine the aggregate impact of public expenditure on economic growth by Lahirushan and Gunasekara (2015). The countries included in this study are Singapore, Malaysia, Thailand, South Korea, Japan, China, Sri Lanka, India and Bhutan and used data from 1970 to 2013. This data was analyzed using econometric techniques of co-integration, panel fixed effect model and Granger causality. This study had the following empirical findings; government expenditure had a positive impact on economic growth, government expenditure and economic growth indicated a long run relationship in Asian countries and finally, there is bidirectional causality between economic growth to government expenditure and government expenditure to economic growth in Asian countries. Hence, Lahirushan and Gunasekara's study validated both the Keynesian theory and Wagner's law.

The study by Lahirushan and Gunasekara is important to this study as it also employed econometric models to analyze its data. This study synchronizes the study by Gangal and Gupta (2013), Medhi (2014) and Ahmad (2014) as it validates both the Keynesian theory and Wagner's law.



Khan, Khan and Zaman (2012) also found government expenditure had a significant negative effect on real economic growth, tax receipts have a positive effect on real economic growth and the size of the budget deficit has a significant negative effect on real economic growth in Pakistan. Their study objective was to empirically investigate a two-way statistical relationship between fiscal variables (i.e. government spending and revenue and budget deficit) and economic growth by using time series data, co-integration and Granger causality test on data drawn from 1980 - 2010. The causality results moderated the conventional view that economic growth has significant long run causal effects on fiscal variables in Pakistan. Another study by Muhammad, Xu and Karim (2015) also based on Pakistan, examined time series data running from 1972 to 2013 and used ADF, Johansen co-integration test and Granger causality test and concluded that there was no relationship between expenditure and GDP in the long run. This conclusion was informed by the co-integration test. These two studies have different conclusions though they draw their data from the same country and used the same methodologies and test, with the only difference being the length of time period i.e. one study considered data for 30 years and the other considered 41 years data, nonetheless the 30 years was within the period of the 41 years study. However, both studies are significant to this study as they examine the same variables i.e. public expenditure and economic growth except that Khan et al. considered other variable in addition to public expenditure. These two studies used co-integration and Granger causality test, though Muhammad et al. also used ADF to establish the stationary properties of the variables. However, this study will also use ADF, ECM, ARDL and the Granger causality test, the ARDL and ECM will test for long and short run relationship in this study.

Eideh (2015) explored the causal relationship between public expenditure and economic growth in the Palestinian territories for the period 1994 to 2013. This study used econometric techniques to analyze time series data. The study used the ADF test to empirically investigate the stationarity properties and the order of integration of the variables. The Engle-Granger co-integration test was used to determine the long-run relationship between public expenditure and economic growth. The study also used the

Granger causality test to establish which variable causes the other. Eideh's study is also not only examining the causal effects of the same variable as this study but is also using econometric tools to analyze the data. However, Eideh's study is focusing on Palestinian territories and is analyzing 20 years data as opposed to this study which is analyzing 25 years data from Zambia

A study by Odhiambo (2015) examined causality between public expenditure and economic growth using data from South Africa and used auto-regressive distribution lag model (ARDL) – bound testing approach to examine this linkage. The empirical findings of the study showed that both public expenditure and economic growth Granger cause each other in the short run, however, in the long run, economic growth Granger causes public expenditure.

The study by Odhiambo is important to this study because both studies are examining causality between public expenditure and economic growth and both studies are using ARDL model to analyze the data and both studies are examining data from countries in Southern Africa though South Africa has a much more robust economy compared to Zambia.

Lamartina and Zaghini (2008) analyzed government expenditure on economic growth in 23 OECD countries and used panel co-integration analysis. The findings of the study indicate a structural positive correlation between public spending and per-capita GDP and they argued that this is consistent with Wagner's Law. The study found that public expenditure was being influenced by the increase in economic activities. Another study on OECD countries by Hietger (2001) also investigated the relationship between the size of government and economic growth using data from 1960 to 2000. This study observed that government expenditure on public good basically have a positive effect on growth, but this effect tends to decline or reverse when the governments become excessive by providing private goods. This study analyzed panel data from 21 OECD countries. Total government expenditure, as well as expenditure by type, indicated a significant negative impact on economic growth except for transfers and public investments. Though the

study by Lamartina and Zaghini (2008) is based on 23 countries, used panel data, the study Hietger (2001) is also based on 21 countries and also used panel data but their findings are a direct contrast to each other. However, these studies are similar to this study in that all three studies are examining the same variable i.e. public expenditure and economic growth. Further, Hietger brings out an interesting aspect of observation on what caused what should have been the positive effects of public expenditure to turn negative.

## 2.5 Summary of Empirical Studies Reviewed

**Table 2.1**  
**Studies with Disaggregate Public Expenditure**

Author(s)	Type of study (period)	Sample country(ies)	Findings
<b>Li and Liang (2010)</b>	Examined the impact of health and educational spending on GDP using panel data set 1961 -2007	East Asia	Statistical impact of health spending is stronger than that of education on economic growth.
<b>Nworji, Okwu, Obiwuru and Nworji (2012)</b>	Effects of disaggregate public spending on economic growth using time series data 1970 -2009	Nigeria	Some sections of government spending are exerting positive effects while other exert negative effects on economic growth.
<b>Kweka &amp; Morrissey (2000)</b>	Examined the impact of disaggregate public spending on economic growth 1965 – 1996	Tanzania	Productive expenditure was found to have negative effects while consumption expenditure was found to have a positive effect on economic growth.
<b>Carter, Craigwell and Lowe (2013)</b>	Examined the impact of disaggregate public spending on economic growth 1976 – 2011	Barbados	Expenditure on education has a significant and negative impact on economic growth, both in the short and long run, while health and social

			security spending had little influence on economic growth.
<b>Acosta-Ormaechea and Morozumi (2013)</b>	Examined the impact of public spending reallocation on economic growth 1970 - 2010	56 countries	The reallocation that involved a rise in education spending had a positive and robust effect on economic growth especially where this involved a reduction in social protection spending.
<b>Sennoga and Matovu (2010)</b>	Examined the interrelationship between public expenditure composition and economic growth and poverty reduction.	Uganda	Improved public sector efficiency coupled with re-allocation of public expenditure away from unproductive sectors to the productive sectors leads to higher GDP growth rates and accelerates poverty reduction.
<b>Fan and Saurkar (2003)</b>	Public spending in developing countries	Africa and Asia	Government spending on agriculture and infrastructure had large returns to GDP and their impact on poverty reduction was strong.
<b>Yasin (2008)</b>	Examined the impact of government spending on economic growth in Sub-Saharan Africa using panel data set for the period 1987 to 1997.	Sub-Saharan Africa	Government spending on capital formation, trade-openness and private investment spending all had a positive and significant impact on economic growth. However, official development assistance and population growth rate were both statistically insignificant to economic growth.
<b>Musaba, Chilonda and Matchaya (2013)</b>	Examined the impact of government sectoral expenditure on economic growth in Malawi, using	Malawi	In the short run, there was no significant relationship between public expenditure and economic growth, in the long run, there was a significant positive effect on

	econometric model			economic growth from expenditure on agriculture and defense. The expenditure on education, health, social protection and transport and communication were negatively related to economic growth.
<b>Jung and Thorbeeke (2001)</b>	Examined the impact of education spending on human capital, growth and poverty in Tanzania and Zambia,	Tanzania and Zambia	and	Education expenditure can raise economic growth. However, to maximize the return the output of education should match the demands of labour in the market.

### Studies with aggregate public expenditure

Author(s)	Type of study (Period)	Sample Country(ies)	Findings
<b>Bagdigen and Cetintas (2004)</b>	Examined the causal relationship between public expenditure and economic growth and analyzed data for the period 1965 and 2000	Turkey	No causality from either direction was found in their study.
<b>Sevitenyi</b>	Analyzed	the Nigeria	Causality test found unidirectional

<b>(2012)</b>	relationship and direction of causality between government expenditure and economic growth using annual data from 1961 to 2009		causality running from total government expenditure to economic growth thereby supporting the Keynesian hypothesis. At disaggregate level, all variable except total recurrent expenditure caused economic growth.
<b>Garba and Abdullahi (2013)</b>	Investigated the causal relationship between public expenditure and economic growth	Nigeria	The study found a significant long run positive relationship between public expenditure/population and economic growth. Granger causality test indicated weak significant bidirectional causality at 10% level.
<b>Egbetunde and Fasanya (2013)</b>	Investigated public expenditure and economic growth in Nigeria for the period 1970 to 2010	Nigeria	The impact of total public spending on economic growth was negative.
<b>Gangal and Gupta (2013)</b>	Analyzed the impact of public expenditure on economic growth for the period 1998 to 2012	India	A positive relationship between public expenditure and economic growth was found. The Granger causality test found a unidirectional relationship from total public expenditure to Economic growth.
<b>Ahmad (2014)</b>	The Impact of government expenditure on economic growth	India	Unidirectional causality running from GDP/GDP per capita to public expenditure.
<b>Medhi (2014)</b>	Examined the relationship between government spending and GDP growth in India using annual	India	The study found long run equilibrium relationship between government spending and growth. The study also found a unidirectional causality from government spending to economic

	data for the period 1974 to 2010.		growth.
<b>Lahirushan and Gunasekara (2015)</b>	Examine aggregate impact of public expenditure on economic growth and used data from 1970 to 2013	Singapore, Malaysia, Thailand, South Korea, Japan, China, Sri Lanka, India & Bhutan	Government expenditure had a positive impact on economic growth, government expenditure and economic growth indicated a long run relationship in Asian countries and there is bi-directional causality between economic growth to government expenditure and vice versa in Asian countries.
<b>Khan, Khan and Zaman (2012)</b>	To empirically investigate the relationship between fiscal variables and economic growth using data from 1980 – 2010	Pakistan	Government expenditure had a significant negative effect on real economic growth, tax receipts have a positive effect on real economic growth and the size of budget deficit has a significant negative effect on real economic growth.
<b>Muhammad, Xu and Karim (2015)</b>	Examined the relationship between public spending and economic growth and used time series data running from 1972 to 2013 and used econometric test	Pakistan	Concluded that there was no relationship between expenditure and GDP in the long run.
<b>Eideh (2015)</b>	Explored the causal relationship between public expenditure and economic growth for the period 1994 to 2013	Palestinian Territories	The study found co-integration and a long-run relationship between public expenditure and economic growth. The study also found bi-directional causality.

<b>Odhiambo (2015)</b>	Examined causality between public expenditure and economic growth using ARDL – bound testing approach to examine this linkage	South Africa		The empirical findings of the study showed that both public expenditure and economic growth Granger cause each other in the short run, however, in the long run, economic growth Granger causes public expenditure.
<b>Lamartina and Zaghini (2008)</b>	Analyzed government expenditure on economic growth in 23 OECD countries and used panel co-integration analysis.	23 countries	OECD	The study found the public expenditure was being influenced by the increase in economic activities and this is consistent with Wagner’s Law.
<b>Heitger (2001)</b>	Investigated the relationship between the size of government and economic growth using data from 1960 to 2000	21 countries	OECD	Total government expenditure, as well as expenditure by type, indicated a significant negative impact on economic growth except for transfers and public investments.

## 2.6 CONCLUSION

A lot of studies have been conducted around the area of public spending and economic growth. The bulk of these studies has covered European and Asian countries, though some but of a smaller number have covered African countries. The most significant finding from the literature is that currently there appear not to be any consensus on the impact of public spending on economic growth and which one of the two variables causes the other. However, most of the studies are rich in knowledge and have provided insights into the sources of economic growth. The most commonly used research approaches in this area of study are ADF test, Johansen co-integration, ECM, ARDL and Granger test of causality.



### **3. RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter outlines the research design and methodology that has been utilized to examine the research questions stated in the introduction of the study. This outline will start with the overall research approach and strategy in order to provide an overview of the foundation of the methodology. Thereafter, the data choice will be examined, its frequency and collection method that was used in line with the research strategy and design. This chapter also explains the kind of data that was used and where the data was sourced from. Further, a detailed explanation is given on which tools were used to analyze the data and how the analysis was done. This chapter, in short, explains how the research questions were answered and also provides the basis for validity and reliability of the research.

The main objective of this study is to analyze the effect of public expenditure on economic growth in Zambia using data drawn from 1991 to 2015. Therefore, this study used two research variables i.e. Public expenditure and economic growth.

Table 3.1  
Variable Description and Source

No.	Variable	Description	Data Source
1	Total Public Expenditure (PEXP)	All expenditure done by the Zambian government to the public either directly or indirectly. Expressed in USD to manage inflation and volatility factors.	Ministry of Finance Zambia
2	Economic Growth proxy – Gross Domestic Product (GDP)	Expressed as annual percentage change	World Bank

### **3.2 Research Approach and Strategy**

#### **❖ Deductive Research Approach**

This study followed a deductive approach process. According to Dawson (2013), researchers that draw from deductive technique rely heavily on existing and substantive prior knowledge to conceptualize specific situations. This research examined the effects of public spending on economic growth in Zambia and was guided by the following research questions;

1. What is the effect of public expenditure on economic growth in Zambia?
2. What sought of relationship exists between public expenditure and economic growth in Zambia?

Further, this study hypothesized through the alternative hypothesis that ‘there is a relationship between public spending and economic growth’. Therefore, this study started off with the intention of validating or disputing the Keynesian theory, with regard to the Zambian economic context, which states that the growth in public spending will result in high economic growth. On the contrary, Wagner’s Law states that increased economic activities actually result in higher public spending. In this regard, the theory was used to guide and inform the formulation of the research questions and also further guided the collection and analysis of data.

Arising from the above, the data that was collected was used to test the hypothesis, as a means of validating the existing theory on public spending and economic growth in Zambia. The approach taken in this study is opposed to the ‘bottom-up’ inductive approach where theory develops from data as data is being collected or as data is being analyzed (Saunders, Lewis and Thornhill, 2000).

#### **❖ Quantitative Research Strategy**

Based on the research questions and the problem at hand, this research adopted a quantitative research method. The research questions for this study are seeking to

determine the effect of public spending on economic growth. Therefore, the variables used in this study are public expenditure and economic growth, both of which can be quantifiable and the causal relationship between these variables can statistically be determined. However, though qualitative research method can be used to analyze the impact of public spending on economic growth, it may not be the most appropriate method of analyzing the impact of public spending on economic growth because qualitative method is best suited for data that are based on meaning, expressed through words, collection results in non-standardized data requiring classification into categories and analysis conducted through the use of conceptualization (Saunders, Lewis and Thornhill, 2000).

### **3.3 Data Collection, Frequency and Choice of Data**

#### **❖ Research Design**

The purpose of this research was to examine the effect of public spending on economic growth in Zambia; the impact was examined over a twenty-five years period from 1991 to 2015. This study, therefore, used time series data and following on the purpose, this study pursued an explanatory study inquiry.

This study used time series data because it examines the impact of public spending on economic growth over twenty-five years. Time series data make it possible to analyze the change and developments over that period of time. Saunders, et al. (2000), argues that the main strength of longitudinal research is its ability to study change and development over time. Further, notwithstanding the time constraints, time series data analysis was made possible on account of availability of data on public spending and economic growth (Gross Domestic Product) on Zambia through the following sources; Ministry of Finance, Bank of Zambia, Central Statistical Office and World Bank websites and bulletins and other publications. Saunders, et al. (2000), argues that even with time constraints it is possible to introduce longitudinal elements to a research as there is a massive amount of published data collected over time just waiting to be analyzed.

This study's main focus was to examine the effect of public spending on economic growth in Zambia. Morris and Wood (1991), cited by Saunders et al. (2000) explain that a case study research strategy is helpful in gaining a rich understanding of the context under study. Saunders et al. (2000) also argue that this strategy is the appropriate way of exploring existing theory and that a simple well-constructed case study can enable you challenge existing theory and also provide a source of a new hypothesis.

As explained above, this study's objective was to examine the causal relationship between the independent variable public expenditure and the dependent variable economic growth. Arising from the above, this inquiry adopted an explanatory approach as it seeks to explain the relationship between the variables. Saunders et al. (2000) explain that studies that are set to establish a causal relationship between variables may be termed as explanatory studies.

#### ❖ **Choice of Data**

This research relied on secondary data on government spending and gross domestic product (GDP) which was readily available and extracted from the Ministry of Finance and World Bank websites, bulletins and other publications.

This study depended on secondary data because it is the best data source for longitudinal studies as it cuts down on the cost and time of collecting primary data over a length period of time which can run into decades. Further, secondary data in this regard was also readily available and made it easy to analyze the causal relationship between government spending and economic growth. Finally, secondary data is permanent and this makes it easy for others to validate this study.

However, secondary data may also have its own limitations that include; the data may have been collected for a purpose which does not match this research, technically making the data not to match the model and purpose. Further, access to data may be difficult or costly. Finally, the initial purpose may affect how data are presented and aggregations may result in data being not so suitable for other researchers.

### ❖ **Data Frequency and Sample Size**

In view of the research questions which sought to determine the relationship between government spending and economic growth; this research examined and reviewed time series annual data from 1991 to 2015 or in short for a twenty-five years period. This period guaranteed a sufficient sample size to be able to run a cointegration test using ARDL. According to Odhiambo (2009) ARDL cointegration technique provides numerous advantage, among them is its ability to accommodate small sample sizes while retaining reliability. Further, this research focused on the post one party state which is associated with the command economy; it focused on data that was generated after the Zambian economy was liberalized.

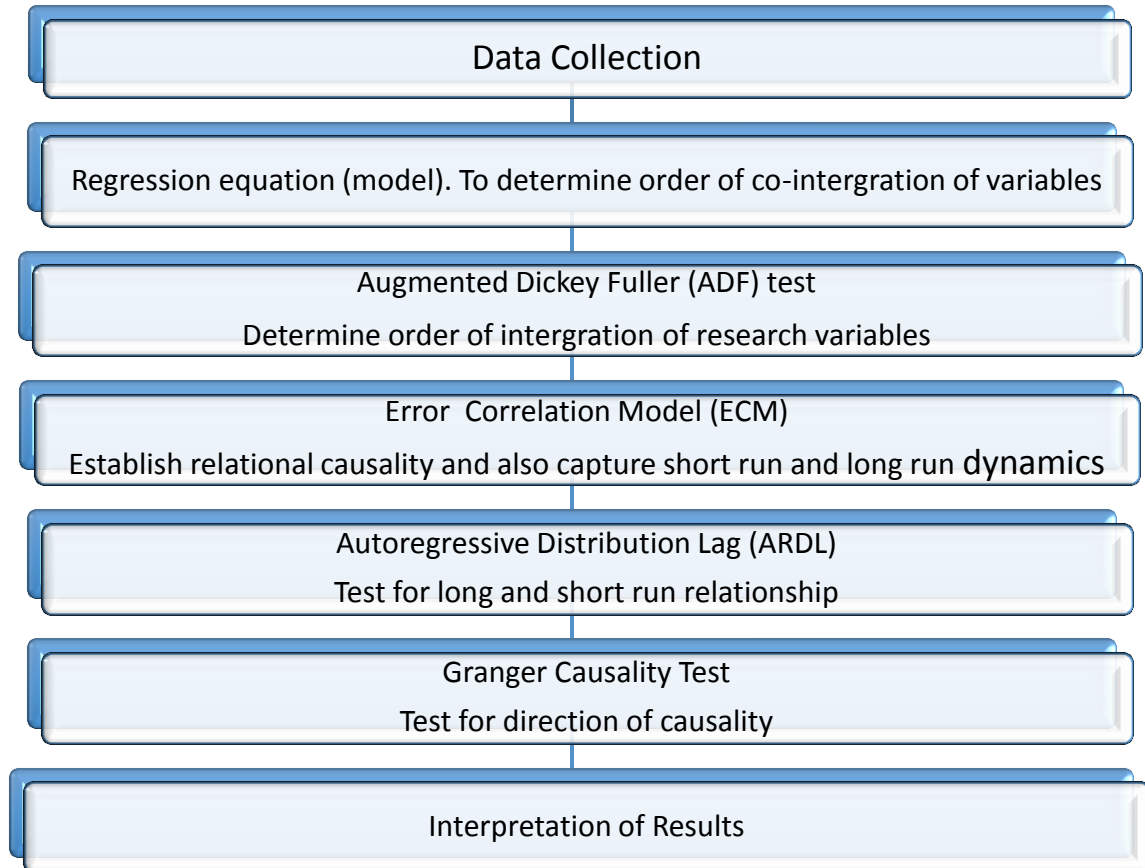
The data frequency for the selected period is dictated by the standard measurement period for the data to be collected. The dependent variable economic growth was measured through a proxy GDP; this is consistent with the argument by Costanza, Hart, Posner and Talberth (2009) that the most widely used measure of economic growth is GDP, Garba and Abdullahi also used the GDP natural log as a proxy for economic growth. Further, Costanza et al. (2009) argue that GDP is measured annually or quarterly. However, the most readily available GDP data in Zambia is annual GDP prompting this study to use annual GDP figures. An analysis of current studies done on public spending and economic growth, Nworji et al. (2012); Fan and Saurkar (2003); Muthui et al. (2013) and Garba and Abdullahi (2013) revealed that most of them also used annual GDP data.

### ❖ **Data Collection**

The research questions were explored using quantitative empirical technique appropriate for time series data. In line with the strategy selected above, this study used longitudinal case study approach and used secondary data. Secondary data made it possible to undertake longitudinal study over a short period of time. In this case, data on public spending and GDP on Zambia is readily available and is compiled at regular time intervals by the Zambian Government, through the Ministry of Finance, International

Monetary Fund (IMF) and the World Bank. The study used data from 1991 to 2015. As such, data collection utilized a purposive sampling, this being a case study research (Saunders et al. 2000).

Figure 3.1 *Methodology Flow Chart*



In view of the fact that this study used time series data, to array the fears associated with the non-random disposition of the series which could undermine the use of econometric tests such as F and t tests. The non-random disposition of the series can cause the rejection of a hypothesis that would otherwise not be rejected. This study, therefore conducted stationarity and co integration test to mitigate such situations (Muthui et al., 2013)

According to current studies done on public spending and economic growth by Nworji et al. (2012); Fan and Saurkar (2003); Muthui et al. (2013) and Garba and Abdullahi (2013), they also used annual GDP data, and draw their data from IMF, World Bank and the country respective governments.

Finally, the secondary data collected on public expenditure was in Zambian Kwacha ZMW; these figures are compiled in Kwacha the official currency in Zambia. However, in order to avoid distortion that might have arisen from high inflation and currency volatility, the Zambian Kwacha expenditure figure was converted to USD. Annual average USD/ZMW exchanged rates were used. The rates were sourced from the World Bank website.

### **3.4 Data Analysis Methods**

#### **❖ Descriptive Statistics**

Prior to commencement of analysis, the descriptive statistics of the data were produced. The descriptive statistics informed the research of the mean, median, mode, minimum and maximum values of our variables and also guided the research on whether the variables i.e. GDP and PEXP are symmetric or not. Further, the descriptive statistics pointed out the characteristics of the residual of the two research variables in the research.

#### **❖ Regression Equation**

After analyzing the descriptive statistics, the regression equation was estimated in order to establish co-integration of the research variables. The estimated regression model was subjected to the following diagnostic test; serial correlation, heteroscedasticity and normality tests. These tests are important as they help in determining how good the regression equation is.

#### **❖ Augmented Dickey-Fuller (ADF) Test**

After determining whether a relationship exists in the variables, the next step was to determine the stationary properties of the individual variables. In econometric modeling,

it is important to determine the order of integration of the variables in order to avoid spurious regression results (Granger and Newbold, 1974). The Augmented Dickey-Fuller (ADF) test was conducted to examine properties of the time series variables and to determine the order of integration for each series in the study. Determining the stationary properties of the variables is important as it guides in the selection of the subsequent test that informs the short and long-run relationship between the variables in the research.

#### ❖ **Error Correlation Model (ECM)**

After step two established the order of integration of the variables in the research, the next step was to estimate the error correlation model (ECM), which incorporated variables both in their first difference and capture the short-run disequilibrium situations as well as the long-run equilibrium adjustments between the variables. The ECM was subjected to the following diagnostic test; serial correlation, heteroscedasticity and normality tests. However, Khan et al. (2012) argue that if time series are I(1), then regressions could be run at first difference, nevertheless, by taking first differences, the long run relationship could be lost that is stored in the data. Therefore, ARDL results will help ascertain the results of ECM.

#### ❖ **Autoregressive Distribution Lag (ARDL)**

The fourth step was to apply the Autoregressive Distribution Lag (ARDL) regression model to test for the long-run relationship between public spending and gross domestic product. Egbetunde, et al. (2013) argues that this method has three main advantages; firstly, compared to other multivariate co-integration methods (i.e. Johansen and Juselius (1990)), the bound test (ARDL's other name) *'is a simple technique because it allows the co-integration relationship to be estimated by OLS once the lag order of the model is identified.'* Additionally, the unit root test is not a pre-condition of this model. *'Thirdly, the long-run and short-run parameters of the models can be simultaneously estimated'* (Egbetunde, et al., 2013). Further, Pesaran and Shin (1997) also argue that ARDL has an additional advantage of yielding consistently estimates of the long-run coefficients that are asymptotically normal irrespective of whether the underlying regressors are I (1) or I



(0). Therefore, this study used the Autoregressive Distribution Lag (ARDL) bound test proposed by Pesaran, Shin and Smith (2001) to determine the relationship between public spending and economic growth in Zambia from 1991 to 2015. Further, this regression model was used to validate the Keynesian theory on the Zambian public economic spectrum. This model was also subjected to some of the diagnostic tests such as serial correlation test and CUSUM test of stability.

#### ❖ **Granger Causality Test**

The last step was to test causality among the variables to determine the direction of causality. Granger (1969) and Sims (1972) frameworks will be used to determine causal direction. The variables will be subjected to Pairwise Granger causality test. These frameworks are based on the belief that the past and present may cause the future, but the future cannot cause the past (Kesavarajah, 2012).

### **3.5 Research Validity and Reliability**

This study largely followed the methodology of Garba and Abdullahi (2013); Gangal and Gupta 2013; Adamu and Hajara (2015) and Muhammad et al. (2015), however, this study is focused on Zambia a country none of above studies focused on. Therefore, this study did not reinvent the ‘wheel’; the methodology applied has been tested and proven in more than one study as stated above. Nonetheless, the value of this study lies in applying this model to a country that went through SAP and debt relief. Furthermore, the choice of this approach is most important based on its analytical ability to resolve the research question.

The process of maintaining validity and reliability was taken into account at the stage of selecting the tools of analysis and in the use of the tools of analysis itself. Also, this research study used secondary data that is readily available and can help in ensuring the reliability of this study. Additionally, the data for this study was sourced from well-respected sources such as Ministry of Finance and World Bank. Lastly, this study only focused on data from the post liberalization Zambia, whose economy is market driven.

### **3.6 Limitations**

The study was limited by the following consideration;

- ❖ Time and budget; this study was to some extent constrained by the availability of time and resources, nevertheless, within these constraints the best possible effort was made to produce this report.
- ❖ The data collected on public expenditure in Zambian Kwacha was non-stationary at first difference. This posed a challenge in that its use would have prevented the use of Error Correction Model (ECM) and Autoregressive Distribution Lag (ARDL) tests; therefore, this data was converted to US Dollars equivalent at annual average exchange rates. This action also helped to manage exchange rate volatility embedded in the currency and inflationary distortions during the period under research.

### **3.7 Conclusion**

This chapter has outlined how the research question and objective were answered by providing a detailed research approach and strategy, the choice and analysis of data in relation to the research approach and strategy. The selection of methodology and research strategy was based on the research objectives and aims. As such, this inquiry adopted an explanatory approach as it seeks to explain the relationship between public expenditure and economic growth, its two variables. Further, the research followed a deductive approach and used quantitative research methods. The research used secondary data; the data was mainly sourced from the Ministry of Finance and World Bank and comprised of Annual expenditure figures in USD and annual GDP growth in percentages. This data was analyzed using a regression equation, ARDL and Pairwise Granger causality test. This chapter provided the basis for which the research question was answered. Further, the chapter also considered the validity and reliability of the research. This chapter is the basis on which the findings of this research have been revealed and hence made possible this contribution to the existing body of knowledge through the findings which explain the effects of public spending on economic growth in Zambia.

## **4. RESEARCH FINDINGS, ANALYSIS AND DISCUSSION**

### **❖ Introduction**

This chapter serves as the platform through which the findings of this study are announced. However, this chapter is heavily guided by prior chapters. The findings of this study are based on the secondary data that was collected, processed and analyzed using the E-Views 9.5 student version. The analysis that follows is based on results of the various E-Views quantitative tests that were conducted to answer the research questions. Finally, the conclusion was derived from the analysis of empirical results and answered the research questions contained in Chapter 1. All test outputs are included in the appendices.

### **❖ Results of the Study**

#### **➤ *Descriptive Statistics of Variables***

Table 4.1 presents the results of the descriptive statistics. The mean, median, mode, minimum and maximum values of our variables are not close to each other and the implication is that data for GDP and PEXP variables are not symmetric. The probability values of the Jarque-Bera test of GDP and PEXP are above 5% level of significance. The null hypothesis which states that the residuals are normally distributed is not rejected; therefore the residues of the variables are assumed to be normally distributed.

Table 4.1 Descriptive Statistic of Variables

	GDP	PEXP
Mean	4.124000	2411.393
Median	5.400000	1339.530
Maximum	10.30000	6266.930
Minimum	-8.600000	693.7300
Std. Dev.	4.479609	1812.371
Skewness	-1.094489	1.024014
Kurtosis	3.762303	2.635923
Jarque-Bera Probability	5.596590 0.060914	4.507259 0.105017
Sum	103.1000	60284.83
Sum Sq. Dev.	481.6056	78832509
Observations	25	25

➤ *Estimating the Equation*

In this study, we have two variables, i.e. Gross Domestic Product (GDP) as a dependent variable and Total Public Expenditure (PEXP) as the independent variable. The first step to data analysis was to estimate the regression equation of the model. Based on the output in Table 8.1 of the appendices, PEXP is significant in explaining GDP at 1%. This result also means that a 10% increase in public expenditure in Zambia will result in a 1.4% increase in GDP growth. Other studies such as the one done by Gisore, Kiprop, Kalio and Ochieng (2014) and Gangal and Gupta (2013) also found the effect of total public expenditure on GDP to be positive and significant. Further, the F-statistic probability, further affirm this stand as it is also 0.38%. This regression model is not spurious given that the R-squared value (0.310562) is less than the Durbin-Watson statistic (1.536474).

### Residual Serial Correlation Test

The regression equation was subjected to a diagnostic test to verify that it is a good model. The Breusch-Godfrey serial correlation test output in Table 8.2 of the appendices shows that the residual of the regression model are not serially correlated as the observed R-squared probability is 56.71% and this meant failing to reject the null hypothesis which says that the model or the residual of the model are not serially correlated.

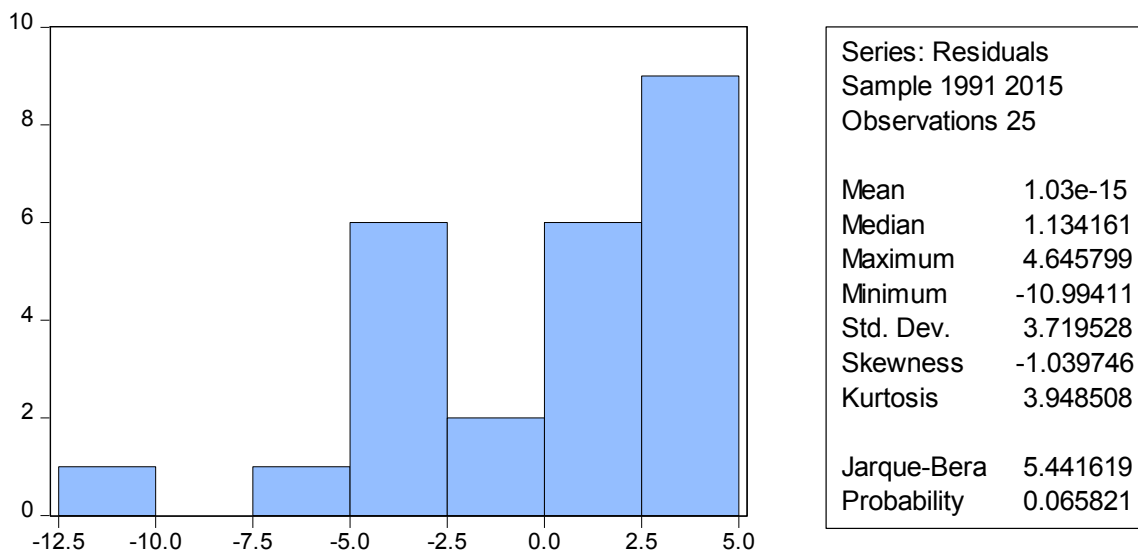
### Residual Heteroscedasticity Test

The Beusch-Pagan-Godfrey heteroscedasticity test also found this regression model not to be heteroscedastic or rather; it found the model to be homoscedastic. According to the output in Table 8.3 of the appendices, the corresponding P value of the observed R-squared is 37.83%, therefore the research failed to reject the null hypothesis which states that the residual are not heteroscedastic.

### Residual Distribution Normality Test

According to the Jarque-Bera residual distribution normality test results below, the corresponding P-value of the Jarque-Bera test is 6.5821%. Consequently, we fail to reject the null hypothesis which states that the residuals are normally distributed. See the graph output below.

**Figure 4.1 Regression Residual Distribution**



Therefore, we conclude that the residuals of model 1.1 below are normally distributed. Our model is not serially correlated, not heteroscedastic and is also normally distributed. Therefore, the regression model is a good one.

$$\text{GDP} = B1 + B2 * \text{PEXP} + E \text{ (Model 1.1)}$$

However, there is a need to ascertain if the variables in this research are stationary at level or first difference. Therefore, the next step was to conduct the Augmented Dickey-Fuller test on the two research variables namely GDP and PEXP.

➤ *Augmented Dickey Fuller Test*

Before undertaking the other econometric test, it is important to establish the order of integration of the variable in the research. This is also important in that it aids in decision making on appropriate tests to undertake given the order of integration of the variables at hand. The Regression equation is good, it is not spurious, meaning it has established that the variables in the research are co-integrated, its residual are not serially correlated nor heteroscedastic and are normally distributed. The next step is to test individual variables for stationarity. The graphical output of the variables are shown below, (Figure 4.2) on GDP and (Figure 4.3) on PEXP demonstrate the non-stationary properties of GDP and PEXP at level. GDP showed minor signs of random walk, while PEXP was trending upwards. The Augmented Dickey-Fuller (ADF) test results in Table 4.2 below show that both variables are not stationary at level. The ADF test statistic absolute value for GDP was less than the critical values at 1%, 5% and 10%. Similarly, the PEXP ADF test statistic absolute value was also less than all the critical values at 1%, 5% and 10%. Therefore, both variables i.e. GDP and PEXP are considered to be non-stationary at level.

However, both variables become stationary at first difference as shown firstly by the graphs (Figure 4.4) on GDP and (Figure 4.5) on PEXP below, additionally Table 4.2 below shows that the ADF test statistic absolute values for GDP is greater than all critical values and is significant at 1% significance on the other hand PEXP test statistic

is greater than the critical values only at 5% significance. This is consistent with the finding of Sevitenyi (2012) (See output results in appendices Table 8.4 – 8.7)

Table 4.2: ADF Test Results at Level

At level	t-statistic	Test critical values	P Value
<b>PEXP</b>	-1.944685	-4.394309*, -3.612199**, -3.243079***	0.6005
<b>GDP</b>	-1.491269	-3.769597*, -3.004861**, -2.642242***	0.5191

\* 1% significance, \*\* 5% significance, \*\*\* 10% significance

Figure 4.2 GDP Graphs at Level

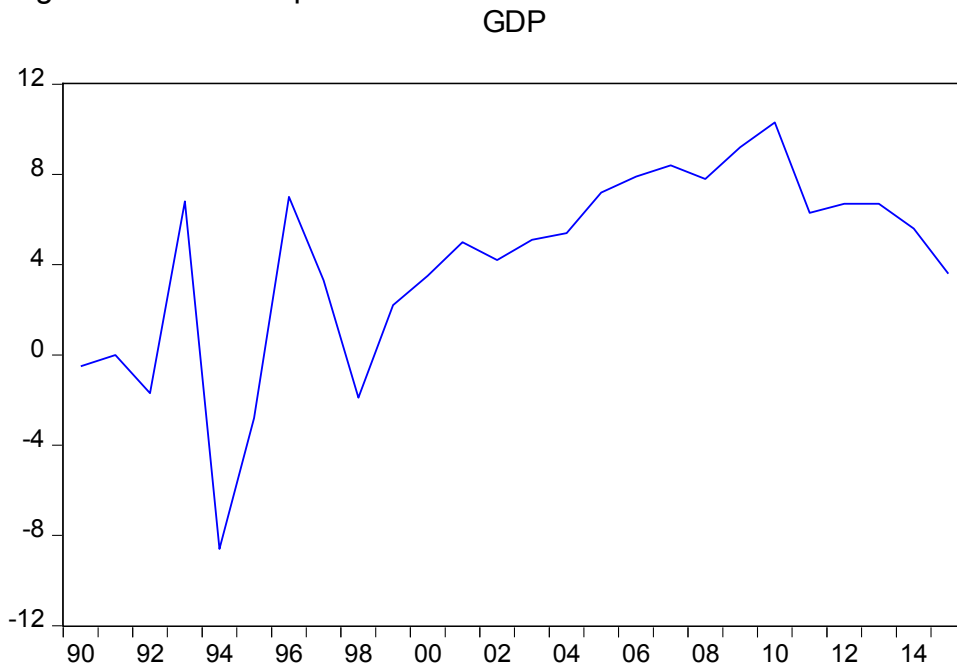


Figure 4.3 PEXP Graph at Level

PEXP

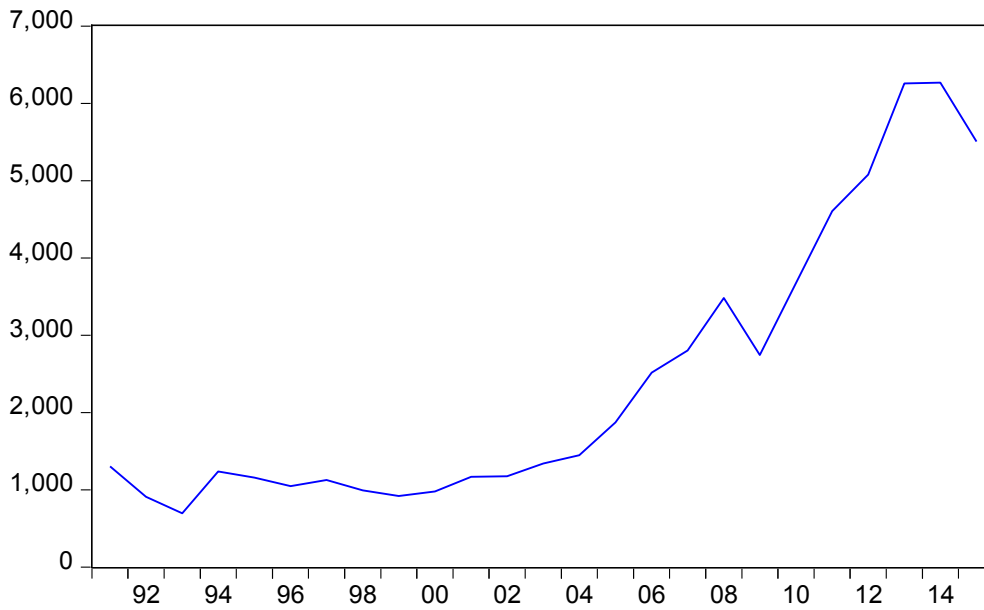


Figure 4.4 GDP Graph after First Difference

DGDP

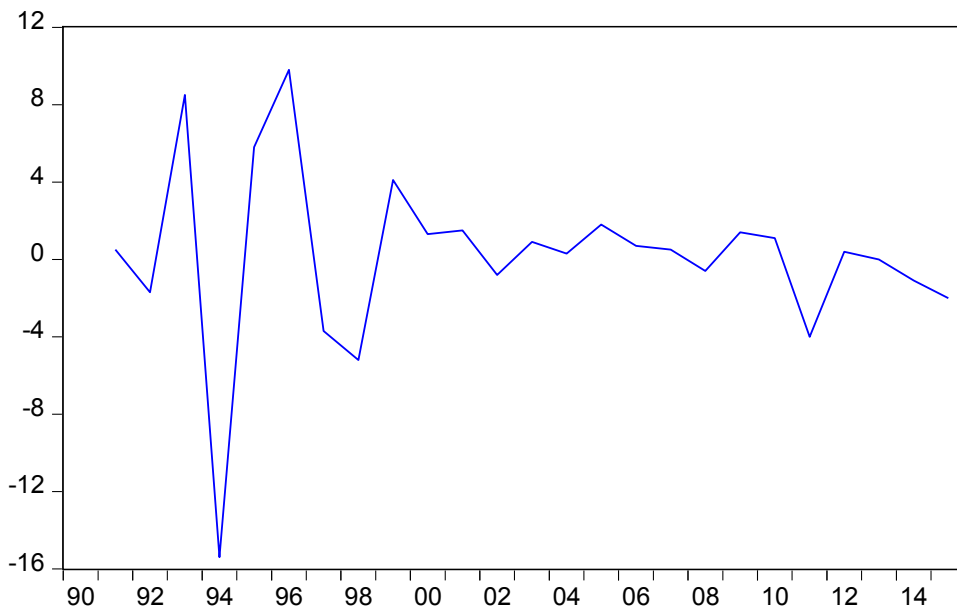




Figure 4.5 PEXP Graph after First difference  
DPEXP

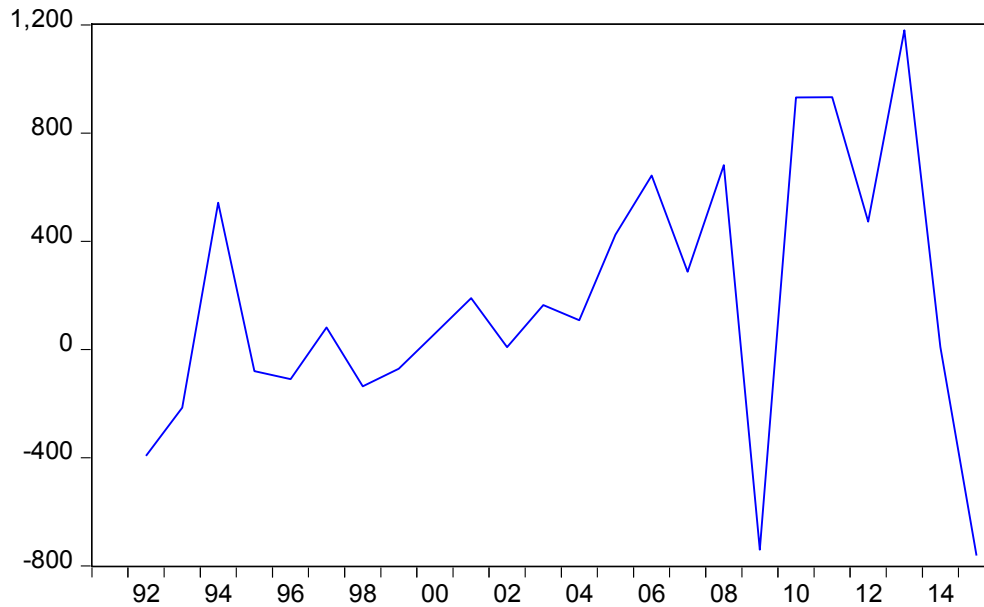


Table 4.3: ADF Test Results after First Difference

At First Difference	t-statistic	Test critical values	P Value
<b>PEXP</b>	-3.711038	-4.532598*, -3.673616**, -3.277364***	0.0467
<b>GDP</b>	-7.128563	-3.769597*, -3.004861**, -2.642242***	0.0000

\* 1% significance, \*\* 5% significance, \*\*\* 10% significance

➤ *Error Correction Model (ECM)*

Based on Table 8.8 in the appendices, given that the variable GDP and PEXP are co-integrated and both variables are stationary at first difference, we can run the error correction model as shown by model 1.2 below;

$$D(\text{GDP}) = B_3 + B_4 * D(\text{PEXP}) + B_5 * U_{t-1} + V \text{ (Model 1.2)}$$

In model 1.2

D(GDP) is the first difference of GDP

D(PEXP) is the first difference of PEXP

B3 is the intercept

B4 is the short-run coefficient

B5 is the coefficient of the residuals ( $U_t - 1$ )

V is the white noise error term

$(U_t - 1)$  is the one-period lag residual of model 1.1 (it corrects the disequilibrium)

Since B5, the coefficient of the error term is significant and contains a negative sign, it validates that there exists a long-run equilibrium relationship among variables GDP and PEXP as stated in model 1.1. Given the value of B5, the coefficient of the error term is 86.13%, means that the system corrects its previous period disequilibrium at a speed of 86.13 percent annually. In short, the speed of adjustment is 86.13% annually.

Given that the value of the error correction term coefficient is negative -0.861278 and is significant at 5%, it therefore, gives validity that GDP and PEXP have a long run equilibrium relationship.

The coefficient of DPEXP 0.003554, which is also the short run coefficient, is also significant. It therefore, follows that this coefficient is significant at 5% given that the P value is 3.93%, it consequently means that DPEXP with a coefficient at 0.003554 is a significant variable in explaining GDP in the short run. This model is also not a spurious model given that the R-squares at 0.463950 is less than the Durbin-Watson statistic which is 1.876175.

#### Residual Serial Correlation Test

The Error Correction Model was also subjected to a further diagnostic test to verify that it is a good model. The Breusch-Godfrey serial correlation test output in Table 8.9 of the appendices showed that the ECM is not serially correlated as the observed R-squared probability is 54.48% and this meant failing to reject the null hypothesis which says that the ECM model is not serially correlated.

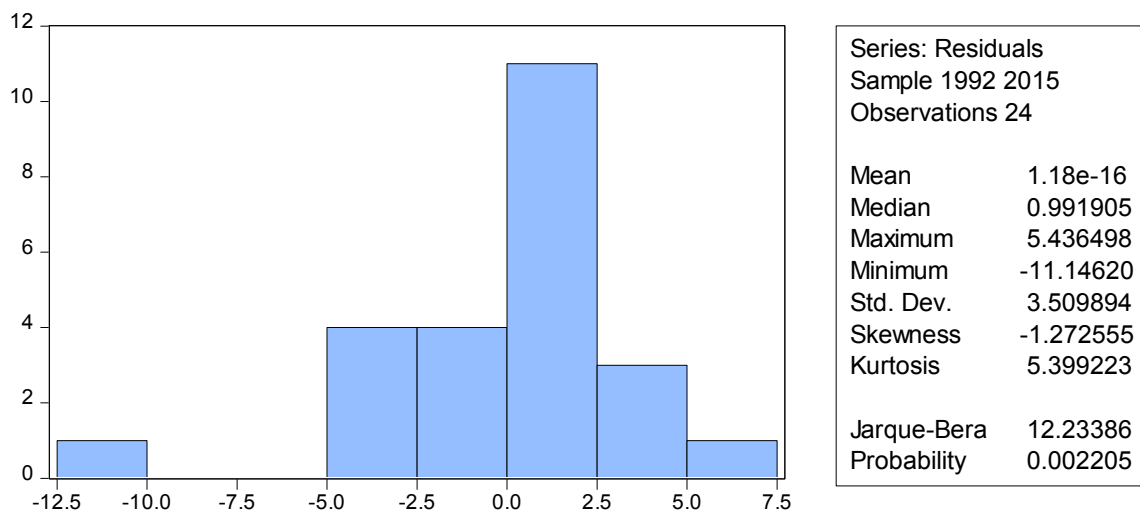
#### Residual Heteroscedasticity Test

The Beusch-Pagan-Godfrey heteroscedasticity test also found that the ECM model not to be heteroscedastic or rather; it found the model to be homoscedastic. According to the output in Table 8.10 of the appendices, the corresponding P value of the observed R-squared is 61.59%, therefore the research failed to reject the null hypothesis which states that the ECM model is not heteroscedastic.

#### Residual Distribution Normality Test

According to the Jarque-Bera normality test results below, the corresponding P-value of the Jarque-Bera test is 0.22%. Consequently, the research rejected the null hypothesis which states that the residuals are normally distributed. See graphic output below in Figure 4.6.

**Figure 4.6 ECM Residual Distribution**



Therefore, the research concluded that though the ECM model is not serially correlated and is not heteroscedastic, but it is not normally distributed. However, the model is still good enough given that the most important test for series data is the serial correlation test which is in good order. Further, the data will be subjected to Autoregressive Distributive Lag test to ascertain the results of the ECM model.

➤ *Autoregressive Distributive Lag (ARDL)*

Table 8.11 and 8.13 in the appendices shows ARDL output. The ARDL also established the existence of both short run and long run relationship between GDP and PEXP. The long run coefficient of the ARDL model is significant at 10% and this validated the existence of a long-run equilibrium relationship among variables GDP and PEXP as stated in the regression equation and ECM models. The ARDL model also established a short run relationship between GDP and PEXP. The coefficient of DPEXP 0.003634, which is also the short run coefficient, is significant at 5%, therefore, DPEXP is a significant variable in explaining GDP in the short run. Further, this model is not spurious given the lower R-Squared value compared to the Durbin-Watson statistic. The diagnostic tests that were done on the ARDL model showed that the research produced a good model as it was not serially correlated, nor was it heteroskedastic but it was not normally distributed. The model was also subjected to a stability test, the CUSUM test and the model was found to be stable.

Therefore, the results of the regression equation, ECM and ARDL models were all consistent in this study and the research concludes that there exists both short and long-run relationship between GDP and public expenditure in Zambia.

**Figure 4.7 ARDL Residual Distribution Normality Test**

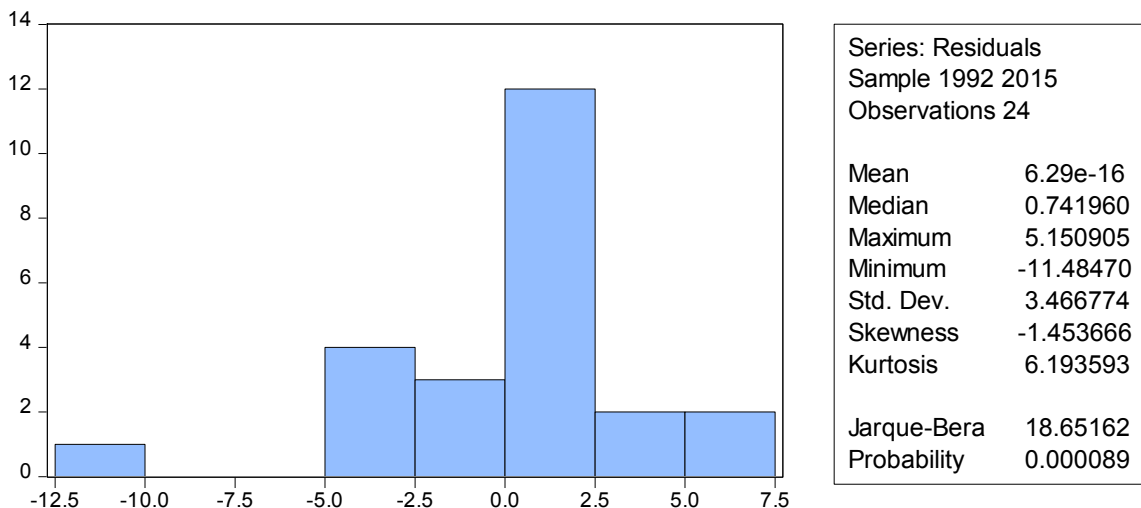
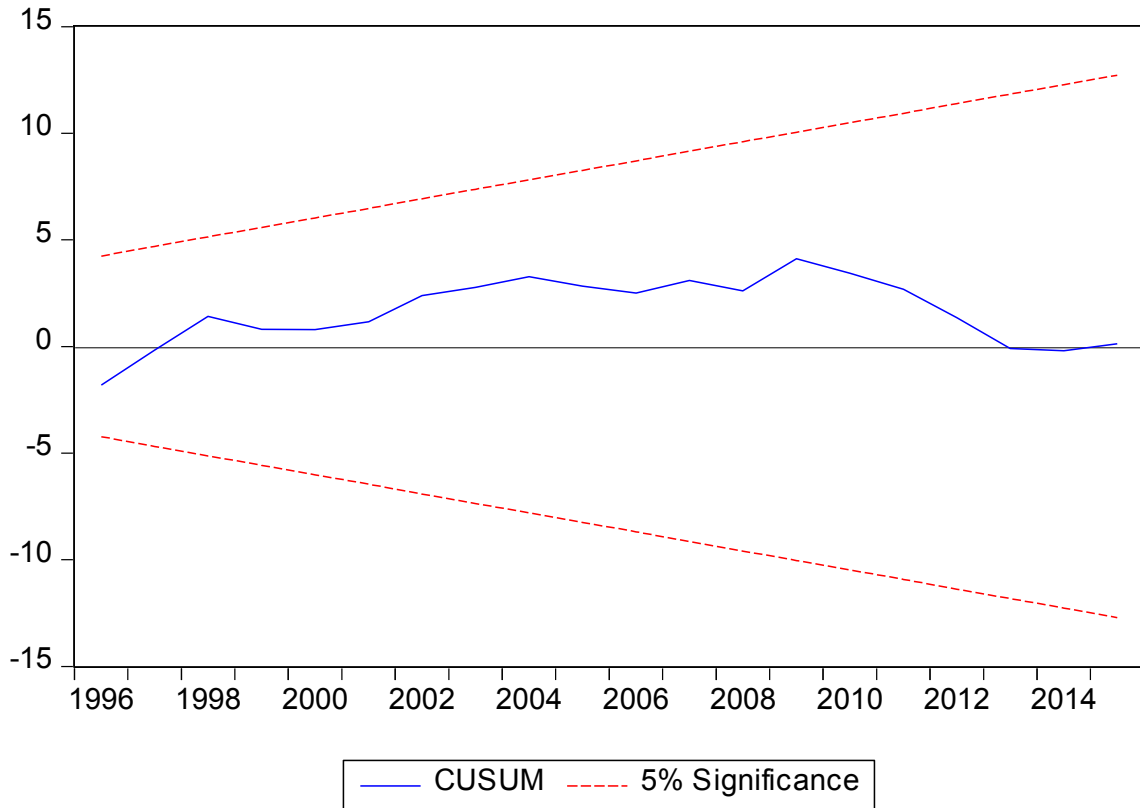


Figure 4.8 CUSUM Plot



➤ *Granger Causality Test*

One of the aims of this research was to examine the causal relationship between the public expenditure and economic growth in Zambia for the period 1991 to 2015. The Pairwise Granger causality tests that were conducted at different lags ranging from 2 – 7 indicated causality running from public expenditure to economic growth for the period under research in Zambia. However, other than lags 5, 6 and 7 the rest of the tests had P-values that were not significant, hence failing to reject the null hypothesis in lag 2, 3 and 4, meaning there was no causality from either direction of public expenditure to economic growth or economic growth to public expenditure. However, at lag 5, 6 and 7 the F- statistic for the null hypothesis for PEXP does not Granger Cause GDP was significant at 10%, meaning in all three lags 5, 6 and 7 the research rejected the null hypothesis PEXP does not Granger Cause GDP, and instead accept the alternative

**Table 4.4 Granger Pairwise Causality Results**

Hypothesis	Obs.	PEXP does not Granger cause GDP	GDP does not Granger cause PEXP
Lags	2	23	
F-Statistic		0.56969	1.25488
Probability		0.5756	0.3089
Lags	3	22	
F-Statistic		0.44513	1.80581
Probability		0.7243	0.1893
Lags	4	21	
F-Statistic		1.69642	1.72098
Probability		0.2152	0.2099
Lags	5	20	
F-Statistic		2.63575	2.03584
Probability		0.0979	0.1670
Lags	6	19	
F-Statistic		10.3461	1.93783
Probability		0.0060	0.2204
Lags	7	18	
F-Statistic		6.20288	0.66617
Probability		0.0809	0.7045

hypothesis which states that PEXP (public expenditure) Granger causes GDP (economic growth) at a significance level of 10% for lags 5 and 7 and 1% for lag 6. This finding is consistent with the finding of Sevitenyi (2012), Gangal and Gupta (2013) and Adamu and Hajara (2015) who also found causality running government spending to economic growth in their respective studies. But the hypothesis GDP does not Granger causes PEXP was not significant in all instances, meaning there was no causality from economic growth to public expenditure at all lags. Therefore, this study does not empirically support the existence of Wagner's Law in Zambia in public spending. Table 4.4 provides the output summaries of all the tests under all lags that were run. Pairwise Granger causality test outputs are in Table 8.15 of the appendix.

➤ *Research Hypothesis*

Based on the results above, we reject the null hypothesis which states that there is no relationship between public spending and economic growth in Zambia and instead accept the alternative hypothesis which says that there is a relationship between public spending and economic growth in Zambia. This is based on the following empirical findings;

1. Based on the regression output in appendices 8.1, since PEXP is significant at 1% in explaining GDP, it can be concluded that a relationship exists between Public expenditure and economic growth.
2. Based on the Error Correction Model (ECM), since we observed that the coefficient of the error term is significant and contains a negative sign, it validated the fact that there exists a long-run equilibrium relationship among variables GDP and PEXP. Further, the fact that the short-run coefficient, DPEXP 0.003554, is significant, it therefore, follows that DPEXP is a significant variable in explaining GDP in the short run. Therefore, we conclude that based on the Error Correction Model a relationship exists between public expenditure and economic growth.

3. Based on the Autoregressive Distribution Lag Model, since the long run coefficient of the ARDL model is significant at 10% and this validated the existence of a long-run equilibrium relationship among variables GDP and PEXP. Further, the ARDL model also established a short run relationship between GDP and PEXP. The coefficient of DPEXP 0.003634, which is also the short run coefficient, is significant at 5%, therefore, DPEXP is a significant variable in explaining GDP in the short run. Therefore, we conclude that based on the Autoregressive Distribution Lag Model a relationship exists between public expenditure and economic growth.
  
4. Finally, based on the results of the Granger Pairwise causality test, given that there is causality running from public expenditure to economic growth at lag 5, 6 and 7, validated the existence of a relationship between public expenditure and economic growth.



## **5. RESEARCH CONCLUSION AND RECOMMENDATIONS**

### **5.1 Research Conclusion**

The aim of this research was to determine the effect of public expenditure on economic growth in Zambia, to analyze the direction of causality between public expenditure and economic growth and to establish the short run and long run relationship between public spending and economic growth in Zambia. In order to achieve the aims of the research the following tests were conducted in E-Views, the first step was to run a regression equation to determine co-integration between public expenditure and economic growth in Zambia, the second step was to run the Augmented Dickey-Fuller test to establish the order of integration of the variables under research and determine the appropriateness of subsequent tests. The third step was to run an error correction model (ECM) and autoregressive distributive lag (ARDL) test to determine the long run and short run relationships between public spending and economic growth in Zambia. Finally, Pairwise Granger causality test was run to determine which of the two, namely public expenditure or economic growth Granger causes the other in Zambia.

The results of the various tests conducted on the secondary data collected from the website of the Zambian Ministry of Finance and the World Bank website indicate the following; the regression equation established co-integration between public expenditure and economic growth in Zambia. This means that there exists a long-run relationship between public expenditure and economic growth in Zambia. The diagnostic tests that were done on the regression equation showed that the research produced a good regression model as it was not serially correlated, nor was it heteroskedastic and the residuals of the model were normally distributed.

The variables of study, Gross Domestic Product (GDP) and Total Public Expenditure (PEXP) were initially non-stationary at level  $I(0)$ , but were converted to stationary after taking the first difference  $I(1)$ . This made possible to do the other tests such as Error Correction Model (ECM) and the Autoregressive Distributive lag (ARDL). This is so because if any of these variables was stationary at second difference  $I(2)$ , it would have been a challenge to conduct these test as they can only be done at  $I(0)$  or  $I(1)$ .

The ECM established both a short run and a long run relationship between GDP and PEXP. The coefficient of the error term, B5 was negative and significant and this validated the existence of a long-run equilibrium relationship among variables GDP and PEXP as stated in the regression model. Because B5, the coefficient of the error term is 86.13%, this means that the system corrects its previous year's disequilibrium at a speed of 86.13 percent annually. In short, the speed of adjustment is 86.13% annually, meaning approximately 86.13% of disequilibria from the previous year's shock converge back into the long-run equilibrium in the current year. The ECM model also established a short run relationship between GDP and PEXP. The coefficient of DPEXP 0.003554, which is also the short run coefficient, is significant at 5%, therefore, DPEXP is a significant variable in explaining GDP in the short run. This model was not found to be spurious given that the R-squared value 0.463950 is less than the Durbin-Watson statistic which is 1.876175. Further, the diagnostic tests that were done on the ECM model showed that the research produced a good model as it was not serially correlated, nor was it heteroskedastic but the residuals were not normally distributed. However, the research found the model to be good enough given that the most important test for series data, serial correlation test, is in good order. Further, the data was subjected to Autoregressive Distributive Lag test to ascertain the results of the ECM model.

The ARDL also established both a short run and a long run relationship between GDP and PEXP. The long run coefficient of the ARDL model is significant at 10% and this validated the existence of a long-run equilibrium relationship among variables GDP and PEXP as stated in the regression equation and ECM models. The ARDL model also established a short run relationship between GDP and PEXP. The coefficient of DPEXP 0.003634, which is also the short run coefficient, is significant at 5%, therefore, DPEXP is a significant variable in explaining GDP in the short run. The diagnostic tests that were done on the ARDL model showed that the research produced a good model as it was not serially correlated, nor was it heteroskedastic but the residuals were not normally distributed. The model was also subjected to a stability test, the cumulative sum (CUSUM) plot from recursive estimation of the model which also indicated

stability in the coefficients over the research period. Therefore, the results of the regression equation, ECM and ARDL models were all consistent in this study and the research concludes that there exists both short and long-run relationship between GDP and public expenditure in Zambia.

Based on empirical findings, this research established the existence of a long-run relationship between public expenditure and economic growth in Zambia. This finding is supported by the results of the regression equation, ECM and ARDL tests. This research also established the existence of a short-run relationship between public expenditure and economic growth in Zambia. This finding is supported by the results of the ECM and ARDL tests.

The Pairwise Granger causality test found causality running from public expenditure to GDP in Zambia. However, this was only at lag 5, 6 and 7. At lag 5 and 7 causality was at 10% significance while at lag 6 it was at 1% significance. Nevertheless, there was no causality running GDP to PEXP under lags 5, 6 and 7. Lags 2, 3 and 4 did not show any causality either way. This research, therefore, concluded that there is causality running from public expenditure to GDP, however, there is no causality from GDP to public expenditure. In short, public expenditure has an effect on GDP as it Granger causes GDP. As such, better target spending is likely to yield higher economic growth in Zambia.

Therefore, the implication of this study is that public expenditure is an important tool in achieving economic growth. This conclusion is supported by the findings of this research which found that public expenditure and GDP are co-integrated and have both short and long-run relationship. Therefore, based on the empirical findings of this research, this research rejected the null hypothesis which states that 'there is no relationship between public spending and economic growth' and instead accept the alternative hypothesis which states that 'there is a relationship between public spending

and economic growth'. Further, this study also concluded that the Zambian fiscal policy is hinged on the Keynesians theory (1936), this view is also supported by Adamu and Hajara (2015). By implication, this study contradicted the famous Wagner's Law (1813) which postulates that the growth in economic activities or GDP results in the increase in public spending to address social needs. Therefore, in this case, well-targeted public expenditure is likely to achieve enhanced economic growth in Zambia.

Based on the research findings, there is a relationship between public expenditure and economic growth in Zambia. Both in the long-run and short-run the variables in the research are co-integrated; this is based on the ECM and ARDL tests. Further, the research found Public expenditure to Granger cause economic growth in Zambia.

## **5.2 Recommendations for Future Research**

1. As proposed by Ahmad (2014) in his study on Nigeria, this study also recommends the use of public expenditure as an effective policy instrument for long-run economic growth in Zambia. This recommendation is based on empirical findings that there exists a long-run relationship between public expenditure and economic growth based on the regression equation, ECM and ARDL tests. Further, this research also found that public expenditure Granger causes economic growth.
2. Since there is a relationship between public expenditure and economic growth, especially that public expenditure Granger causes economic growth; this, therefore, necessitates the continued use of fiscal policy instruments to achieve macroeconomic objectives in Zambia. This recommendation is based on the research test results, namely regression equation, ECM and ARDL, which found co-integration between public expenditure and economic growth and also

established that public expenditure Granger causes economic growth using pairwise Granger causality test. This is also the view of Adamu and Hajara (2015).

3. Since high public expenditure results in higher economic growth, however, as seen in some of the research done on sector spending i.e. education, health, agriculture, infrastructure, general administrative, recurrent and capital expenditures, some sectors yield positive effects while others produced negative effects on economic growth. For instance, a study by Gisore, et al. (2014) on East Africa found expenditure on health and defense to be positive and statistically significant on economic growth while in contrast, expenditure on education and agriculture was insignificant. Therefore, further research is encouraged into various sectors of public expenditure in Zambia to establish which of those sectors yield positive impact and which ones have a negative impact on economic growth. Therefore, this research is recommending a follow-up research to examine the effects of disaggregate public expenditure on economic growth in Zambia.
4. Based on the research tests and the findings that public expenditure Granger causes economic growth in Zambia. Therefore, since public spending has a positive effect on economic growth, Government is encouraged to consider collaborating with the private sector in the provision of social services and the use of Public-Private Partnerships (PPP) should be encouraged to achieve better returns in the area of infrastructure development. The involvement of the private sectors and the use PPP in infrastructure development will ensure an increase in expenditure targeted at social needs and infrastructure without creating a strain on national resources or causing the government to contract additional debt.

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## APPENDICES

**Table 8.1 (Regression Equation)**

Dependent Variable: GDP  
 Method: Least Squares  
 Date: 09/12/16 Time: 12:45  
 Sample: 1991 2015  
 Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.802494	1.281526	0.626202	0.5373
PEXP	0.001377	0.000428	3.218771	0.0038
R-squared	0.310562	Mean dependent var		4.124000
Adjusted R-squared	0.280586	S.D. dependent var		4.479609
S.E. of regression	3.799527	Akaike info criterion		5.584249
Sum squared resid	332.0374	Schwarz criterion		5.681759
Log likelihood	-67.80311	Hannan-Quinn criter.		5.611294
F-statistic	10.36049	Durbin-Watson stat		1.536474
Prob(F-statistic)	0.003804			

**Table 8.2 (Unit root test for Residuals)**

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.499095	Prob. F(2,21)	0.6141
Obs*R-squared	1.134401	Prob. Chi-Square(2)	0.5671

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 09/12/16 Time: 13:13

Sample: 1991 2015

Included observations: 25

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.065372	1.334186	0.048998	0.9614
PEXP	-3.36E-05	0.000455	-0.073847	0.9418
RESID(-1)	0.220199	0.220414	0.999022	0.3292
RESID(-2)	-0.039969	0.229930	-0.173831	0.8637

R-squared	0.045376	Mean dependent var	1.03E-15
Adjusted R-squared	-0.090999	S.D. dependent var	3.719528
S.E. of regression	3.885080	Akaike info criterion	5.697811
Sum squared resid	316.9708	Schwarz criterion	5.892831
Log likelihood	-67.22264	Hannan-Quinn criter.	5.751901
F-statistic	0.332730	Durbin-Watson stat	1.935285
Prob(F-statistic)	0.801767		

**Table 8.3 (Heteroscedasticity Test)**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

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F-statistic	0.736999	Prob. F(1,23)	0.3995
Obs*R-squared	0.776213	Prob. Chi-Square(1)	0.3783
Scaled explained SS	0.968565	Prob. Chi-Square(1)	0.3250

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Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 09/12/16 Time: 13:15

Sample: 1991 2015

Included observations: 25

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.73849	7.894109	2.373731	0.0263
PEXP	-0.002263	0.002636	-0.858486	0.3995

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R-squared	0.031049	Mean dependent var	13.28149
Adjusted R-squared	-0.011080	S.D. dependent var	23.27622
S.E. of regression	23.40481	Akaike info criterion	9.220379
Sum squared resid	12599.06	Schwarz criterion	9.317889
Log likelihood	-113.2547	Hannan-Quinn criter.	9.247424
F-statistic	0.736999	Durbin-Watson stat	1.656195
Prob(F-statistic)	0.399483		

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### Table 8.4 (ADF TEST GDP AT LEVEL)

Null Hypothesis: GDP has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.491269	0.5191
Test critical values:		
1% level	-3.769597	
5% level	-3.004861	
10% level	-2.642242	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(GDP)

Method: Least Squares

Date: 09/12/16 Time: 13:30

Sample (adjusted): 1994 2015

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.345986	0.232008	-1.491269	0.1532
D(GDP(-1))	-0.433745	0.231594	-1.872872	0.0774
D(GDP(-2))	-0.465855	0.196412	-2.371825	0.0291
C	2.157587	1.259390	1.713200	0.1038
R-squared	0.511126	Mean dependent var		0.331818
Adjusted R-squared	0.429647	S.D. dependent var		4.997941
S.E. of regression	3.774533	Akaike info criterion		5.657396
Sum squared resid	256.4477	Schwarz criterion		5.855767
Log likelihood	-58.23135	Hannan-Quinn criter.		5.704126
F-statistic	6.273091	Durbin-Watson stat		2.074021
Prob(F-statistic)	0.004203			

### Table 8.5 (ADF TEST GDP AT FIRST LEVEL)

Null Hypothesis: D(GDP) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	-7.128563	0.0000
Test critical values:		
1% level	-3.769597	
5% level	-3.004861	
10% level	-2.642242	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(GDP,2)

Method: Least Squares

Date: 09/12/16 Time: 13:30

Sample (adjusted): 1994 2015

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-2.231313	0.313010	-7.128563	0.0000
D(GDP(-1),2)	0.581222	0.186259	3.120498	0.0056
C	0.720019	0.836118	0.861145	0.3999
R-squared	0.805792	Mean dependent var		0.027273
Adjusted R-squared	0.785349	S.D. dependent var		8.405281
S.E. of regression	3.894204	Akaike info criterion		5.682979
Sum squared resid	288.1316	Schwarz criterion		5.831758
Log likelihood	-59.51277	Hannan-Quinn criter.		5.718027
F-statistic	39.41662	Durbin-Watson stat		2.163528
Prob(F-statistic)	0.000000			

### Table 8.6 (ADF TEST PEXP AT LEVEL)

Null Hypothesis: PEXP has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	-1.944685	0.6005
Test critical values:		
1% level	-4.394309	
5% level	-3.612199	
10% level	-3.243079	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(PEXP)

Method: Least Squares

Date: 09/12/16 Time: 13:45

Sample (adjusted): 1992 2015

Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PEXP(-1)	-0.207814	0.106863	-1.944685	0.0653
C	-169.0411	192.5313	-0.877993	0.3899
@TREND("1991")	65.47594	26.14976	2.503883	0.0206
R-squared	0.235058	Mean dependent var		175.0750
Adjusted R-squared	0.162207	S.D. dependent var		489.2860
S.E. of regression	447.8486	Akaike info criterion		15.16326
Sum squared resid	4211936.	Schwarz criterion		15.31051
Log likelihood	-178.9591	Hannan-Quinn criter.		15.20232
F-statistic	3.226539	Durbin-Watson stat		1.793189
Prob(F-statistic)	0.059992			



**Table 8.7 (ADF TEST PEXP AT FIRST DIFFERENCE)**

Null Hypothesis: D(PEXP) has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 4 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.711038	0.0467
Test critical values:		
1% level	-4.532598	
5% level	-3.673616	
10% level	-3.277364	

\*MacKinnon (1996) one-sided p-values.  
 Warning: Probabilities and critical values calculated for 20 observations  
 and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(PEXP,2)  
 Method: Least Squares  
 Date: 09/12/16 Time: 13:48  
 Sample (adjusted): 1997 2015  
 Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PEXP(-1))	-4.701002	1.266762	-3.711038	0.0030
D(PEXP(-1),2)	3.049617	1.016193	3.001021	0.0110
D(PEXP(-2),2)	2.289284	0.816537	2.803650	0.0159
D(PEXP(-3),2)	1.630692	0.592557	2.751955	0.0175
D(PEXP(-4),2)	0.532373	0.366115	1.454112	0.1716
C	-1329.557	523.3085	-2.540675	0.0259
@TREND("1991")	158.1706	50.88069	3.108657	0.0090
R-squared	0.743003	Mean dependent var		-34.29053
Adjusted R-squared	0.614504	S.D. dependent var		670.0471
S.E. of regression	416.0208	Akaike info criterion		15.17666
Sum squared resid	2076880.	Schwarz criterion		15.52461
Log likelihood	-137.1782	Hannan-Quinn criter.		15.23554
F-statistic	5.782190	Durbin-Watson stat		1.706096
Prob(F-statistic)	0.004913			

**Table 8.8 (ECM)**

Dependent Variable: D(GDP)  
 Method: Least Squares  
 Date: 09/12/16 Time: 15:10  
 Sample (adjusted): 1992 2015  
 Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.268099	0.799652	-0.335270	0.7407
DPEXP	0.003554	0.001617	2.198339	0.0393
U(-1)	-0.861278	0.210772	-4.086296	0.0005
R-squared	0.463950	Mean dependent var		0.254167
Adjusted R-squared	0.412897	S.D. dependent var		4.793925
S.E. of regression	3.673231	Akaike info criterion		5.556489
Sum squared resid	283.3452	Schwarz criterion		5.703746
Log likelihood	-63.67787	Hannan-Quinn criter.		5.595556
F-statistic	9.087719	Durbin-Watson stat		1.876175
Prob(F-statistic)	0.001434			

**Table 8.9 (ECM Residual Diagnostic Test – Serial Correlation)**

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.360604	Prob. F(2,19)	0.7019
Obs*R-squared	0.877683	Prob. Chi-Square(2)	0.6448

Test Equation:

Dependent Variable: RESID  
 Method: Least Squares  
 Date: 09/12/16 Time: 15:25  
 Sample: 1992 2015  
 Included observations: 24  
 Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.024719	0.826278	-0.029916	0.9764
DPEXP	0.000376	0.001727	0.217736	0.8300
U(-1)	-0.332074	0.654973	-0.507004	0.6180
RESID(-1)	0.389160	0.678281	0.573744	0.5729
RESID(-2)	-0.096010	0.255344	-0.376003	0.7111
R-squared	0.036570	Mean dependent var		1.18E-16
Adjusted R-squared	-0.166257	S.D. dependent var		3.509894
S.E. of regression	3.790453	Akaike info criterion		5.685900
Sum squared resid	272.9832	Schwarz criterion		5.931328
Log likelihood	-63.23080	Hannan-Quinn criter.		5.751012
F-statistic	0.180302	Durbin-Watson stat		1.948248
Prob(F-statistic)	0.945786			

**Table 8.10 (ECM Residual Diagnostic Test – Heteroscedasticity)**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.441970	Prob. F(2,21)	0.6486
Obs*R-squared	0.969412	Prob. Chi-Square(2)	0.6159
Scaled explained SS	1.632564	Prob. Chi-Square(2)	0.4421

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 09/12/16 Time: 15:27

Sample: 1992 2015

Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.04823	5.645317	2.311337	0.0311
DPEXP	-0.007875	0.011413	-0.689996	0.4978
U(-1)	1.176731	1.487993	0.790818	0.4379
R-squared	0.040392	Mean dependent var		11.80605
Adjusted R-squared	-0.050999	S.D. dependent var		25.29498
S.E. of regression	25.93197	Akaike info criterion		9.465298
Sum squared resid	14121.80	Schwarz criterion		9.612555
Log likelihood	-110.5836	Hannan-Quinn criter.		9.504366
F-statistic	0.441970	Durbin-Watson stat		1.627666
Prob(F-statistic)	0.648612			

**Table 8.11 (ARDL MODEL)**

Dependent Variable: GDP

Method: ARDL

Date: 09/12/16 Time: 15:31

Sample (adjusted): 1992 2015

Included observations: 24 after adjustments

Maximum dependent lags: 2 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (2 lags, automatic): PEXP

Fixed regressors: C

Number of models evaluated: 6

Selected Model: ARDL(1, 1)

Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	0.144930	0.213504	0.678814	0.5050
PEXP	0.003634	0.001640	2.215733	0.0385
PEXP(-1)	-0.002775	0.001689	-1.642372	0.1161
C	1.129890	1.290830	0.875320	0.3918
R-squared	0.398202	Mean dependent var		4.316667
Adjusted R-squared	0.307932	S.D. dependent var		4.468894
S.E. of regression	3.717701	Akaike info criterion		5.615100
Sum squared resid	276.4260	Schwarz criterion		5.811442
Log likelihood	-63.38120	Hannan-Quinn criter.		5.667189
F-statistic	4.411243	Durbin-Watson stat		1.924295
Prob(F-statistic)	0.015492			

\*Note: p-values and any subsequent tests do not account for model selection.

**Table 8.12 (ARDL Co-integration and Long Run Model)**

ARDL Cointegrating And Long Run Form  
Original dep. variable: GDP  
Selected Model: ARDL(1, 1)  
Date: 09/12/16 Time: 15:32  
Sample: 1991 2015  
Included observations: 24

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Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PEXP)	0.003634	0.001478	2.458471	0.0232
CointEq(-1)	-0.855070	0.198843	-4.300233	0.0003

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Cointeq = GDP - (0.0010\*PEXP + 1.3214 )

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Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PEXP	0.001005	0.000538	1.868160	0.0765
C	1.321400	1.524339	0.866867	0.3963

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**Table 8.13 (ARDL Residual Diagnostic Test – Serial Correlation)**

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.236483	Prob. F(2,18)	0.7918
Obs*R-squared	0.614475	Prob. Chi-Square(2)	0.7355

Test Equation:

Dependent Variable: RESID

Method: ARDL

Date: 09/12/16 Time: 15:34

Sample: 1992 2015

Included observations: 24

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.096078	0.717825	-0.133846	0.8950
PEXP	0.000287	0.001760	0.163012	0.8723
PEXP(-1)	-0.000131	0.001991	-0.065882	0.9482
C	-0.011030	1.400013	-0.007878	0.9938
RESID(-1)	0.131964	0.753918	0.175038	0.8630
RESID(-2)	-0.142097	0.271075	-0.524197	0.6065
R-squared	0.025603	Mean dependent var	6.29E-16	
Adjusted R-squared	-0.245063	S.D. dependent var	3.466774	
S.E. of regression	3.868309	Akaike info criterion	5.755830	
Sum squared resid	269.3486	Schwarz criterion	6.050343	
Log likelihood	-63.06996	Hannan-Quinn criter.	5.833964	
F-statistic	0.094593	Durbin-Watson stat	1.948475	
Prob(F-statistic)	0.991957			

**Table 8.14 (ARDL Residual Diagnostic Test – Heteroscedasticity)**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.603681	Prob. F(3,20)	0.6202
Obs*R-squared	1.992798	Prob. Chi-Square(3)	0.5739
Scaled explained SS	3.593674	Prob. Chi-Square(3)	0.3088

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 09/12/16 Time: 15:35

Sample: 1992 2015

Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.82147	9.560125	1.759545	0.0938
GDP(-1)	1.524394	1.581253	0.964042	0.3465
PEXP	-0.010863	0.012148	-0.894268	0.3818
PEXP(-1)	0.006660	0.012513	0.532229	0.6004

R-squared	0.083033	Mean dependent var	11.51775
Adjusted R-squared	-0.054512	S.D. dependent var	26.81287
S.E. of regression	27.53398	Akaike info criterion	9.619731
Sum squared resid	15162.40	Schwarz criterion	9.816073
Log likelihood	-111.4368	Hannan-Quinn criter.	9.671820
F-statistic	0.603681	Durbin-Watson stat	1.626803
Prob(F-statistic)	0.620209		

### Table 8.15 (Causality Test)

Pairwise Granger Causality Tests  
 Date: 09/12/16 Time: 15:51  
 Sample: 1991 2015  
 Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PEXP does not Granger Cause GDP	23	0.56969	0.5756
GDP does not Granger Cause PEXP		1.25488	0.3089

Pairwise Granger Causality Tests  
 Date: 09/12/16 Time: 15:50  
 Sample: 1991 2015  
 Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PEXP does not Granger Cause GDP	22	0.44513	0.7243
GDP does not Granger Cause PEXP		1.80581	0.1893

Pairwise Granger Causality Tests  
 Date: 09/12/16 Time: 15:49  
 Sample: 1991 2015  
 Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PEXP does not Granger Cause GDP	21	1.69642	0.2152
GDP does not Granger Cause PEXP		1.72098	0.2099

Pairwise Granger Causality Tests  
 Date: 09/12/16 Time: 15:49  
 Sample: 1991 2015  
 Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PEXP does not Granger Cause GDP	20	2.63575	0.0979
GDP does not Granger Cause PEXP		2.03584	0.1670

Pairwise Granger Causality Tests  
 Date: 09/12/16 Time: 15:48  
 Sample: 1991 2015  
 Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PEXP does not Granger Cause GDP	19	10.3461	0.0060
GDP does not Granger Cause PEXP		1.93783	0.2204



Pairwise Granger Causality Tests

Date: 09/12/16 Time: 15:46

Sample: 1991 2015

Lags: 7

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Null Hypothesis:	Obs	F-Statistic	Prob.
PEXP does not Granger Cause GDP	18	6.20288	0.0809
GDP does not Granger Cause PEXP		0.66617	0.7045

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**Table 8.16 (Research raw data)**

Years	GDP	PEXP (USD)	PEXP (ZMW)	Echange Rate
1991	0	1,303.38	84.72	0.065
1992	-1.7	909.30	156.40	0.172
1993	6.8	693.73	314.26	0.453
1994	-8.6	1,236.17	827.00	0.669
1995	-2.8	1,155.50	998.35	0.864
1996	7.0	1,045.27	1,264.78	1.21
1997	3.3	1,126.53	1,475.75	1.31
1998	-1.9	989.78	1,841.00	1.86
1999	2.2	918.41	2,195.00	2.39
2000	3.5	977.49	3,040.00	3.11
2001	5.0	1,166.76	4,212.00	3.61
2002	4.2	1,175.45	5,172.00	4.4
2003	5.1	1,339.53	6,336.00	4.73
2004	5.4	1,447.49	6,919.00	4.78
2005	7.2	1,871.75	8,348.00	4.46
2006	7.9	2,514.17	9,051.00	3.6
2007	8.4	2,801.75	11,207.00	4.0
2008	7.8	3,482.67	13,060.00	3.75
2009	9.2	2,742.08	13,847.50	5.05
2010	10.3	3,673.83	17,634.40	4.8
2011	6.3	4,606.15	22,385.90	4.86
2012	6.7	5,078.10	26,152.22	5.15
2013	6.7	6,257.43	33,790.13	5.4
2014	5.6	6,266.93	38,541.64	6.15
2015	3.6	5,505.18	47,509.70	8.63